

THE TOWN OF ERVING LOCAL NATURAL HAZARDS MITIGATION PLAN



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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, and other disasters. Mitigation efforts undertaken by communities will help to minimize damage to buildings and infrastructure, such as water supplies, sewers, and utility transmission lines, as well as natural, cultural and historic resources.

Planning efforts, like the one undertaken by the Town of Erving and the Franklin Regional Council of Governments, 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 Hazard 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. Many disaster assistance agencies and programs, including FEMA, require that a community adopt a pre-disaster mitigation plan as a condition for both mitigation funding and disaster relief funding. For example, the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA) and the Community Rating System (CRS), are programs with this requirement.

PLANNING PROCESS

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

- Identifying the natural hazards that may impact the community, and past occurrences of hazards at the local or regional level.
- Conducting a Vulnerability/Risk Assessment to identify the infrastructure (i.e., critical facilities, public buildings, roads, homes, businesses, etc.) at the highest risk for being damaged by the identified natural hazards, particularly flooding.
- Identifying and assessing the policies, programs, and regulations a community is currently implementing to protect against future disaster damages. Examples of such strategies include:

- Preventing or limiting development in natural hazard areas like floodplains, wetlands, drinking water recharge areas, and conservation land;
 - Implementing recommendations in existing planning documents including Stormwater Management Plans, Master Plans, Open Space and Recreation Plans, and Emergency/Evacuation Plans that address the impacts of natural hazards; and
 - Requiring or encouraging the use of specific structural requirements for new buildings such as buried utilities, flood-proofed structures, and lightning grounding systems.
- Identifying deficiencies in the current strategies and establishing goals for updating, revising or adopting new strategies.
 - Identifying specific projects that will mitigate the risk to public safety and damages to infrastructure from natural hazards.
 - Adopting and implementing the final Local Natural Hazards Mitigation Plan.

The planning process for the Town of Erving also incorporated the following procedures:

- Providing an opportunity for the public to comment on the plan during the drafting and prior to the approval of the plan. Publicity was done with a press release in the Greenfield Recorder in January 2011 as well as through flyers posted in town throughout the planning process. A copy of the draft plan was available to the public at the Town Hall. Three Public Meetings were held – one each on November 17, 2010, February 9, 2011, and March 2, 2011.
- Providing an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities and agencies that have the authority to regulate development, and businesses, academia and other private and nonprofit organizations to be involved in the planning process by publicizing the planning process. Most notable in involving other entities in the planning process was meeting attendance by FirstLight Power's Northfield Mountain Pumped Storage Facility (Northfield Mountain Facility).
- Reviewing and incorporating, if appropriate, existing plans, studies, reports and technical information. Plans reviewed and incorporated include the 2010 Erving Comprehensive Emergency Management Plan, the 2010 Erving Open Space and Recreation Plan, and data sources cited in footnotes throughout this Plan.
- Documenting the planning process, including how it was prepared, and how the public was involved.

Much of this work was carried out by the staff of the FRCOG Planning Department with the assistance of the Erving Natural Hazards Mitigation Planning Committee, which includes representatives of the Police Department, Fire Department, Highway Department, Northfield Mountain Facility, and the Town Administrator. Meeting minutes, sign in sheets and other correspondence are located in the appendix of this document.

2 – LOCAL PROFILE¹

COMMUNITY SETTING

Geographically, Erving has the smallest land area of the Franklin County towns, with 9194 acres, and was also the last Town to be settled and incorporated. There are three village population centers in Erving: Ervingside, Farley and Erving Center. The current population for the Town is estimated to be 1,549.² Located in the eastern part of the county, Erving is believed to have been part of the original Mohawk Trail. Approximately 83 percent of the Town is forested³, including the 2,524 acres of the Erving State Forest.

European settlement may have taken place as early as 1500. However, Erving's steeply sloped hills and the scarcity of good agricultural soil limited interest in the Town until the early part of the 19th Century, when the construction of a turnpike encouraged settlement. The Town was officially incorporated in 1838.

Unlike some of its Franklin County neighbors, Erving did not develop primarily as a farming community. Instead, the Town's plentiful forests and proximity to the Connecticut and Millers rivers supported a manufacturing and forestry-based economy. In the mid-nineteenth century, the addition of rail service coupled with the Town's water and lumber resources offered Erving opportunities to expand industry. Soon, woodworking and furniture businesses began to develop in the Town, followed by the emergence of paper mills.

During the Late Industrial Period of the late 19th and early 20th centuries, Erving's population grew by over 100 percent. By 1998, over half of the Town's jobs were in the manufacturing sector. In recent years, a combination of layoffs and plant closures have been responsible for the loss of hundreds of manufacturing jobs. Manufacturing still accounts for the majority of employment within the Town, although only 15 percent of workers living in Erving are employed in the Town⁴.

The presence of the Northfield Mountain Pumped Storage Project in Erving affords residents and business owners some of the lowest tax rates in the state⁵ and provides approximately 90 percent of the Town's tax base. The project was built in the 1960s and serves as a major generator of electrical power.

¹ The majority of the information for this section was obtained from the Town of Erving's 2002 Master Plan, which was prepared by the Erving Master Planning Committee and the Franklin Regional Council of Governments Planning Department, and the 2010 Town of Erving Open Space and Recreation Plan, prepared by the Erving Open Space Planning Committee and the Franklin Regional Council of Governments Planning Department.

² 2009 U.S. Census Population Estimates Program.

³ 2005 MassGIS Land Use data.

⁴ 2000 U.S. Census of Population and Housing.

⁵ The 2010 residential tax rate is the 29th lowest out of 351 cities and towns in the state at \$7.01/\$1,000. The 2010 commercial tax rate is \$12.14/\$1,000.

INFRASTRUCTURE

Erving's road infrastructure is crucial to the Town. According to the 2000 U.S. Census, 94% of Erving's adult workers commute to work using a car, truck or van. Safety has been a concern along Route 2 – the primary transportation route through the Town - for many years and there are a number of major projects underway to address concerns within the Town of Erving. According to the 2010 Regional Transportation Plan, construction projects are anticipated to be ongoing on Route 2 for at least the next 10 years. MassDOT construction schedules and associated alternate routes should be taken into account when emergency management personnel formulate evacuation plans.

Roads and Highways

Route 2 is the primary east-west highway across the northern half of the state, and serves as the only direct east-west route through the Town. Route 63 passes through the western side of Erving as it travels north from Montague to Northfield. The closest access to I-91, Franklin County's major north/south route, is in Greenfield.

About 7 miles (13 percent) of Erving's roads are gravel. The Town has a total of 51 miles of roads⁶.

Rail

Railroads, which first came to Erving in the mid- 1800s, have played an active role in the Town's economic and social activities. The rail line was instrumental in the development of the manufacturing industries in Erving.

At present, the Town is served by two freight rail lines. Guilford Rail Systems operates an east-west line, which runs along the Millers River. The New England Central Railroad (NECR) runs north-south on the western side of Town, parallel to Route 63.

Passenger rail service was discontinued in 1967. Amtrak's Vermonter line currently runs through the Town twice daily without stopping. A project to reroute the line to the west is currently underway, and will add a stop in Greenfield while discontinuing use of the NECR tracks through Erving.

Public Transportation

Erving's public transportation is limited. The Franklin Regional Transit Authority (FRTA) operates a weekday bus route from Greenfield to Athol which makes two scheduled stops in Erving during each of its seven daily runs. These stops are at the French King Entertainment Center and Erving Center. The FRTA also has weekly demand response door-to-door transit service for seniors and the disabled for a small fee.

The Franklin County Bikeway is a project under implementation by the Franklin Regional Council of Governments with the aim to provide a biking network throughout Franklin County, linking employment, recreational, and educational destinations. The Bikeway includes "The

⁶ Massachusetts Department of Transportation, 2007.

Northfield Connector”, which follows Dorsey Road along the western border of Erving. This portion of the bikeway utilizes shared roadway and provides a link to the Northfield Mountain Recreation Center. Future plans for expanding the network through Erving are in preliminary stages, including a proposed route that would connect Erving’s village centers with the town of Wendell to the south. Safety issues on Route 2 have led to the identification of a number of possible alternatives for bicyclists and pedestrians in Erving. These potential connections are being explored as safer alternatives to travel along Route 2.

Public Drinking Water Supply

The Department of Environmental Protection identifies eleven public water supply systems in the Town of Erving, two of which are community systems⁷.

The Erving Water Department serves residents and businesses in the Ervingside area of Town. Other parts of Erving, including Farley and Erving Center, are served by individual wells. The Town’s water supply is currently more than adequate to meet demand. The Town’s average annual daily use is approximately sixty-one thousand gallons daily. The Town has two interconnections with the Turners Falls Fire District, allowing for emergency short-term backup.

Sewer Service

Public sewer service in Erving is limited. Erving Center, Farley Center and Ervingside areas of Town are served by publicly owned treatment works. All three facilities discharge treated wastewater into the Millers River. The three plants are well within their design limits and permits and the Town has excess capacity. The availability of sewage treatment capacity may make it possible to accommodate new development as infill in the areas served.

NATURAL RESOURCES

According to the Town of Erving 2010 Open Space and Recreation Plan, the Town’s land falls into two separate and distinct types of landscape: “riparian corridors with either steep banks or sloping sand flats and mountain ridges with their associated slopes, hills ridgelines and plateaus.”

As stated before, Erving’s natural features were key in guiding its development. The Millers River is ideal for dam and mill construction and the mountainous topography of the Town (several mountains within Erving are over 1,000 feet high) has limited development and helped to maintain the quality of natural resources.

Water Resources

Erving lies in the watersheds of both the Connecticut and Millers rivers, although the majority of the Town (75.8 percent) is within the latter watershed. Numerous feeder brooks drain into the river from the uplands of the Town. Erving has about 505 acres of forested and nonforested

⁷ The Erving Water Department and Weatherheads are community water supply systems. The DCR Erving State Forest, Erving Town Offices, Box Car Restaurant, French King Motor Inn, Freight House Antiques, Copper Angel, Buck Run, and Charles F. Zalinski Memorial Field are non-community public water systems and the Erving Paper Mills are non-transient, non-community. As is shown on the Critical Facilities, Infrastructure, 2005 Land Use & Natural Hazards Map for the Town of Erving, some systems can have more than one source.

wetlands and surface water according to 2005 MassGIS Land Use data. The rivers and wetlands in Erving are buffered in accordance with the Massachusetts Wetlands Protection Act. The Connecticut and Millers rivers are supportive of recreational use, although consumption of fish from the Millers River, and consumption of certain species of fish from the Connecticut River, is not advisable.

In addition to the Connecticut and Millers rivers, there are numerous streams and brooks in Erving, which drain from the slopes of Poplar and Northfield mountains. The Millers River has six main feeder streams, which include Schoolhouse Brook, Briggs Brook, Packard Brook, Jacks Brook, Keyup Brook and the stream that drains from Spruce Swamp.

Forests

Forests constitute the most abundant and one of the most important natural resources in the Town of Erving. These forests, including many large tracts of uninhabited or roadless land, provide Erving its rugged and rural character. According to the 2005 MassGIS Land Use data, Erving has approximately 7,648 acres of forest, comprising 83 percent of the Town's total land. Thirty-seven percent, or 2,806 acres, of forest in Erving are permanently protected from development, including 2,524 acres of the Erving State Forest. The Department of Conservation and Recreation (DCR) manages Erving State Forest for recreation, forest products and wildlife habitat protection. It is one of the most popular recreation and wilderness areas used by residents of Erving and surrounding towns.

Northfield Mountain Facility owns approximately 1,758 acres of unprotected open space in Erving, including some of the more remote and scenic ridge lands in Town. This area is comprised of the Northfield Mountain Reservoir and the Northfield Mountain Environmental and Recreation Center. Roughly 800 acres are developed for recreation, approximately 600 acres are in undeveloped recreation, and the Reservoir itself is comprised of 342 acres.

Large blocks of contiguous forestland such as those in Erving are important resources for several reasons. They represent an area with a low degree of fragmentation. Wildlife species that require a certain amount of deep forest cover separate from people's daily activities tend to migrate out of fragmenting landscapes. New frontage lots and subdivisions can often result in a widening of human activity, an increase in the populations of plants and animals that thrive alongside humans (i.e. raccoons and squirrels) and a reduction in the species that have larger home ranges and unique habitat needs. Large blocks of forest provide clean water, air, and healthy wildlife populations.

CULTURAL AND HISTORIC RESOURCES

The importance of integrating cultural resource and historic property considerations into hazard mitigation planning is demonstrated by disasters that have occurred in recent years, such as the Northridge earthquake in California, Hurricane Katrina in New Orleans, or floods in the Midwest. The effects of a disaster can be extensive—from human casualty to property and crop damage to the disruption of governmental, social, and economic activity. Often not measured, however, are the possibly devastating impacts of disasters on historic properties and cultural resources. Historic structures, artwork, monuments, family heirlooms, and historic documents

are often irreplaceable, and may be lost forever in a disaster if not considered in the mitigation planning process. The loss of these resources is all the more painful and ironic considering how often residents rely on their presence after a disaster, to reinforce connections with neighbors and the larger community, and to seek comfort in the aftermath of a disaster.⁸

Historic properties and cultural resources can be important economic assets, often increasing property values and attracting businesses and tourists to a community. While preservation of historic and cultural assets can require funding, it can also stimulate economic development and revitalization. Hazard mitigation planning can help forecast and plan for the protection of historic properties and cultural resources.

Cultural and historic resources help define the character of a community and reflect its past. These resources may be vulnerable to natural hazards due to their location in a potential hazard area, such as a river corridor, or because of old or unstable structures. The Committee identified the Erving Public Library, the Senior Center, the Pearl B. Care Building, and the Boxcar Restaurant as some significant cultural and/or historic resources.

The 2010 Erving Comprehensive Emergency Management (CEM) Plan identifies cultural resources in Erving, some of which contain historic documents and cultural artifacts (Table 2-1).

Table 2-1: 2010 Erving CEM Plan Cultural Resources

Resource Name	Resource Location	Resource Type	Materials Contained
Congregational Church	4 East Main Street	Historical Building	Archives
Erving Public Library	17 Moore Street	Library	
Erving Senior Center	18 Pleasant Street	Historical Building	
Holton Cemetery	Old State Road	Cemetery	
Pearl B. Care Homestead Old Fire House	Route 2 and Arch St.	Historical Building	Archives, Museum artifacts

Source: 2010 Erving CEM Plan

The Massachusetts Cultural Resource Information System (MACRIS)⁹ lists a total of 88 areas, buildings, burial grounds, objects, and structures of cultural and/or historic significance in Erving. Some of these include Erving United Church of Christ on East Main Street, Guildford Industries Freight House and the Erving Depot Railroad Station on Main Street, and the Farley Hotel on Old State Road. Designation on this list does not provide any protective measures for the historic resources but designated sites may qualify for federal and state funding if damaged during a natural or manmade hazard. A building of particular historic interest in Erving is the Pearl B. Care building, which was recently renovated and could potentially be impacted by flooding. The Committee has expressed interest in pursuing funding to flood-proof the structure.

⁸ Integrating Historic Property and Cultural Resource Considerations Into Hazard Mitigation Planning, State and Local Mitigation Planning How-To Guide, FEMA 386-6 / May 2005.

⁹ <http://mhc-macris.net/Results.aspx>

3 – RISK ASSESSMENT

NATURAL HAZARD IDENTIFICATION AND PROFILE

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

Floods

General Description

The average annual precipitation for Erving and surrounding areas in northwestern Massachusetts is 44 inches.¹⁰ There are three major types of storms that bring precipitation to Erving. 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. The second major storm type are coastal storms. There are two kinds that bring major precipitation and wind – nor'easters and hurricanes. Nor'easters bring heavy rain, high winds, ice storms or blizzards into New England from the coast of Maine and Canada. In late summer or early fall, hurricanes may reach Massachusetts from the south 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 are 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. Since the Town is located at the confluence of two rivers, Erving has also experienced what is known locally as *backwater flooding* due to ice jams on the Connecticut and Millers rivers.¹¹ 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.

¹⁰ Massachusetts Department of Conservation and Recreation 2009 precipitation data, <http://www.mass.gov/dcr/watersupply/rainfall/index.htm>.

¹¹ According to the state MEMA maps, there was a historic ice jam on the Millers River in Erving. Its type is classified as “unknown.”

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.

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 is a natural occurrence, past and current development and alteration of these areas will result in flooding that is a costly and frequent hazard.

Location and Extent

In Erving, the 100-year floodplain covers about 210 acres, or approximately two percent of the town, including an estimated one acre of developed residential land. In addition to the 100-year floodplain, there are a number of feeder brooks in Erving with the potential to cause localized flooding. Key areas of concern include:

Keyup Brook

This brook runs through the center of the Erving Center section of Town. There is periodic localized flooding where the brook intersects Laurel Lake Road and where it runs into the Millers River. In past years, heavy spring runoff has flooded the area of Hanson Court. In 1986, the brook swelled over its banks causing a small shed to be carried by the current and smashed into the East Main Street Bridge over Route 2. This same event washed out parts of North Street. Total monetary damages associated with the 1986 event are unknown. In 2000, a Keyup Brook flood ripped a breezeway from its house. The occupants of the house required evacuation. The same flooding required the removal of a propane tank at risk of damage from the flood. The total estimated costs incurred as a result of that flooding are unknown.

An historically significant structure, the Pearl B. Care building lies within the potential flooding area of Keyup Brook. The structure, formerly the fire station, was beautifully restored in 2010 and contains historically significant artifacts. Flood proofing the structure is of high interest to the Committee.

A sewer pipe, installed in 1998, runs under the Keyup Brook near Route 2 and could potentially be impacted by flooding. Route 2 runs over the Keyup Brook. With past riverbank stabilization projects failing, dense brush and trees growing near that bridge are beginning to cause some accumulation of debris in the brook during flooding events. Continued accumulation could potentially cause localized backup and flooding.

Krusiewick Pond Dam (also known as Pete's Pond Dam)

This dam is located off Swamp Road and is owned by a private party living on North Street. The pond was historically used as an ice pond. It now contains high levels of silt. During heavy rains, the water regularly overflows the pond, circumventing the dam entirely. If the dam gave way altogether, Keyup Brook would flood local residences.

West Main Street

In the spring of 2004, floodwaters by the underpass and turnout west of Town came to within a foot of the edge of Route 2.

The River Street area in Erving

The Committee identified the area where the Millers River bends northwest near the wastewater treatment plant in Erving as having chronic flooding issues and as being a potential site for serious flood damage, given the more densely populated nature of that area. Erving also encompasses the Town's wellhead protection area.

Potential Mitigation Measures for Floods

Some potential projects to help mitigate the effects of flooding include:

- Flood-proofing the Pearl B. Care building, an historically significant structure containing important artifacts and at potential risk of flooding from Keyup Brook.
- Riverbank stabilization and tree removal and trimming on Keyup Brook to prevent accumulation of debris and potential localized flooding. This activity would have to be approved and permitted by the Conservation Commission.

Severe Snowstorms/Ice Storms

General Description

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.

Location and Extent

Franklin County regularly experiences severe winter storm events between the months of December and April. According to the National Climatic Data Center (NCDC), there have been a total of 111 snow and ice events reported in Franklin County between February 1, 1993 and February 26, 2010, including heavy snow, snow, ice storms, snow squalls, freezing rain and

winter storms.¹² The NCDC web site has more detailed information about each of the listed storms. Seven out of the 111 snow and ice events that impacted Franklin County (as well as other areas of Massachusetts) resulted in Presidential Disaster Declarations or Emergency Declarations, which then made the state, residents and businesses eligible for federal disaster relief funds. Table 3-1 lists the 7 recent severe winter disasters that have led to Presidential Disaster or Emergency Declarations in Massachusetts.

Table 3-1: Major Disaster and Emergency Declarations in Massachusetts, 1993 - 2009

Disaster Name	Date of Event	Declared Areas	Disaster #/Type of Assistance	Federal Share Disbursed	Non-Federal Share Disbursed	Total Disbursement
Blizzards, High Winds and Record Snowfall	March 1993	All 14 Counties	FEMA-3103-EM (PA)	\$1,284,873	\$183,649	\$1,468,522
Blizzard	January 1996	All 14 Counties	FEMA-1090-EM (PA)	\$16,177,860		\$16,177,860
Snowstorm	March 2001	Counties of Berkshire, Essex, Franklin, Hampshire, Middlesex, Norfolk, and Worcester. The cost share is 75% federal and 25% local.	FEMA-3165-EM (PA)	\$21,065,441		\$21,065,441
Snowstorm	February 2003	All 14 Counties. The cost share is 75% federal and 25% local.	FEMA-3175-EM (PA)	\$28,868,815		\$28,868,815
Snowstorm	December 2003	Counties of Barnstable, Berkshire, Bristol, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Plymouth, Suffolk, and Worcester	FEMA-3191-EM (PA)	\$35,683,865		\$35,683,865
Snowstorm	January 2005	All 14 Counties	FEMA-3201-EM (PA)	\$49,945,087		\$49,945,087
Severe Winter Storm	December 2008	Berkshire, Bristol, Essex, Franklin, Hampden, Hampshire, Middlesex, Suffolk, and Worcester *(Figure as of 9/8/2009)	FEMA-3296-EM-MA	\$66,509,713		
Severe Storms and Flooding	December 2008	All 14 Counties (6 month lock-in \$7,200,000)	FEMA-1813-DR-MA(PA)			

Notes: **Public Assistance (PA) Project grants.** Supplemental disaster assistance to states, local governments, certain private non-profit organizations resulting from declared major disasters or emergencies.

Although ice storms occur much less frequently than snow storms (4 out of 111 in the NCDC database), the effects can be devastating. On December 11, 2008, Franklin County residents awoke to a landscape coated with ice. Half an inch of ice accumulated on exposed surfaces across Franklin County. This major ice storm affected interior Massachusetts and southern New

¹² <http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~storms>

Hampshire as well as much of northern New England. The ice buildup on exposed surfaces combined with breezy conditions resulted in numerous downed trees, branches, and power lines, which resulted in widespread power outages. More than 300,000 customers were reportedly without power in Massachusetts and an additional 300,000 were without power in the state of New Hampshire. Because of the breadth of this storm (from Pennsylvania to Maine), extra crews to reinstate power were harder to come by. Power crews from states as far away as South Carolina, as well as local National Guard teams, were called out to help with power restoration and clean up. While most people had their power restored within a week, others were still without power at Christmas (nearly 2 weeks later).

During this period, temperatures were mostly below normal and at least one major snowstorm affected the same area. At the time of the December 19th snowstorm, which dumped 7 – 12 inches of snow in eastern Franklin County and 9 – 14 inches of snow in western part of the county, over 100,000 customers were still without power in the two states combined. Two days later, on December 21st, 5 – 7 inches of new snow blanketed eastern Franklin County.

In Erving, this storm packed a punch for some residents, particularly those on Mountain Road, who were without power for seven days. The town center suffered a 12-hour power outage. Shelters were opened, with roughly 100 people utilizing them during the storm. The Erving Fire Department supplied water and meals to the shelter. The effects of this ice storm remain, with much built-up fire load in the form of dead trees and limbs accumulated on forest floors. These conditions, combined with any future drought conditions, could potentially contribute to increased wildfires.

Potential Mitigation Measures for Severe Snowstorms/Ice Storms

A potential project relating to mitigating the effects of snow and ice events (and all hazards where shelters could be utilized) is:

- Assess the need for and locate a shelter in an area of town located further away from the two primary existing shelters, the Senior Center and Erving Elementary School, which are located nearby one another. If these shelters were rendered unusable due to a hazard occurring in the immediate area, a backup shelter in a separate location would be valuable.

Hurricanes

General Description

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. August, September, and the first half of October are when most hurricanes occur in New England. In Massachusetts, major hurricanes occurred in 1904, 1938, 1954, 1955, 1960, 1976, 1985, and 1991. The last hurricane to make landfall in New England was Hurricane Bob, a weak category 2 hurricane, in August 1991. In Franklin County, Hurricane Bob caused roughly \$5,555,556 in property and crop damages.¹³

¹³ Spatial Hazard Events and Losses Database (SHELDUS), <http://webra.cas.sc.edu/hvri/>

Tropical storms, defined as having sustained winds from 34-73 mph, have also resulted in high winds and damages in Franklin County. Between 1990 and 2008, 16 tropical storms impacted the County, causing almost \$600,000 in property damages.¹⁴ No significant damage was reported in Erving due to any hurricane events.

Location and Extent

While there have been no reports of hurricane events in Erving, the Committee estimates a hurricane could have a large area of occurrence (more than 50% of the town) and could have a critical impact with multiple injuries possible and a potential of more than 25% of property in affected area damaged or destroyed. A potential complete shutdown of facilities for more than 1 week is also possible. See Table 3-1.

Tornadoes

General Description

Tornadoes are swirling columns of air that typically form in the spring and summer during severe thunderstorm events. In a relatively short period of time and with little or no advance warning, a tornado can attain rotational wind speeds in excess of 250 miles per hour and can cause severe devastation along a path that ranges from a few dozen yards to over a mile in width. The path of a tornado may be hard to predict because they can stall or change direction abruptly. Within Massachusetts, tornadoes have occurred most frequently in Worcester County and in communities west of Worcester, including towns in eastern Franklin County.

On July 11, 1958, a tornado was reported in Erving and was ranked F2 (Significant Tornado) on the Fujita Scale of Tornado Intensity. The tornado touched down on the Connecticut River in an uninhabited area near Warner Road in Erving. The extent of damage it caused is unknown. 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 over twenty tornadoes in Franklin County. In the last fifteen years, three tornadoes have been reported in Franklin County, in the towns of Heath, Charlemont, and Wendell. The July 2006 tornado in Wendell was rated F2 (Strong) on the Fujita Scale with winds estimated near 155 mph.¹⁵

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.¹⁶ According to data supplied by the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center, between May 1996-April 2010, the Town experienced four microburst (or "thunderstorm wind") events. In June 2008, one of these events caused \$3,000 in property damages. Winds caused tree limbs to break, including one that struck an 81 year old woman who subsequently died from the injury. On May 26, 2010, strong thunderstorm winds caused damages throughout the Connecticut River Valley with numerous trees and wires down and widespread power outages.

¹⁴ Ibid.

¹⁵ NOAA National Climate Data Center, <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

¹⁶ <http://www.fema.gov/regions/vii/2003/03r7n06a.shtm>

Location and Extent

Compared with other Franklin County towns, damages in general to Erving due to tropical storm type events are relatively low. According to members of the Committee, long-time residents of Erving refer to living in “the bowl”. This bowl effect is a sheltering of the Town on all sides by mountain ridgelines, offering the Town some protection from storms. However, in evaluating the possible location and extent of a potential tropical storm, the Committee estimated a potential 10 to 50% of the town could be impacted with limited injuries and damages.

Wildland Fires/Brushfires

General Description

According to FEMA, there are three different classes of wildland fires: *surface fires*, *ground fires* and *crown fires*.¹⁷ 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 Erving, 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.

Location and Extent

Between 2004 and 2009, ten (10) brushfires were reported in Erving.¹⁸ Erving has approximately 7,648 acres of forests, and is therefore at risk of fire. In October 2001, 140 acres of Hermit Mountain burned. Fire control efforts extended over a week and required three days of assistance from two helicopters from the Air National Guard Station at Westover Reserve Air Base in Chicopee, Massachusetts.

Brushfires in 2010 included three events. Two were relatively insignificant, with areas under 2 acres. The third occurred on Horse Hill in the Erving State Forest and encompassed a 50-acre area. Caused by dry lightning, the extermination of this fire required the assistance of nearby towns. An accumulation of dead trees and limbs from the 2008 ice storm contributed fuel to the fire.

Dam Failure

General Description

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

¹⁷ FEMA, “Fact Sheet: Wildland Fires,” September 1993.

¹⁸ Massachusetts Fire Incident Reporting System (MFIRS), Massachusetts Department of Fire Services.

represent a potentially disastrous hazard. When a dam fails, the potential energy of the stored water behind the dam is instantly released, oftentimes with catastrophic consequences as the water 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 (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). The DCR was also responsible for conducting dam inspections until 2002, when state law was changed to place the responsibility and cost of inspections on the owners of the dams. In accordance with the new regulations, which went into effect in 2005, dam owners must register, inspect and maintain dams in good operating condition. Owners of High Hazard Potential dams and certain Significant Hazard Potential dams are also required to prepare, maintain and update Emergency Action Plans. The state has three hazard classifications for dams:

- *High Hazard Potential:* 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 Potential:* 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 Potential:* Dams located where failure or improper operation may cause minimal property damage to others. Loss of life is not expected.

Owners of dams are required to hire a qualified engineer to inspect and report results using the following inspection schedule:

- Low Hazard Potential dams – 10 years
- Significant Hazard Potential dams – 5 years
- High Hazard Potential 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. FERC inspections of high and significant hazard projects are conducted on a yearly basis. All other dams are subject to the regulations unless exempted in writing by DCR.

Location and Extent

The Erving Comprehensive Emergency Management Plan lists three dams in the Erving area: Northfield Mountain West Dike Inlet, Northfield Mountain Northwest Dike and Spillway, and the Northfield Mountain Main Dam. The former two dams are listed as high hazard dams. Erving Elementary School is the shelter identified in the case of failure of all three dams, which could affect up to an estimated 105 people.

The DCR Office of Dam Safety provided information about five dams in Erving. They are the Krusiewick Pond Dam (known locally as Pete's Pond), the Millers Falls Tool Company Dam, the Northfield Mountain Main Dam, the Northfield Mountain Northwest Dike and Spillway and the Northfield Mountain West Dike Inlet. The Committee indicated that the Millers Falls Tool Company Dam was removed in the 1990s.

The Northfield Mountain Main Dam, the Northfield Mountain Northwest Dike and Spillway and the Northfield Mountain West Dike Inlet are associated with the Northfield Mountain Project, a pumped storage hydroelectric facility owned and maintained by Northfield Mountain Facility of Hartford, Connecticut and located in Erving. The dams are under FERC supervision and therefore not required to follow state dam inspection regulations. FERC requires that an Emergency Action Plan (EAP) be created and updated annually for licensing of hydropower facilities. The primary purpose of an EAP is to "provide operating and mobilization and notification procedures to be followed in the case of an emergency" such as a sudden release of water caused by a natural disaster or accident.¹⁹ The 2010 Emergency Action Plan for this facility was produced by Northeast Utilities of Hartford, Connecticut and includes inundation maps for the Northfield Main Dam and the Northwest Dike of the Northfield Mountain Reservoir in Erving. All three Northfield Mountain Project dams are classified as Significant Hazards by the DCR Office of Dam Safety. FERC Representatives inspect the Northfield Mountain Project annually and a FERC-approved independent consultant inspects the project and prepares a comprehensive report every five years.²⁰

In the event of total failure of the Northfield Main Dam, flooding along Briggs Brook would be immediate and have potentially catastrophic effects. According to the most recent inundation maps for the Northwest Dike, floodplain areas in Northfield along Briggs Brook and the Connecticut River would be the first to be impacted by a dike failure. Residents would have very little time to respond to potential flooding. Under sunny conditions, floodwaters in Four Mile Brook would reach the confluence of the Connecticut and Millers rivers in 24 minutes.

There are critical facilities in Erving located either within the 100-year floodplain, in a dam inundation area or in an area prone to localized flooding. Although the identified shelter Erving Elementary School is not threatened by these kinds of flooding, the Erving Congregational Church on East Main Street may be subject to flooding. Additionally, Erving's industrial centers, wastewater treatment plants and several bridges all have the potential to be inundated by flood waters.

¹⁹ Federal Energy Regulatory Commission Division of Dam Safety and Inspections Operating Manual. For more information, see <http://www.ferc.gov/industries/hydropower/safety.asp>.

²⁰ Northfield Mountain Pumped Storage Project Emergency Action Plan.

In the event that either dam fails, the effect on the Town would be almost immediate and catastrophic. To plan for such a situation, Northfield Mountain Facility sponsored a Northfield Emergency Action Plan drill in July of 2010. The drill schedule, described by Northfield Mountain Facility as “table top” drills - where all parties are present, in one location, and participate in the drill – is determined by FERC. They are scheduled roughly every five years, with the next drill anticipated to take place sometime in the next two years.

For the Farley area of Erving, there are approximately 50 alert radios, which work on an emergency notification system. The National Weather Service conducts a test of the radios every Wednesday. Northfield Mountain Facility issues annually a public outreach letter to radio holders as well as new batteries and new radios, as needed. Northfield Mountain Facility indicated they would be moving from radios to a Reverse 911 system by the end of 2011.

Beaver Dams

General Description

Along with manmade dams, failure of beaver dams can cause flooding as well. Alteration of the landscape by beavers is a natural process that creates habitat for shore birds, mammals and rare amphibians. However, beaver ponds can flood structures, roads and utilities, causing costly and potentially dangerous situations. Beaver activity can also pollute drinking water supplies. Mitigation measures suggested by Massachusetts Division of Fish and Wildlife (MassWildlife) and other agencies can help communities and homeowners deal with nature’s master builders.

Until 1996, when a ballot initiative passed restricting the practice, Massachusetts residents were permitted to trap beavers. That change in policy caused a spike in the beaver population, which, in turn, led to a sharp increase in complaints about beaver activity and its effects. The law was modified in 2000 so that town Board of Health members could issue emergency trapping permission outside of the usual trapping season. But an increased beaver population, combined with land development reducing beaver habitat, means that humans and beavers continue to clash. Several mitigation measures, when applied thoughtfully, legally and with maintenance measures in mind, can help with beavers’ negative effects, while preserving beavers’ positive impact on the land.²¹

Water Control

State law makes it illegal for any person to disturb or tear open a beaver dam or beaver lodge without written permission from MassWildlife and the local Conservation Commission or Department of Environmental Protection. Permits are needed to disturb a beaver dam for any reason in Massachusetts. Even dams that cause flooding require permits to be breached.²²

While trapping beaver can have short-term benefits, the right conditions for beaver habitat will eventually lure new beavers. It may be best to combine trapping with measures that discourage beaver activity that’s bad for humans. Techniques used to mitigate the flooding damage caused by beaver include breaching of beaver dams, protecting road culverts with fences or guards, and controlling water levels with water flow devices. All these techniques require a certain degree of

²¹ Otsego County (NY) *All Hazards Mitigation Plan*, 2010.

²² Langlois, S.A. and T.A. Decker. 2004. *The Use of Water Flow Devices and Flooding Problems Caused by Beaver in Massachusetts* (Rev. Ed.). MA Division of Fisheries and Wildlife. 18pp.

effort and regular maintenance to insure water levels that can be tolerated (thereby preserving the positive aspects of the associated wetland). See the MassWildlife publication *The Use of Water Flow Devices and Flooding Problems Caused by Beaver in Massachusetts* for details on these mitigation measures. The following techniques were adapted from that publication.

- Dam breaching is an immediate but very short-term solution to flooding problems caused by beaver. Potato hoes or stone hooks are the best tools for dismantling dams by hand. Shovels and spading forks are ineffective. Good water control is possible if the breach is kept shallow and broad so that the water level falls slowly. Opening a deep breach creates a dangerous situation and may cause serious flooding and erosion downstream. Tractor- or truck-mounted excavators may be used by town, county or state highway employees to remove large amounts of material from beaver dams but care should be taken to avoid downstream flooding. Neighbors should be told where, when, and why a dam excavation is going to be done. If the method is justified and must be used, it is best done in mid-summer when the water level is low.
- Beavers build dams instinctively. When they sense running water, they start to build or repair dams. Culverts, especially ones made out of metal, will amplify the sound of the water rushing through them. Thus, beaver will commonly block road culverts with sticks, mud and rocks. This can cause flooding upstream. Culverts blocked from the inside are difficult to clean and potentially dangerous. The use of meshes and grills, placed on both the upstream and downstream ends of the culvert, can prevent beavers from entering. Several strategies are listed in *The Use of Water Flow Devices and Flooding Problems Caused by Beaver in Massachusetts*.
- Water Level Control Devices (WLCDs) keep beavers away from an intake pipe that lowers the water level of the pond. It's been estimated that only 4.5% of beaver problems in Massachusetts will respond to these devices. Using and maintaining a WLCD in conjunction with trapping young beavers can allow coexistence for years. Several types of WLCDs are available. For construction details, see *The Use of Water Flow Devices and Flooding Problems Caused by Beaver in Massachusetts*.

Location and Extent

As described on Page 50, there are some beaver dams in Erving, including one on Keyup Brook near Pete's Pond and some along the Millers River. The beaver dam on Keyup Brook is causing some impoundment of water in Pete's Pond. The beaver dams on the Millers River have been evaluated as have a low potential for causing flooding, due to the rapidity of water flow on the river. Overall, the Committee identified the possible extent of flooding due to beaver dams as small.

Potential Mitigation Measures for Dam Failure

A potential action item to help mitigate potential dam failure:

- Town to sponsor regularly scheduled evacuation drills for a dam failure at Northfield Mountain, including improving public awareness and outreach.

Earthquakes

General Description

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.²³ 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.²⁴

Table 3-2 Northeast Earthquakes with a Magnitude of 4.2 or more 1924 - 2007

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
Bar Harbor, ME	October 3, 2006	4.2

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

Table 3-3 Northeast States Record of Historic Earthquakes

State	Years of Record	Number Of Earthquakes
Connecticut	1668 - 2007	137
Maine	1766 - 2007	544
Massachusetts	1668 - 2007	355
New Hampshire	1638 - 2007	360
Rhode Island	1776 - 2007	38
Vermont	1843 - 2007	73
New York	1840 - 2007	755

Total Number of Earthquakes within the Northeast states between 1638 and 2007 = 2,403.

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

²³ Northeast States Emergency Consortium Web site: www.nesec.org/hazards/earthquakes.cfm

²⁴ Federal Emergency Management Agency Web site: www.fema.gov/hazards/earthquakes/quake.shtml.

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.

According to the United States Geological Survey, a fault line runs north-south through the western side of Erving. The fault extends along the entire length of Franklin County, and was originally responsible for the creation of the Connecticut River.

Location and Extent

While no significant earthquake events have been reported in Erving, the Committee evaluated the potential area of impact to be 50% of town or greater with potential catastrophic impacts on the Town's population and infrastructure. See Table 3.11.

Landslides

General Description

Landslides are geological phenomena that include a wide range of ground movement, such as rock falls, failure of slopes and shallow debris flows. They can occur in coastal, mountain, and river edge environments.

Landslides occur when the stability of a slope changes from a stable to an unstable condition. A change in the stability of a slope can be caused by a number of factors, acting together or alone. Natural causes of landslides include:

- groundwater pressure acting to destabilize the slope
- loss or absence of vertical vegetative structure, soil nutrients, and soil structure (e.g. after a wildfire)
- erosion of the toe of a slope by rivers
- weakening of a slope through saturation by snowmelt or heavy rains
- earthquakes adding loads to barely-stable slopes
- earthquake-caused liquefaction destabilizing slopes
- volcanic eruptions

Landslides are created by human activities as well, including deforestation, cultivation and construction, which destabilize already fragile slopes. Landslides can also occur due to:

- vibrations from machinery or traffic
- blasting
- earthwork which alters the shape of a slope, or which imposes new loads on an existing slope
- in shallow soils, the removal of deep-rooted vegetation that binds colluvium to bedrock
- construction, agricultural or forestry activities (logging) which change the amount of water which infiltrates the soil.

Location and Extent

While no significant landslide events have been observed in Erving, the Committee feels the potential for landslides exist due to the high levels of ledge on which the town is built. It has evaluated the potential area of occurrence to be isolated (less than 10% of the Town). See Table 3-11.

Ice Jams

General Description

Ice jams (or ice dam) occur when water builds up behind a blockage of ice. Ice dams can occur in various ways, but in New England they predominantly form on rivers and streams and mainly threaten infrastructure.

When the upstream part of a river thaws first and the ice is carried downstream into the still-frozen part of the watercourse, ice can form an ice dam and flood low lying areas upstream of the jam. Also, once an ice dam breaks apart, the sudden surge of water that breaks through the dam can flood areas downstream of the jam. Ice jams and flooding usually occur in spring; however, they can happen as winter sets in when the downstream reach of a river freezes first. Where floods threaten, the blockage can be removed mechanically.

Location and Extent

According to the Committee, no significant ice jams events have been observed in Erving. The Committee evaluates the potential location and extent of the impact from an ice jam 10 to 50% of the town affected, with a concentration of impact in the floodplain and along rivers downstream from the ice jam.

Manmade Hazards²⁵

Most non-natural or manmade hazards fall into two general categories: intentional acts and accidental events, although these categories can overlap. Some of the hazards included in these two categories, as defined by MEMA, consist of intentional acts such as explosive devices, biological and radiological agents, arson and cyberterrorism and accidental events such as nuclear hazards, invasive species, infrastructure failure, industrial and transportation accidents. Accidental events can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials.

Note: This plan does not address all manmade hazards that could affect Franklin County. A complete hazards vulnerability analysis was not within the scope of this update. For the purposes of the 2010 plan, FRCOG has evaluated those non-natural hazards that are of an accidental nature. They include industrial transportation accidents and industrial accidents in a fixed facility.

Hazardous Materials General Description

Hazardous materials in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Many products are shipped daily on the

²⁵ Content adapted from Commonwealth of Massachusetts State Hazard Mitigation Plan 2010

nation's highways, railroads, waterways, and pipelines. Chemical manufacturers are one source of hazardous materials, but there are many others, including service stations, hospitals, and hazardous materials waste sites. Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. These substances are most often released as a result of transportation accidents or because of chemical accidents in plants.

A release may occur at a fixed facility or in transit. Communities with a large industrial base may be more inclined to experience a hazardous materials release due to the number of facilities such materials in their manufacturing process. Communities with several major roadways may be at a greater risk due to the number and frequency of trucks transporting hazardous materials passing through.

Location and Extent

Industrial Accidents - Transportation

Franklin County transportation systems include road, rail, and air. Accessible and efficient freight transportation plays a vital function in the economy of the region. Most freight and goods being transported to and from Franklin County are by truck; however, a significant amount of freight that moves through the county is being hauled over the three main rail lines. Given that any freight shipped via air needs first to be trucked to an airport outside the region, air transportation is not being evaluated in this plan.

According to the Franklin County Hazardous Material Emergency Plan²⁶, approximately 13 to 15 trucks per hour traveling through the region contain hazardous materials (Table 3-4). While most of these vehicles are on Interstate 91, 2 trucks per hour travel on Route 2, some of which pass through Erving. Ten to 24 trains per day travel on the Pan Am Systems Main Freight line which runs through Erving (Table 3-5). On each of these trains, an average of 4 cars carries hazardous waste.

Table 3-4: Estimated Levels of Hazardous Material Transported on Area Roadways

Roadway	Number of Tank or Van Trucks Carrying Hazardous Materials per hour
Interstate 91	10
Route 2	2
Other major roadways (<i>Routes 5/10, 63, 47, 116, 202, 8A, 78, 122, 142, and 2A</i>)	1 or 0

Table 3-5: Estimated Level of Hazardous Material Transport on Area Train Lines

Train Line	Trains per Day (General Merchandise)	Average Number of Cars per Train	Average Number of Cars per Train with Hazardous Waste
Main Freight Line, Pan Am Systems	10 to 24	50	4
Connecticut River Line, Pan Am Systems	2 to 3	30	2

²⁶ Franklin County Regional Emergency Planning Committee, Franklin County Hazardous Material Emergency Plan and Maps, 2006. Based on a one-time survey conducted in 2003.

East Deerfield Rail Yard, Pan Am Systems	10 to 15 trains passing through yard	n/a	2 to 5
New England Central	2	60	5

The major trucking corridors in Franklin County are Interstate 91, running north/south, and Route 2, running east/west, with Route 2 traversing Erving. These two highways also represent the busiest travel corridors in the region for non-commercial traffic.

Safe and efficient transportation routes for trucks to and through the region are important to the region's economy to and to the safety of its citizens. The safer the transportation routes are, the less likely a transportation accident will occur. Some challenges to safe transportation routes were identified in the FRCOG 2007 Regional Transportation Plan and include:

- The lack of climbing and turning lanes on Route 2 East. Freight trucks are susceptible to the hazard of rapid stops, as they cannot slow the momentum of their vehicles quickly.
- The severity of the exit ramp curves impacts the safety of exiting for top-heavy vehicles such as freight trucks.
- Steep declines, including those on Route 2 eastbound west of Greenfield. The feasibility of adding runaway truck lanes is being evaluated.

Industrial Accidents – Fixed Facilities

An accidental hazardous material release can occur wherever hazardous materials are manufactured, stored, transported, or used. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas. Those facilities using, manufacturing, or storing toxic chemicals are required to report their locations and the quantities of the chemicals stored on-site to state and local governments. The Toxics Release Inventory (TRI) contains information about more than 650 toxic chemicals that are being used, manufactured, treated, transported, or released into the environment.

Table 3-6: Toxics Release Inventory (TRI)

Facility Name	Facility Location	Number of Compounds Reported at Facility
Erving Paper	Erving	46
International Paper Co	Erving	5

Source: EPA Toxic Release Inventory, 2010.

Note: Table 3-6: Toxics Release Inventory (TRI) in no way indicates any issues with any of the sites but rather is an inventory of those facilities meeting TRI reporting requirements.

There may be additional facilities but, due to the sensitive nature of hazardous materials, the FRCOG was unable to fully access some data. More complete information on hazardous materials may be available in the Comprehensive Emergency Management (CEM) Plan.

In addition to facilities potentially housing hazardous compounds, the Committee identified the transportation of hazardous materials through Erving as a potential manmade hazard. Route 2 and the Pan Am Systems Railroad both serve as primary routes for transportation of cargo, some

of which is of a hazardous nature. According to the HMEP²⁷ Hazardous Materials Survey Results, the Pan Am Systems Railroad carries 5-12 freight trains in each direction daily with an average train length of 50 cars, an average of four of which carry hazardous materials. The hazardous materials regularly carried on these trains passing through Erving include:

- Hydrocyanic acid
- Sulfuric acid
- Liquified petroleum gas
- Hydrochloric acid
- Chlorine
- Caustic soda
- Methanol
- Sodium chloride

The same plan identifies hazardous materials being carried on highways. On Route 2, which runs through Erving, an average of 2 hazardous materials tank or van trucks travel per hour. The hazardous materials regularly carried on these trucks passing through Erving include:

- Gasoline
- Fuel oil
- Kerosene
- Liquified petroleum gas
- Propane
- Sodium aluminate
- Sulfuric acid
- NOS liquids 3082

Potential Mitigation Measures for Manmade Hazards

Currently, evacuation plans are in place in the Erving CEM Plan in the event of a major chemical spill or accident. Fire and Police are at the ready to direct traffic to evacuation routes, as necessary. The Committee has identified the following potential action items concerning manmade hazards:

- Obtain Reverse 911 for the Town of Erving
- Develop and implement evacuation plans and drills for hazardous materials spills and accidents

²⁷ http://www.frcog.org/pubs/emergency/Franklin_County_HMEP.pdf

RISK ASSESSMENT METHODOLOGY

In updating Erving's Natural Hazard Mitigation Plan, the Franklin Regional Council of Governments developed the All Hazards Risk Assessment methodology for assessing the risk of natural hazards. The All Hazards Risk Assessment is an interactive table that the Erving Natural Hazard Mitigation Planning (NHMP) Committee completed with the FRCOG staff to evaluate all the natural hazards that can impact the town based on frequency of occurrence, severity of impacts, area of occurrence and preparedness. The completed table gives the town an overall understanding of the natural hazards, provides guidance on which hazards the Town may want to focus mitigation efforts on, reaffirms that Erving's planning and preparedness is on track, and shows residents that town departments and agencies are organized in case of a natural disaster.

In rating the hazards, the committee considered the following issues for each category:

Issues considered when ranking frequency of occurrence:

- 1) Known risk
- 2) Historical data (previous occurrences)

Issues considered when ranking severity of impacts:

- 1) Building stock
- 2) Critical facilities
- 3) Transportation systems
- 4) Lifeline utility systems
- 5) Communications systems and networks
- 6) High potential loss facilities
- 7) Hazardous material facilities
- 8) Economic elements
- 9) Special consideration areas
- 10) Historic, cultural, and natural resource areas
- 11) Natural resources

Issues considered when ranking preparedness:

- 1) Status of current plans
- 2) Training status
- 3) Availability of backup systems
- 4) Community resources (equipment, personnel, etc.)

The following rating charts were used to determine the rating for each event.

Table 3-7: Frequency of Occurrence Rating Chart

Classification	#	Frequency of Occurrence
Very High	5	events that occur at least once each year (100% per year)
High	4	events that occur from once in 2 years to once in 4 years (25% to 50% per year)
Medium	3	events that occur from once in 5 years to once in 50 years (2% to 20% per year)
Low	2	events that occur from once in 50 years to once in 100 years (1% to 2% per year)
Very Low	1	events that occur less frequently than once in 100 years (less than 1% per year)

Table 3-8: Severity of Occurrence Rating Chart

Classification	#	Severity of Multiple Impacts
Catastrophic	4	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.
Critical	3	Multiple injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 week.
Limited	2	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of facilities for more than 1 day.
Minor	1	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of facilities.

Table 3-9: Area of Occurrence Rating Chart

Classification	#	Percentage of Town Impacted
Large	3	More than 50% of the town affected.
Medium	2	10 to 50% of the town affected.
Isolated	1	Less than 10% of the town affected.

Table 3-10: Preparedness Rating Chart

Classification	#
Poor	3
Fair	2
Good	1

To determine the final hazard index for each hazard, each category was assigned a weight. Frequency of Occurrence was given the most weight (45%), followed by Severity of Impacts (30%), Area of Occurrence (15%), and Preparedness (10%). Ratings were entered into a spreadsheet which calculated the weighted hazard index for each hazard. Hazards with higher index scores represent the events most in need of organization focus and resources for emergency planning and mitigation projects.

The results of the All Hazards Vulnerability Assessment can be seen in Table 3-11. The hazards receiving a Weighted Hazard Index of 4 or more are – in order of vulnerability – Dam Failure (5.8), Flood (4.85), Severe Winter Storm / Ice Storm (4.75), Hurricane (4.7), Earthquake (4.7) and Wind Storms / Microbursts (4).

It is notable that the committee evaluated Dam Failure – the highest vulnerability – as a hazard for which the Town is most prepared and for which the best data has been kept and yet for which the most catastrophic impact exists. The Committee acknowledged that although the likelihood of a catastrophic dam failure seems quite low, the potential impact would be devastating to the Town's built and natural environments as well as to the Town's infrastructure and its residents.

For Floods – rated second highest vulnerability – the Committee evaluated the Town’s preparedness as Fair but the severity of impacts less extensive as compared to Dam Failure.

The Committee rated Severe Winter Storms / Ice Storms as the hazard most frequently occurring in Erving. However, the committee evaluated the Town’s preparedness as Good and the severity of impact Minor to Limited, except for impact to population, which was rated as Critical. Nevertheless, the Committee rated the Town as well-prepared for this hazard.

Hurricanes and Earthquakes were both rated as having a Very Low frequency of occurrence. The Committee rated the Town as having a Fair preparedness level for both types of hazards. While historically there have been no Hurricane events in Erving; the Vulnerability Assessment revealed an occurrence could critically impact the Town, with potential multiple injuries to citizens possible and with a potential of more than 25% of property in affected area damaged or destroyed. An Earthquake event could potentially have a catastrophic impact on the Town, particularly with injuries and deaths to citizens and with a potential complete shutdown of the Town’s infrastructure for a month or more.

In the Town’s hazard mitigation planning, much emphasis has been placed on flooding and yet the Vulnerability Assessment helped to highlight areas in which more hazard mitigation planning might be needed, such as for Hurricanes, Earthquakes, and Wind Storms / Microbursts. The Committee acknowledged that a lower incidence of occurrence and lack of historic events is no protection against future hazards.

TABLE 3-11: All Hazards Vulnerability Assessment Table

EVENTS	FREQUENCY OF OCCURRENCE*	FOC WEIGHTED VALUE	SEVERITY OF IMPACTS*				SOI WEIGHTED VALUE	AREA OF OCCURRENCE*	Add WEIGHTED VALUE	PREPAREDNESS	PREP. WEIGHTED VALUE	WEIGHTED HAZARD INDEX
ASSIGNED WEIGHTING FACTOR	45%		30%					15%		10%		
INDEX VALUE	1-5		Built 1-4*	Natural 1-4*	Population 1-4*	Infrastructure 1-4*		1-3		1-3		
NATURAL HAZARDS:												
Flood	2	0.9	3	2	2	4	3.3	3	0.45	2	0.2	4.85
Severe Winter Storm/Ice Storm	4	1.8	2	1	3	2	2.4	3	0.45	1	0.1	4.75
Hurricane	1	0.45	3	3	3	3	3.6	3	0.45	2	0.2	4.7
Tornado	1	0.45	2	2	2	2	2.4	2	0.3	2	0.2	3.35
Wild Fire/Brush Fire	3	1.35	1	3	1	1	1.8	1	0.15	1	0.1	3.4
Dam Failure	1	0.45	4	4	4	4	4.8	3	0.45	1	0.1	5.8
Earthquake	1	0.45	3	1	4	4	3.6	3	0.45	2	0.2	4.7
Landslide	1	0.45	2	3	3	2	3	1	0.15	2	0.2	3.8
Ice Jam	1	0.45	2	3	2	2	2.7	2	0.3	2	0.2	3.65
Wind Storms, Microbursts, etc.	3	1.35	2	2	2	2	2.4	1	0.15	1	0.1	4
* See rating charts												

VULNERABILITY ASSESSMENT

Vulnerability Overview

In addition to the floodplain vulnerability assessment, a preliminary vulnerability assessment was completed for areas estimated to be affected by catastrophic dam failure at the Northfield Mountain project. Using aerial photography and inundation maps for closer examinations of these areas, it was estimated that approximately 45 house structures in Ervingside and 32 house structures in Farley would be inundated by flooding caused by catastrophic dam failure. It was also determined the Center of Erving would be impacted by backwash from the Milers River. Given the average household size of 2.5 people, an estimated total of 193 residents would be impacted.

Repetitive Loss Properties

Repetitive loss properties are those for which two or more losses of at least \$1000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. According to MEMA, there are no repetitive loss structures in Franklin County.

Vulnerability Assessment Methodology

The Vulnerability Assessment is a series of tables that enabled FRCOG staff to determine the vulnerability of Erving to flooding and to calculate the potential costs of flooding to the town.²⁸ Estimated losses for all other hazard events were also determined, based on damages from past recorded events. The potential implications for vulnerable populations such as senior and low income populations in the event of a hazard are also assessed.

Flooding

Hazard Summary

In this section, a vulnerability assessment was prepared to evaluate the potential impact that flooding could have on the portions of Erving located within the 100-year floodplain. Flooding was chosen for this detailed 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 jams and snow melt. To determine the vulnerability of the town, data was gathered and calculated for the value of residential, commercial, and industrial properties. The damage estimates presented are rough estimates and likely reflect 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.

²⁸ These tables were developed to provide towns with a template for calculating and estimating potential losses and costs of flooding. They draw from and integrate the work of other Natural Hazard Mitigation Plans, specifically the Natural Hazard Mitigation Plan for Thurston County, Washington, September 2009, but the tables can be linked to the most recent demographic, land use, and infrastructure information (databases) and automatically calculate and estimate the cost of flooding to each town or region.

Data Collected and Used

National weather databases and Town of Erving data were collected and analyzed. Data on historic property damage and loss, and injuries and deaths, was collected for Franklin County from the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center website. This data was used to support an evaluation of exposure and potential impacts associated with this hazard. Available historic data are presented in Table 3-18. The Commonwealth of Massachusetts State Hazard Mitigation Plan 2010 was also reviewed for information on flooding.

Impact on the Community

Exposure and Loss Estimation

Flooding can cause a wide range of issues, from minor nuisance roadway flooding and basement flooding to major impacts such as roadway closures. Specific damages associated with flooding events include the following primary concerns:

- Blockages of roadways or bridges vital to travel and emergency response
- Breaching of dams
- Damaged or destroyed buildings and vehicles
- Uprooted trees causing power and utility outages
- Drowning, especially people trapped in cars
- Contamination of drinking water
- Dispersion of hazardous materials
- Interruption of communications and/or transportation systems

Property Damage

Of Erving's total acreage, 210 acres lie within the 100-year floodplain. Table 3-12 displays the number of dwelling units and the estimated population living in the 100-year floodplain in Erving. According to 2005 MassGIS Land Use data there is one dwelling unit located in the floodplain. Using this number and Erving's average household size as of the 2000 U.S. Census, it is estimated that two people, or .002% of Erving's total population, reside in the floodplain.

Table 3-12: Number of Dwelling Units and Percent of Total Population Residing in Flood Hazard Area

Total Town Population	Average # of people per household	Number of Dwelling Units in Flood Hazard Area	Estimated population in Flood Hazard Area	% of total population that reside in the Flood Hazard Area
1,467	2.45	1	2	0.002

Source: 2008 U.S. Census Population Estimates Program; 2000 U.S. Census; 2005 MassGIS Land Use data.

Table 3-13 shows the amount of commercial, industrial, and public/institutional land uses located in town and within the floodplain. Less than half an acre of commercial and public/institutional land uses lie within the floodplain, accounting for only .41 percent of commercial land uses in town and .02 percent of public/institutional uses in town. Roughly five and a half acres of

industrial land use is located in the floodplain, accounting for 11 percent of the industrial land in town.

Table 3-13: Acres of Commercial, Industrial, and Public/Institutional Land Use Within the Flood Hazard Area

Land Use	Total acres in Town	Acres in Flood Hazard Area	% of total acres in Flood Hazard Area
Commercial	29.44	0.12	0.41%
Industrial	49.29	5.45	11.06%
Public/Institutional	92.4	0.02	0.02%

Source: 2005 MassGIS Land Use data.

The average assessed values of the residential, commercial, and industrial land uses located within the floodplain are displayed in Table 3-14. The total average assessed value for these three land uses within the floodplain is \$33,026,632, with the largest assessed value falling within the industrial land use category at \$32,688,003. This is of concern because should a catastrophic flooding event befall Erving, the assessed values of these structures and facilities would likely be significantly reduced, which in turn would impact the town's tax revenues.

Table 3-14: Average Assessed Value of Land Use in Flood Hazard Area

Land Use	Total Acres in Town	Total Assessed Value	Average Assessed Value Per Acre	Acres in Flood Hazard Area	Average Assessed Value in Flood Hazard Area
Residential	386.05	\$121,791,060	\$315,480	0.98	\$309,170
Commercial	29.44	\$7,227,231	\$245,490	0.12	\$29,459
Industrial	49.29	\$295,631,498	\$5,997,799	5.45	\$32,688,003

Source: Massachusetts Department of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010; 2005 MassGIS Land Use data.

Actual 2010 assessed building values were collected from the Erving Assessors Office for the Erving Paper Mill, the three wastewater treatment plants in Town, and the Department of Public Works building (which is included on the same parcel as the Ervingside wastewater treatment plant), all significant structures located in the floodplain in Erving.

The total value of the building contents for each structure was estimated using the percentages for different classes of buildings and facilities. Table 3-15 displays occupancy class and the estimated contents value as a percentage of the building replacement value according.

Table 3-15: Occupancy Class and Estimated Contents Value of Buildings

Occupancy Class	Contents Value % (as a percentage of building replacement value)
Residential (temporary lodging, dormitory, and nursing homes)	50%
Commercial (including retail, wholesale, professional, services, financial, entertainment & recreation)	100%
Commercial (including hospital and medical office/clinic)	150%

Commercial Parking	50%
Industrial (including heavy, light technology)	150%
Agriculture	100%
Religion/Non-Profit	100%
Government Emergency Response	150%
Government General Services	100%
Education Schools/Libraries	100%
Education Colleges/Universities	150%

Source: Natural Hazard Mitigation Plan for Thurston County, Washington, September 2009.

The total building value (Table 3-16) is presented as a percentage of the replacement value of the building (the assessed value of the structure) based on the class of structure. The percentages vary for certain classes because the replacement cost of the contents is different from institution to business to service. The Erving Paper Mill falls under the industrial category, while the wastewater treatment plants are considered a government general service. The estimated combined total building value for all significant structures is \$20,699,050.

Table 3-16: Total Building Value in Flood Hazard Area

Structure	Building Structure Value in Flood Hazard Area	Building Contents Value in Flood Hazard Area	Total Building Value in Flood Hazard Area
Erving Paper Mill	\$989,500	\$1,484,250	\$2,473,750
Erving Center Wastewater Treatment Plant	\$6,857,300	\$6,857,300	\$13,714,600
Farley Wastewater Treatment Plant	\$30,500	\$30,500	\$61,000
Erving side Wastewater Treatment Plant & DPW	\$2,158,600	\$2,158,600	\$4,317,200
Pearl B Care Building (Historical Society)	\$132,500	\$132,500	\$132,500
Usher Plant	\$0	\$0	\$0
Total	\$10,168,400	\$10,663,150	\$20,699,050

Source: 2010 Erving Assessors data.

Table 3-17 displays potential loss estimates for significant structures in the floodplain. A flood resulting in 1% damage to all structures would cause approximately \$206,991 in damages, while a flood resulting in damages to 10% of all structures would result in roughly \$2,069,905 in damages.

Table 3-17: Potential Estimated Loss for Buildings Located in Flood Hazard Area

Structure	Total Building Value in Flood Hazard Area	1% Damage Loss Estimate	5% Damage Loss Estimate	10% Damage Loss Estimate
Erving Paper Mill	\$2,473,750	\$24,738	\$123,688	\$247,375
Erving Center Wastewater Treatment Plant	\$13,714,600	\$137,146	\$685,730	\$1,371,460
Farley Wastewater Treatment Plant	\$61,000	\$610	\$3,050	\$6,100
Erving side Wastewater Treatment Plant & DPW	\$4,317,200	\$43,172	\$215,860	\$431,720

Pearl B Care Building	\$132,500	\$1,325	\$6,625	\$13,250
Usher Plant	\$0	\$0	\$0	\$0
Total	\$20,699,050	\$206,991	\$1,034,953	\$2,069,905

Source: Derived from 2010 Erving Assessors data.

Table 3-18: Severe Flood Events in Erving

Recorded Flood Events	Year	Location	Recorded Property Damages
1	1996	Erving	Unknown
1	1986	Keyup Brook	Unknown
1	2000	Keyup Brook	Unknown

Source: NOAA National Climate Data Center accessed August 2010 and Committee input.

Table 3-18 identifies the recorded flood events in Erving according to NOAA and to Committee input. Recorded property damage, if any, is not known.

Table 3-19 identifies the average assessed value of all residential, commercial, and industrial land uses located in the floodplain in Erving, and the losses that would result from 1%, 5%, and 10% damage to this inventory as a result of a major flooding event.

Table 3-19: Potential Estimated Loss in Flood Hazard Area by Land Use

Land Use	Average Assessed Value of Land in Floodplain	1% Damage Loss Estimate	5% Damage Loss Estimate	10% Damage Loss Estimate
Residential	\$309,170	\$3,092	\$15,459	\$30,917
Commercial	\$29,459	\$295	\$1,473	\$2,946
Industrial	\$32,688,003	\$326,880	\$1,634,400	\$3,268,800
Total	\$33,026,632	\$330,266	\$1,651,332	\$3,302,663

Source: Massachusetts Dept. of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010.

Population Impacts

The Town should be aware that senior and low income segments of Erving's population may be more vulnerable to hazard events due to a number of factors. Senior and low income populations may be physically or financially unable to react and respond to a hazard event and require additional assistance. Access to information about the hazard event may be lacking, as well as access to transportation in the case of an evacuation. The location and construction quality of housing can also pose a significant risk. Table 3-20 displays the number of senior and low income residents in Erving. It should be noted that there may be overlap within the two categories, so that the total number of persons exposed may be lower than what is shown in the table. However the town should be aware of the potential needs of residents within these population segments in the event of a hazard occurrence.

Table 3-20: Senior and Low Income Populations in Erving Exposed to Natural Hazard Events

Population Category	Number of Persons Exposed	Percentage of Total Population
Senior (Over 65 years of age)	202	13.8%

Low Income (Persons with annual incomes less than \$20,000)*	284	19.4%
Total	486	33.2%

* Low income population was calculated by multiplying 2000 U.S. Census Households with Incomes of Less than \$20,000 (116) by 2000 U.S. Census Average Household Size (2.45).

Source: 2000 U.S. Census.

Overall Vulnerability Assessment

Flooding is common in New England, often causing significant impacts to the roads, structures, facilities, utilities, and population of Erving. Existing and future mitigation efforts should continue to be developed and employed that will enable Erving to be prepared for these events when they occur. Particular areas of vulnerability include low-income and elderly populations, trailer homes, and infrastructure such as and the low-lying areas that can be impacted by flooding related to ice jams or rapid snow melt.

Data Deficiencies

In assessing the risks to Erving from flood hazards, the following data deficiencies were identified:

- Lack of available data on the number of vulnerable populations living in households in the floodplain.
- Lack of digital floodplain data to overlay on zoning to determine number of developable lots in the flood hazard area.
- Data for the location and condition of dams within Erving provided by the DCR Office of Dam Safety Legal Department was incomplete. This plan uses 2005 data.
- Records of damages to the built and natural environments due to floods in Erving is not consistently maintained. Data often resides with an individual and can be lost if that individual leaves his or her position. A more formal system of data collection and maintenance could be established and would help improve the Town's hazard mitigation planning. Better data could also increase the Town's chance of qualifying for various grants.

Other Hazards

Severe Snow and Ice Storms

Severe snow and ice storms are common in Erving, often impacting the Towns' roads, structures, facilities, utilities, and population. Existing and future mitigation efforts should continue to be developed and employed that will enable the Town to be prepared for these events.

Severe Winter Storm (Snow)

Hazard Summary

Severe winter storms cause significant concern because they happen often and can be quite severe; they cost residents money; they require snow and ice removal, which can limit access to facilities and can cause health problems; they can cause utility failure and flooding from ice jams; and they put stress on community resources.

Data Collected and Used

National weather databases and Town of Erving data were collected and analyzed. Data on historic property damage and loss, and injuries and deaths, was collected for Franklin County from the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center website. This data was used to support an evaluation of exposure and potential impacts associated with this hazard. Available historic data are presented in Table 3-21. The Commonwealth of Massachusetts State Hazard Mitigation Plan 2010 was also reviewed for information on severe winter storm hazard data and mitigation measures.

Impact on the Community

Exposure and Loss Estimation

Heavy snowfall coupled with low temperatures often results in increases in traffic accidents; disruptions in transportation, commerce, government, and education; utility outages due to falling trees, branches, and other objects; personal injuries associated with slippery surfaces and freezing temperatures; and numerous other problems. Specific damages associated with severe winter storm (snow) events include the following primary concerns:

- Injuries and fatalities associated with accidents, low temperatures, power loss, falling objects and accidents associated with frozen and slippery surfaces and snow accumulation
- Increases in the frequency and impact of traffic accidents, resulting in personal injuries
- Ice-related damage to trees, building and infrastructure inventory, and utilities (power lines, bridges, substations, etc.)
- Roads damaged through freeze and thaw processes
- Stress on the local shelters and emergency response infrastructure
- Lost productivity that occurs when people cannot go to work, school, or stores due to inclement conditions

New England's climate offers no immunity to the potential damaging effects of severe winter storms. Some minimum damage is anticipated annually, with potential extensive damage occurring about once every 10 years.

Property Damage

As presented in Table 3-21, historic data for severe winter storm (heavy snow) events indicate that between 1993 and 2010, 111 heavy snow events were recorded in Franklin County. An average of 6.1 heavy snow and ice events occur each year, causing an average annual property damage county-wide of \$4.5 million.

Table 3-21: Severe Heavy Snow/Ice Events in Franklin County

Year	# of Heavy Snow/Ice Events	Annual Property Damage	Annual Crop Damage
2010	3	\$30,000	\$0
2009	5	\$0	\$0
2008	12	\$6,020,000	\$0
2007	7	\$10,000	\$0
2006	0	\$0	\$0
2005	9	\$625,000	\$0

Year	# of Heavy Snow/Ice Events	Annual Property Damage	Annual Crop Damage
2004	3	\$0	\$0
2003	5	\$50,000	\$0
2002	7	\$1,605,000	\$0
2001	7	\$11,000,000	\$0
2000	7	\$0	\$0
1999	6	\$0	\$0
1998	3	\$0	\$0
1997	6	\$10,030,000	\$0
1996	10	\$47,000,000	\$0
1995	6	\$0	\$0
1994	8	\$5,050,000	\$0
1993	7	\$0	\$0
18	111	\$4,523,333	\$0

Source: NOAA National Climactic Data Center. <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>.

Table 3-22: Severe Heavy Snow/Ice Events in Erving

Year	Location of Event	Property Damage
2008	Mountain Road	Unknown

As indicated in the Risk Assessment section of this plan, a winter storm in 2008 left residents on Mountain Road without power for seven days while the town center suffered a 12-hour power outage. Shelters were opened, with roughly 100 people utilizing them during the storm. Total property damage from this storm total, if any, is unknown. Estimated costs to the Town for storm response, including staffing shelters and providing food and water, was not available.

According to information obtained from the highway department, no other winter storm events resulting in significant damages have been recorded.

Population Impacts

As discussed above, some traffic accidents associated with storm events include injuries and in limited cases, deaths. However, the number of injuries and deaths reported for accidents is generally low.

Populations considered most vulnerable to severe winter storm impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Table 3-23 summarizes the population in Erving over the age of 65 or living in households with an income below \$20,000 per year.

Table 3-23: Senior and Low Income Populations in Erving Exposed to Natural Hazard Events

Population Category	Number of Persons Exposed	Percentage of Total Population
Senior (Over 65 years of age)	202	13.8%

Low Income (Persons with annual incomes less than \$20,000)*	284	19.4%
Total	486	33.2%

* Low income population was calculated by multiplying 2000 U.S. Census Households with Incomes of Less than \$20,000 (116) by 2000 U.S. Census Average Household Size (2.45).

Source: 2000 U.S. Census.

The entire built environment of Erving is vulnerable to a severe winter storm. Table 3-24 identifies the assessed value of all residential, commercial, and industrial land uses in Town, and the losses that would result from 1%, 5%, and 10% damage to this inventory as a result of a severe winter storm.

Table 3-24: Potential Estimated Loss by Land Use

Land Use	Total Assessed Value	1% Damage Loss Estimate	5% Damage Loss Estimate	10% Damage Loss Estimate
Residential	\$121,791,060	\$1,217,911	\$6,089,553	\$12,179,106
Commercial	\$7,227,231	\$72,272	\$361,362	\$722,723
Industrial	\$295,631,498	\$2,956,315	\$14,781,575	\$29,563,150
Total	\$424,649,789	\$4,246,498	\$21,232,489	\$42,464,979

Source: Massachusetts Department of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010.

Overall Vulnerability Assessment

Severe winter storms are common in New England, often causing significant impacts to the roads, structures, facilities, utilities, and population of Erving. Existing and future mitigation efforts should continue to be developed and employed that will enable Erving to be prepared for these events when they occur. The cascade effects of severe winter storms include utility losses, transportation accidents, and flooding. Losses associated with flooding are discussed earlier in this section. Particular areas of vulnerability include low-income and elderly populations, trailer homes, and infrastructure such as roadways and utilities that can be damaged by such storms and the low-lying areas that can be impacted by flooding related to ice jams or rapid snow melt.

Data Deficiencies

In assessing the risks to Erving from severe snow and ice storms, the following data deficiencies were identified:

- Records of damages to the built and natural environments due to severe snow and ice storms in Erving is not consistently maintained. Data often resides with an individual and can be lost if that individual leaves his or her position. A more formal system of data collection and maintenance could be established and would help improve the Town's hazard mitigation planning. Better data could also increase the Town's chance of qualifying for various grants.

Thunderstorms, Hurricanes and Tornadoes

Hazard Summary

Thunderstorms are common in western Massachusetts and can cause significant damage. Hurricanes and tornadoes are rare in Erving but could cause severe impacts such as flooding,

power outages, flying debris, damage to property and injury and loss of life. Existing and future mitigation efforts should continue to be developed and employed that will enable the Town to be prepared for these events.

Thunderstorms bring strong winds, rain and, at times, hail, potentially causing damage to property, crops and utilities and injuries or deaths to residents. Persistent rain can also cause flooding.

Hurricanes or tropical cyclones, can spin off tornadoes and bring thunderstorms, high winds and, in coastal areas, storm surges in the sea, possibly resulting in beach erosion and loss or damage to property. Inland, hurricanes mainly bring heavy rains that can cause flooding.

Tornadoes can have devastating effects on infrastructure, property and human health. Striking at random, their conical winds leave trails of devastation, at times more than a mile wide, in their wake. Small tornadoes, known as “gustnadoes,” have been known to strike in Franklin County, most recently in Sunderland in 2009. The gustnado does not appear in data compiled on tornadoes for this report, however, even gustnadoes can cause damage; the 2009 occurrence destroyed a barn and downed trees in Sunderland.

Data Collected and Used

National weather databases and Town of Erving data were collected and analyzed. Data on historic property damage and loss, and injuries and deaths, was collected for Franklin County from the National Oceanic and Atmospheric Administration’s (NOAA) National Climatic Data Center website, and the Spatial Hazard Events and Losses Database (SHELDUS). This data was used to support an evaluation of exposure and potential impacts associated with this hazard. Available historic data are presented in Tables 3-20, 3-21, 3-22. The Commonwealth of Massachusetts State Hazard Mitigation Plan 2010 was also reviewed for information on thunderstorms, hurricanes and tornadoes hazard data and mitigation measures.

Impact on the Community

Exposure and Loss Estimation

High winds and heavy rain and/or hail associated with thunderstorms, hurricanes and tornadoes can cause damage to utilities, structures, roads, trees (potentially causing vehicle accidents) and injuries and death.

Property Damage

As presented in Table 3-25, historic data for tornado events indicate that between 1991 and 2010, 4 tornadoes were recorded in Franklin County. Over 20 years, tornadoes have caused an average of \$16,000 in property damages yearly. Between 1990 and 2009, one hurricane and 16 tropical storms have been recorded in Franklin County (Table 3-26). Hurricane Bob in 1991 caused over 5.5 million dollars in property damage in the county, and over \$500,000 in crop damage. Overall, tropical storms and hurricanes have caused an average annual property damage of just over \$300,000 over the last 20 years.

Table 3-25: Tornado Events in Franklin County

Year	# of Tornado Events	Annual Property Damage	Annual Crop Damage
2010	0	\$0	\$0
2009	0	\$0	\$0
2008	0	\$0	\$0
2007	0	\$0	\$0
2006	1	\$200,000	\$0
2005	0	\$0	\$0
2004	0	\$0	\$0
2003	0	\$0	\$0
2002	0	\$0	\$0
2001	0	\$0	\$0
2000	0	\$0	\$0
1999	0	\$0	\$0
1998	0	\$0	\$0
1997	2	\$100,000	\$0
1996	0	\$0	\$0
1995	0	\$0	\$0
1994	0	\$0	\$0
1993	0	\$0	\$0
1992	1	\$25,000	\$0
1991	0	\$0	\$0
# of Years	Total # of Events	Average Annual Property Damage	Average Annual Crop Damage
20	4	\$16,250	\$0

Source: NOAA National Climactic Data Center. <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>.

Table 3-26: Hurricane and Tropical Storm Events in Franklin County

Year	# of Hurricane/Tropical Storm Events	Annual Property Damage	Annual Crop Damage
2009	0	\$0	\$0
2008	0	\$0	\$0
2007	0	\$0	\$0
2006	5	\$277,861	\$0
2005	1	\$33,889	\$0
2004	1	\$37,778	\$0
2003	2	\$127,381	\$0
2002	0	\$0	\$0
2001	0	\$0	\$0
2000	0	\$0	\$0
1999	1	\$7,692	\$0

Year	# of Hurricane/Tropical Storm Events	Annual Property Damage	Annual Crop Damage
1998	2	\$63,269	\$0
1997	0	\$0	\$0
1996	0	\$0	\$0
1995	1	\$0	\$0
1994	1	\$35,714	\$0
1993	0	\$0	\$0
1992	0	\$0	\$0
1991	1	\$5,555,556	\$555,556
1990	2	\$7,142	\$0
# of Years	Total # of Events	Average Annual Property Damage	Average Annual Crop Damage
20	17	\$307,314	\$27,778

Source: Spatial Hazard Events and Losses Database (SHELDUS), <http://webra.cas.sc.edu/hvri/>.

Severe thunderstorms, hail and lightning events brought about significant property wreckage in Franklin County in recent years. Thunderstorms, 115 of them in the last 19 years, caused an average annual property loss of more than \$59,000 (Table 3-27). It is worth noting that the number of thunderstorms has increased in recent years; in the 1990s, there were an average of 3.8 storms per year, according to NOAA data. From 2000 to 2008, NOAA recorded an average of 9.6 storms per year, 2.5 times the previous decade. In 2007 and 2008, the most recent years with data available, 40 storms were recorded countywide for an average number of 20 storms for those two years.

Table 3-27: Thunderstorm Events in Franklin County

Year	# of Thunderstorm Events	Annual Property Damage	Annual Crop Damage
2008	21	\$602,000	\$0
2007	19	\$0	\$0
2006	9	\$338,000	\$0
2005	9	\$85,000	\$0
2004	4	\$30,000	\$0
2003	1	\$10,000	\$0
2002	6	\$25,000	\$0
2001	5	\$0	\$0
2000	3	\$20,000	\$0
1999	5	\$0	\$0
1998	8	\$2,000	\$0
1997	7	\$10,000	\$0
1996	5	\$0	\$0
1995	3	\$0	\$0
1994	4	\$0	\$0
1993	0	\$0	\$0
1992	2	\$0	\$0

Year	# of Thunderstorm Events	Annual Property Damage	Annual Crop Damage
1991	3	\$0	\$0
1990	1	\$0	\$0
# of Years	Total # of Events	Average Annual Property Damage	Average Annual Crop Damage
19	115	\$59,053	\$0

Source: NOAA National Climactic Data Center. <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>.

Four thunderstorms over the last ten years produced high winds in Erving that caused damage to trees and power lines (Table 3-28). In one instance a large tree limb broke and struck an 81 year old woman who later died from the injury. In 2008, \$3,000 in property damages was recorded due to one storm. No property damage was recorded for the other three events, resulting in an average annual property damage of \$300 over ten years.

Table 3-28: Severe Thunderstorm Events in Erving

Year	# of Thunderstorm Events	Annual Property Damage	Annual Crop Damage
1998	1	\$0	\$0
2007	2	\$0	\$0
2008	1	\$3,000	\$0
10	4	\$300	\$0

Source: NOAA National Climactic Data Center. <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>.

As Table 3-29 shows, 24 hail storms between 1993 and 2010 have caused an average of more than \$560,000 in property damage per year. Ten lightning events (Table 3-30) have caused an average of more than \$8,000 in property damage per year over the last 15 years in Franklin County.

Table 3-29: Hail Events in Franklin County

Year	# of Hail Events	Annual Property Damage	Annual Crop Damage
2009	0	\$0	\$0
2008	0	\$0	\$0
2007	0	\$0	\$0
2006	5	\$1,928,000	\$0
2005	1	\$305,000	\$0
2004	1	\$340,000	\$0
2003	2	\$1,350,000	\$0
2002	0	\$0	\$0
2001	0	\$0	\$0
2000	0	\$0	\$0
1999	1	\$0	\$0
1998	0	\$0	\$0
1997	0	\$0	\$0

1996	2	\$0	\$0
1995	5	\$0	\$0
1994	4	\$5,050,000	\$0
1993	3	\$550,000	\$0
# of Years	Total # of Events	Average Annual Property Damage	Average Annual Crop Damage
17	24	\$560,176	\$0

Source: NOAA National Climactic Data Center. <http://www4.ncdc.noaa.gov/cgi-win/wwcgl.dll?wwevent~storms>.

Table 3-30: Lightning Events in Franklin County

Year	# of Hail Events	Annual Property Damage	Annual Crop Damage
2008	1	\$10,000	\$0
2007	0	\$0	\$0
2006	0	\$0	\$0
2005	1	\$50,000	\$0
2004	1	\$35,000	\$0
2003	0	\$0	\$0
2002	1	\$15,000	\$0
2001	1	\$20,000	\$0
2000	0	\$0	\$0
1999	0	\$0	\$0
1998	0	\$0	\$0
1997	1	\$3,000	\$0
1996	0	\$0	\$0
1995	2	\$0	\$0
1994	2	\$0	\$0
# of Years	Total # of Events	Average Annual Property Damage	Average Annual Crop Damage
15	10	\$8,867	\$0

Source: NOAA National Climactic Data Center. <http://www4.ncdc.noaa.gov/cgi-win/wwcgl.dll?wwevent~storms>.

Population Impacts

As discussed above, some traffic accidents associated with storm events include injuries and deaths. However, the number of injuries and deaths reported for accidents is generally low.

Populations considered most vulnerable to hurricane and tornado impacts in Erving are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Table 3-31 summarizes the population over the age of 65 or living in households with an annual income below \$20,000.

Table 3-31: Senior and Low Income Populations in Erving Exposed to Natural Hazard Events

Population Category	Number of Persons Exposed	Percentage of Total Population
Senior (Over 65 years of age)	202	13.8%
Low Income (Persons with annual incomes less than \$20,000)*	284	19.4%
Total	486	33.2%

* Low income population was calculated by multiplying 2000 U.S. Census Households with Incomes of Less than \$20,000 (116) by 2000 U.S. Census Average Household Size (2.45).

Source: 2000 U.S. Census.

The entire built environment of Erving is vulnerable to the high winds and/or flooding from a hurricane or tornado. Table 3-32 identifies the assessed value of all residential, commercial, and industrial land uses in Erving, and the losses that would result from 1%, 5%, and 10% damage to this inventory as a result of an extreme wind and rain storm.

Table 3-32: Potential Estimated Loss by Land Use

Land Use	Total Assessed Value	1% Damage Loss Estimate	5% Damage Loss Estimate	10% Damage Loss Estimate
Residential	\$121,791,060	\$1,217,911	\$6,089,553	\$12,179,106
Commercial	\$7,227,231	\$72,272	\$361,362	\$722,723
Industrial	\$295,631,498	\$2,956,315	\$14,781,575	\$29,563,150
Total	\$424,649,789	\$4,246,498	\$21,232,489	\$42,464,979

Source: Massachusetts Department of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010.

Overall Vulnerability Assessment

Thunderstorms are common in New England, and can impact property, crops, utilities and the population of Erving. Hurricanes and tornados are less common, but can cause significant damage when they do occur. Existing and future mitigation efforts should continue to be developed and employed that will enable Erving to be prepared for these events. The cascade effects of severe storms include utility losses and transportation accidents and flooding. Losses associated with the flood hazard are discussed earlier in this section. Particular areas of vulnerability include low-income and elderly populations, trailer homes, and infrastructure such as roadways and utilities that can be damaged by such storms and the low-lying areas that can be impacted by flooding.

Data Deficiencies

In assessing the risks to Erving from thunderstorms, hurricanes and tornadoes, the following data deficiencies were identified:

- Records of damages to the built and natural environment due to thunderstorms, hurricanes and tornadoes in Erving is not consistently maintained. Data often resides with an individual and can be lost if that individual leaves his or her position. A more formal system of data collection and maintenance could be established and would help improve the Town's hazard mitigation planning. Better data could also increase the Town's chance of qualifying for various grants.

Earthquakes

Hazard Summary

Earthquakes are rare in Franklin County, however temblors are unpredictable and can cause significant damage to roads, structures, facilities, utilities, and population. Existing and future mitigation efforts should continue to be developed and employed that will enable the Town to be prepared for earthquakes.

While rare in Franklin County, earthquakes have happened in New England. New England experiences an average of 30 to 40 earthquakes each year although most are not noticed by people.²⁹ 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 landslides, 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.³⁰

Data Collected and Used

The National Oceanic and Atmospheric Administration recorded no earthquakes for Franklin County in the last 20 years. The Commonwealth of Massachusetts State Hazard Mitigation Plan 2010 was also reviewed for information on earthquake hazard data and mitigation measures.

Impact on the Community

Exposure and Loss Estimation

A major earthquake could cause severe damage to Erving buildings, including older structures that were built before a 1975 law requiring new buildings to withstand earthquakes.

Property Damage

Historic data for earthquake events indicate that between 1991 and 2010, no earthquakes were recorded in Franklin County during this period, causing no damage to property.³¹

Population Impacts

Populations considered most vulnerable to earthquake impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Table 3-33 summarizes the population over the age of 65 or living in households with an income below \$20,000 per year.

Table 3-33: Senior and Low Income Populations in Erving Exposed to Natural Hazard Events

Population Category	Number of Persons Exposed	Percentage of Total Population
Senior (Over 65 years of age)	202	13.8%
Low Income (Persons with annual incomes less than \$20,000)*	284	19.4%
Total	486	33.2%

²⁹ Northeast States Emergency Consortium web site: www.nesec.org/hazards/earthquakes.cfm

³⁰ Federal Emergency Management Agency web site: www.fema.gov/hazards/earthquakes/quake.shtm.

³¹ NOAA National Climactic Data Center. <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

* Low income population was calculated by multiplying 2000 U.S. Census Households with Incomes of Less than \$20,000 (116) by 2000 U.S. Census Average Household Size (2.45).
Source: 2000 U.S. Census.

The entire built environment of Erving is vulnerable to earthquakes. Table 3-34 identifies the assessed value of all residential, commercial, and industrial land uses in Erving, and the losses that would result from 1%, 5%, and 10% damage to this inventory as a result of an earthquake.

Table 3-34: Potential Estimated Loss by Land Use

Land Use	Total Assessed Value	1% Damage Loss Estimate	5% Damage Loss Estimate	10% Damage Loss Estimate
Residential	\$121,791,060	\$1,217,911	\$6,089,553	\$12,179,106
Commercial	\$7,227,231	\$72,272	\$361,362	\$722,723
Industrial	\$295,631,498	\$2,956,315	\$14,781,575	\$29,563,150
Total	\$424,649,789	\$4,246,498	\$21,232,489	\$42,464,979

Source: Massachusetts Department of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010.

Overall Vulnerability Assessment

Earthquakes, while rare, could cause significant impacts and losses to the roads, structures, facilities, utilities, and population of Erving. Existing and future mitigation efforts should continue to be developed and employed that will enable Erving to be prepared for these events when they occur. Particular areas of vulnerability include low-income and elderly populations, trailer homes and buildings erected before 1975, and infrastructure such as roadways and utilities that could be damaged by earthquakes. According to members of the Local Natural Hazard Mitigation Team, no earthquakes have impacted Erving in the last 20 years.

Data Deficiencies

In assessing the risks to Erving from earthquakes, no data deficiencies were identified.

Wildland Fires/Brushfires

Hazard Summary

According to data from Massachusetts Fire Incident Reporting System of the Massachusetts Department of Fire Services, the Erving Fire Department responded to ten wildfires between 2004 and 2009. Wildfires can damage woodlands, homes, utilities and buildings, and could cause injuries or deaths. Existing and future mitigation efforts should continue to be developed and employed that will enable the Town to be prepared for these events.

Burn piles that blaze out of control, lightning strikes in forested land, campfires improperly managed, and arson can cause wildfires. Erving is vulnerable to these conflagrations, especially in times of drought. As indicated in the vulnerability assessment section, dead timber from the 2008 ice storm may have contributed to subsequent wildfires, particularly the one on Horse Hill in 2010. Fire suppression can be expensive and dangerous for firefighters, and wildfires can threaten wildlife and human habitat and health.

Data Collected and Used

National weather databases and Town of Erving data were collected and analyzed. Data on historic property damage and loss, and injuries and deaths, was collected for Franklin County from the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center website. Data from this website shows no wildfires have occurred in or impacted Franklin County in the last 20 years. According to the Massachusetts Department of Fire Services Fire Incident Reporting System (MFIRS), 10 brushfires were reported in Erving between 2004 and 2009. The Commonwealth of Massachusetts State Hazard Mitigation Plan 2010 was also reviewed for information on wildland fires and brushfires hazard data and mitigation measures.

Impact on the Community

Exposure and Loss Estimation

A major out-of-control wildfire can damage property, utilities and forested land; create smoke that can cause breathing problems; and injure or kill people.

Property Damage

No property damage, injuries or deaths have been recorded for Erving's ten fires between 2004 and 2009. However the brushfire on Horse Hill in 2010 was noted as being of significant size and severity.

Population Impacts

Populations considered most vulnerable to wildfire impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Table 3-35 summarizes the population over the age of 65 or living in households with an income below \$20,000 per year.

Table 3-35: Senior and Low Income Populations in Erving Exposed to Natural Hazard Events

Population Category	Number of Persons Exposed	Percentage of Total Population
Senior (Over 65 years of age)	202	13.8%
Low Income (Persons with annual incomes less than \$20,000)*	284	19.4%
Total	486	33.2%

* Low income population was calculated by multiplying 2000 U.S. Census Households with Incomes of Less than \$20,000 (116) by 2000 U.S. Census Average Household Size (2.45).

Source: 2000 U.S. Census.

Because Erving is heavily wooded, has so many historic wooden structures, and has the potential fuel load of dead trees and limbs from the 2008 ice storm, the entire built environment of the Town is vulnerable to a wildfire. Table 3-36 identifies the building type and valuation of this inventory as well as the losses that would result from 1%, 5%, and 10% damage to this inventory as a result of a wildfire.

Table 3-36: Potential Estimated Loss by Land Use

Land Use	Total Assessed Value	1% Damage Loss Estimate	5% Damage Loss Estimate	10% Damage Loss Estimate
Residential	\$121,791,060	\$1,217,911	\$6,089,553	\$12,179,106
Commercial	\$7,227,231	\$72,272	\$361,362	\$722,723
Industrial	\$295,631,498	\$2,956,315	\$14,781,575	\$29,563,150
Total	\$424,649,789	\$4,246,498	\$21,232,489	\$42,464,979

Source: Massachusetts Department of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010.

Overall Vulnerability Assessment

While wildfires have caused minimal damage, injury and loss of life to date in Erving, their potential to destroy property and cause injury or death exists. Existing and future mitigation efforts should continue to be developed and employed that will enable Erving to be prepared for these events when they occur. Wildfires can also cause utility disruption and air-quality problems. Particular areas of vulnerability include low-income and elderly populations.

Data Deficiencies

In assessing the risks to Erving from wildfire hazards, the following data deficiencies were identified:

- Records of damages to the built and natural environment due to wildfires in Erving is not consistently maintained. Data often resides with an individual and can be lost if that individual leaves his or her position. A more formal system of data collection and maintenance could be established and would help improve the Town's hazard mitigation planning. Better data could also increase the Town's chance of qualifying for various grants.

Dam Failure

Hazard Summary

Dams hold back water, and when a dam fails, the potential energy of the stored water behind the dam is instantly released as water rushes in 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. Existing and future mitigation efforts should continue to be developed and employed that will enable the Town to be prepared for these events.

When a dam fails, huge quantities of water quickly flow downstream. Areas adjacent to a river or stream or on low ground are in danger of being inundated by a large volume of water that could destroy structures, utilities, roadways and bridges, and cause injuries or deaths. 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.

Data Collected and Used

Data from the National Oceanic and Atmospheric Administration's National Climatic Data Center website shows no dam failures have occurred in or impacted Franklin County in the last 20 years. According to the members of the Local Natural Hazard Mitigation Team, no dam failures have occurred in Erving in the last 20 years.

Impact on the Community

Exposure and Loss Estimation

While dam failures are rare, their impacts can be devastating, including loss of property, disruption to infrastructure, and injury and death.

Property Damage

Historic data for dam failure events indicate that between 1993 and 2010, no events were recorded in Franklin County, causing no property damage or population impacts.

Population Impacts

Populations considered most vulnerable to dam failure are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Table 3-37 summarizes the population over the age of 65 or living in households with an income below \$20,000 per year.

Table 3-37: Senior and Low Income Populations in Erving Exposed to Natural Hazard Events

Population Category	Number of Persons Exposed	Percentage of Total Population
Senior (Over 65 years of age)	202	13.8%
Low Income (Persons with annual incomes less than \$20,000)*	284	19.4%
Total	486	33.2%

* Low income population was calculated by multiplying 2000 U.S. Census Households with Incomes of Less than \$20,000 (116) by 2000 U.S. Census Average Household Size (2.45).

Source: 2000 U.S. Census.

Structures that lie in the inundation area of each of the dams in Erving are vulnerable to a dam failure. Table 3-38 identifies the building type and valuation for all residential, commercial, and industrial uses in Town, as well as the losses that would result from 1%, 5%, and 10% damage to this inventory as a result of a dam failure.

Table 3-38: Potential Estimated Loss by Land Use

Land Use	Total Assessed Value	1% Damage Loss Estimate	5% Damage Loss Estimate	10% Damage Loss Estimate
Residential	\$121,791,060	\$1,217,911	\$6,089,553	\$12,179,106
Commercial	\$7,227,231	\$72,272	\$361,362	\$722,723
Industrial	\$295,631,498	\$2,956,315	\$14,781,575	\$29,563,150
Total	\$424,649,789	\$4,246,498	\$21,232,489	\$42,464,979

Source: Massachusetts Department of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010.

Overall Vulnerability Assessment

Dam failures, while rare, can destroy roads, structures, facilities, utilities, and impact the population of Erving. Existing and future mitigation efforts should continue to be developed and employed that will enable Erving to be prepared for these events when they occur. Particular areas of vulnerability include low-income and elderly populations, buildings in the floodplain or inundation areas, and infrastructure such as roadways and utilities that can be damaged by such events. According to the members of the Local Natural Hazard Mitigation Team, no dam failures have occurred in the last 20 years in Erving.

In terms of beaver dam issues, there is some beaver activity in Erving that could potentially cause some flooding, including on Keyup Brook, backing up into Pete's Pond. This particular beaver dam is estimated by the Committee to have minimal impact currently.

There is also intermittent damming caused by beaver activity on the Millers River, however given the rapidity of the water on the river, the dams are highly unlikely to cause flooding and are more notable due to the sheer number of trees beavers have been downing. Beaver dam locations are shown on the Critical Facilities and Infrastructure map included with this report.

Data Deficiencies

In assessing the risks to Erving from dam failure hazards, the following data deficiencies were identified:

- Data for the location and condition of dams within Erving provided by the DCR Office of Dam Safety Legal Department was incomplete. This plan uses 2005 data.

Landslides

Hazard Summary

Landslides rarely occur in Franklin County but have occurred in the eastern part of the state: Following heavy rains in March 2010, Walpole and Topsfield experienced landslides that destroyed a storage building and closed a portion of Route 1. The Topsfield slide resulted in a tree land on a passing car, but no injuries were reported. Earlier that month, a mudslide at a construction site brought mud within 12 feet of train tracks at the Wellesley Hills station of the Massachusetts Bay Transportation Authority in Wellesley. Landslides are most often caused by heavy rains destabilizing slopes but can have other causes, including clearing land for development, earthquakes, and vibrations from machinery or blasting. Landslides can be dangerous because they are unexpected and fast. They can bury structures with little warning and rescue efforts can be threatened by new slides.

Data Collected and Used

National Oceanic and Atmospheric Administration's National Climactic Data Center website shows no landslide events in Franklin County for the last 20 years. The Commonwealth of Massachusetts State Hazard Mitigation Plan 2010 was also reviewed for information on landslide hazard data and mitigation measures.

Impact to the Community

Exposure and Loss Estimation

While landslides are rare, their impacts can be devastating, including loss of property, disruption to infrastructure, and injury and death. Continued development, particularly on steep slopes or unstable soils, increases the chances that landslides will be a danger.

Property Damage

Historic data for landslide events indicate that between 1993 and 2010, no landslide events were recorded in Franklin County.

Population Impacts

Populations considered most vulnerable to landslide impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Table 3-39 summarizes the population over the age of 65 or living in households with an income below \$20,000 per year.

Table 3-39: Senior and Low Income Populations in Erving Exposed to Natural Hazard Events

Population Category	Number of Persons Exposed	Percentage of Total Population
Senior (Over 65 years of age)	202	13.8%
Low Income (Persons with annual incomes less than \$20,000)*	284	19.4%
Total	486	33.2%

* Low income population was calculated by multiplying 2000 U.S. Census Households with Incomes of Less than \$20,000 (116) by 2000 U.S. Census Average Household Size (2.45).

Source: 2000 U.S. Census.

Table 3-40 identifies the assessed value of all residential, commercial, and industrial uses in Town, as well as the losses that would result from 1%, 5%, and 10% damage to this inventory as a result of a massive landslide.

Table 3-40: Potential Estimated Loss by Land Use

Land Use	Total Assessed Value	1% Damage Loss Estimate	5% Damage Loss Estimate	10% Damage Loss Estimate
Residential	\$121,791,060	\$1,217,911	\$6,089,553	\$12,179,106
Commercial	\$7,227,231	\$72,272	\$361,362	\$722,723
Industrial	\$295,631,498	\$2,956,315	\$14,781,575	\$29,563,150
Total	\$424,649,789	\$4,246,498	\$21,232,489	\$42,464,979

Source: Massachusetts Department of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010.

Overall Vulnerability Assessment

Landslides, while rare in Franklin County, can destroy roads, structures, facilities, utilities, and impact the population of Erving. Existing and future mitigation efforts should continue to be developed and employed that will enable Erving to be prepared for these events when they occur.

Particular areas of vulnerability include low-income and elderly populations, and buildings, roadways, and utilities near the foot of slopes, especially when slopes are destabilized. According to the members of the Local Natural Hazard Mitigation Team, no landslides have occurred in the last 20 years in Erving.

Data Deficiencies

In assessing the risks to Erving from landslides, no data deficiencies were identified.

Ice Jams

Hazard Summary

Ice jams (or ice dams) occur when water builds up behind a blockage of ice. Ice jams can occur in various ways, but in New England they predominantly form on rivers and streams and mainly threaten infrastructure.

When the upstream part of a river thaws first and the ice is carried downstream into the still-frozen part of the watercourse, ice can form an ice dam and flood low lying areas upstream of the jam. Also, once an ice dam breaks apart, the sudden surge of water that breaks through the dam can flood areas downstream of the jam. The resulting flow of water when an ice jam is broken can cause flooding downstream, threatening infrastructure, structures, and roadways.

The structures and people most at risk from an ice jam are those within the floodplain. The average assessed values of the residential, commercial, and industrial land uses located within the floodplain are displayed in Table 3-41. The total average assessed value for these three land uses within the floodplain is \$33,026,632, with the largest assessed value falling within the industrial land use category at \$32,688,003. This is of concern because should a catastrophic flooding event befall Erving, the assessed values of these structures and facilities would likely be significantly reduced, which in turn would impact the town's tax revenues.

Table 3-41: Average Assessed Value of Land Use in Flood Hazard Area

Land Use	Total Acres in Town	Total Assessed Value	Average Assessed Value Per Acre	Acres in Flood Hazard Area	Average Assessed Value in Flood Hazard Area
Residential	386.05	\$121,791,060	\$315,480	0.98	\$309,170
Commercial	29.44	\$7,227,231	\$245,490	0.12	\$29,459
Industrial	49.29	\$295,631,498	\$5,997,799	5.45	\$32,688,003

Source: Massachusetts Department of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010; 2005 MassGIS Land Use data.

Data Collected and Used

The National Oceanic and Atmospheric Administration's National Climactic Data Center website shows no ice jam events or damage in Erving over the last 20 years. The Commonwealth of Massachusetts State Hazard Mitigation Plan 2010 was also reviewed for information on ice jam hazard data and mitigation measures.

Impact to the Community

Exposure and Loss Estimation

Losses to ice jams include the rising waters along the river or stream that is being dammed, and the rush of water downstream when the dam either melts or is broken up by human intervention. Buildings, roadways and utilities are threatened by ice blockages.

Property Damage

Data on ice jams in Franklin County indicate that no property damage or injuries or deaths occurred as the result of ice jams in the last 20 years.

Population Impact

Populations considered most vulnerable to ice jam impacts are identified based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Table 3-42 summarizes the population over the age of 65 or living in households with an income below \$20,000 per year.

Table 3-42: Senior and Low Income Populations in Erving Exposed to Natural Hazard Events

Population Category	Number of Persons Exposed	Percentage of Total Population
Senior (Over 65 years of age)	202	13.8%
Low Income (Persons with annual incomes less than \$20,000)*	284	19.4%
Total	486	33.2%

* Low income population was calculated by multiplying 2000 U.S. Census Households with Incomes of Less than \$20,000 (116) by 2000 U.S. Census Average Household Size (2.45). Source: 2000 U.S. Census.

The built environment in the floodplain of Erving is vulnerable to ice jam events. Land uses located in the floodplain are discussed in the flooding section above. Table 3-43 identifies the average assessed value for all residential, commercial, and industrial uses in Town, as well as the losses that would result from 1%, 5%, and 10% damage to this inventory as a result of an ice jam.

Table 3-43: Potential Estimated Loss by Land Use Category

Land Use	Total Acres in Town	Total Assessed Value	Average Assessed Value Per Acre	Acres in Flood Hazard Area	Average Assessed Value in Flood Hazard Area
Residential	386.05	\$121,791,060	\$315,480	0.98	\$309,170
Commercial	29.44	\$7,227,231	\$245,490	0.12	\$29,459
Industrial	49.29	\$295,631,498	\$5,997,799	5.45	\$32,688,003

Source: MA Dept. of Revenue - Division of Local Services, Municipal Databank/Local Aid Section 2010; 2005 MassGIS Land Use data.

Overall Vulnerability Assessment

Ice jams occur throughout New England, often causing significant impacts and losses to roads, structures, facilities, utilities, and the population. Existing and future mitigation efforts should

continue to be developed and employed that will enable Erving to be prepared for these events when they occur. Particular areas of vulnerability include low-income and elderly populations, trailer homes, and infrastructure such as roadways near rivers and streams and utilities and low-lying areas. According to the members of the Local Natural Hazard Mitigation Team, no ice jams have occurred in the last 20 years in Erving.

Data Deficiencies

In assessing the risks to Erving from ice jams, no data deficiencies were identified.

DEVELOPMENT TRENDS ANALYSIS

In assessing development trends for the Town of Erving - and the impact those trends might have on hazard mitigation - the Committee was asked to evaluate the probability of development in town and areas most likely to be targeted for development. The Committee was also asked about changes in industry, proposed housing and retail development, and any major highway or public transit improvements that might change accessibility to parts of town. Additionally, data such as number of construction permits issued, change in population, current zoning bylaws and the acres of developable land was considered.

The Committee forecasted that little to no development is likely over the next ten years. There are no proposed housing or retail developments pending and no development pressures such as big box stores. There are no pending changes in industry and no changes in highway or transit that might impact accessibility in town.

The Committee's assessment of development trends is reflected in the data consulted. According to Census data for new privately-owned residential building permits issued in Erving, a total of 69 permits were issued between the years 2000 and 2009. More notably, in the past four years, only 1.5 permits have been issued annually. ^[1] In terms of non-residential buildings, only the Senior Center was identified by the Committee as being constructed recently.

The total estimated population for 2009 in Erving is 1,549. The population increase in Erving between 2000 and 2009, based on estimated 2009 census figures, was 82 people or 5.29%. This increase is one of the highest in Franklin County, which saw an estimated increase of .28% countywide. It is possible this relatively larger increase in Erving occurred earlier in the 2000s, based on when the majority of the residential building permits were issued.

As discussed in the Vulnerability Assessment Section of this plan, current development in the flood plain includes less than six acres of commercial, public/institutional and industrial uses and one acre of residential use. The majority of the land in and along the floodplain is undeveloped and is zoned Rural Residential, Village Residential or Central Village. An analysis of the percentage of acres in the floodplain zoned either Rural Residential or Central Village relies on estimations. Further GIS analysis beyond the scope of the current project would be necessary to determine the exact number of developable acres in and along the floodplain.

^[1] <http://censtats.census.gov/cgi-bin/bldgprmt/bldgbrowse.pl>

Generally speaking though, the vast majority of the 210 acres of land in the floodplain is in a narrow strip – less than a tenth of a mile wide – running primarily between the Millers River and Route 2. The Millers River forms the southern boundary of Erving. In Ervingside, on the eastern end of town, where Route 2 and Route 63 intersect, the flood plain widens out to approximately a tenth of a mile. Of those 210 floodplain acres, approximately 90%, or 189 acres, are zoned “Rural Residential”. The remaining approximately 10%, or 21 acres, of the floodplain are zoned “Village Residential” or “Central Village”. “Village Residential” acreage in the floodplain occurs in the west end of Town in Ervingside along Route 2 and in Farley, on Route 2, in the central part of Town. “Central Village” zoned acreage in the floodplain is located Farley and again on the other end of the Town in the Town Center.

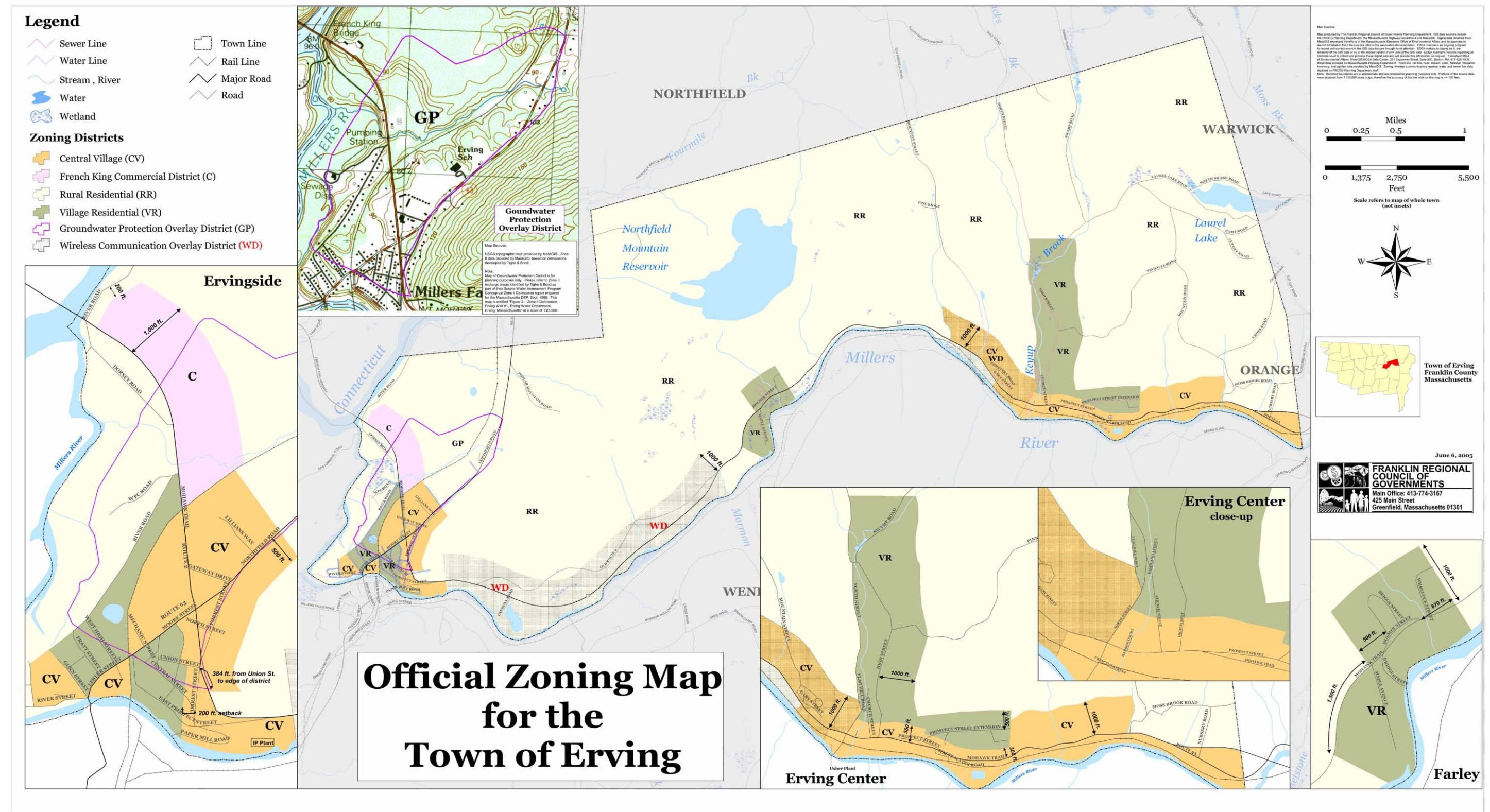
Based on the Dimensional Schedule in Section 5 of Erving’s Zoning Bylaws, updated in 2009, the minimum lot size for both Village Residential and Central Village zoned land is one half acre. Land zoned Rural Residential has a minimum lot size of 2 acres. Using the approximate floodplain acreage in each Zoning District and the minimum lot size, a projection of the potential developable lots in the floodplain is shown in Table 3-44.

Table 3-44: Potential Developable Acres in Floodplain Based on Zoning Districts and Minimum Lot Sizes

Zoning District	Approximate Acres in Floodplain	Current Zoning Minimum Lot Size per Use	Potential Developable Lots Based on Current Zoning
Rural Residential	189	2	95
Village Residential	11	.5	22
Central Village	10	.5	22
Approximate Totals:	210		139

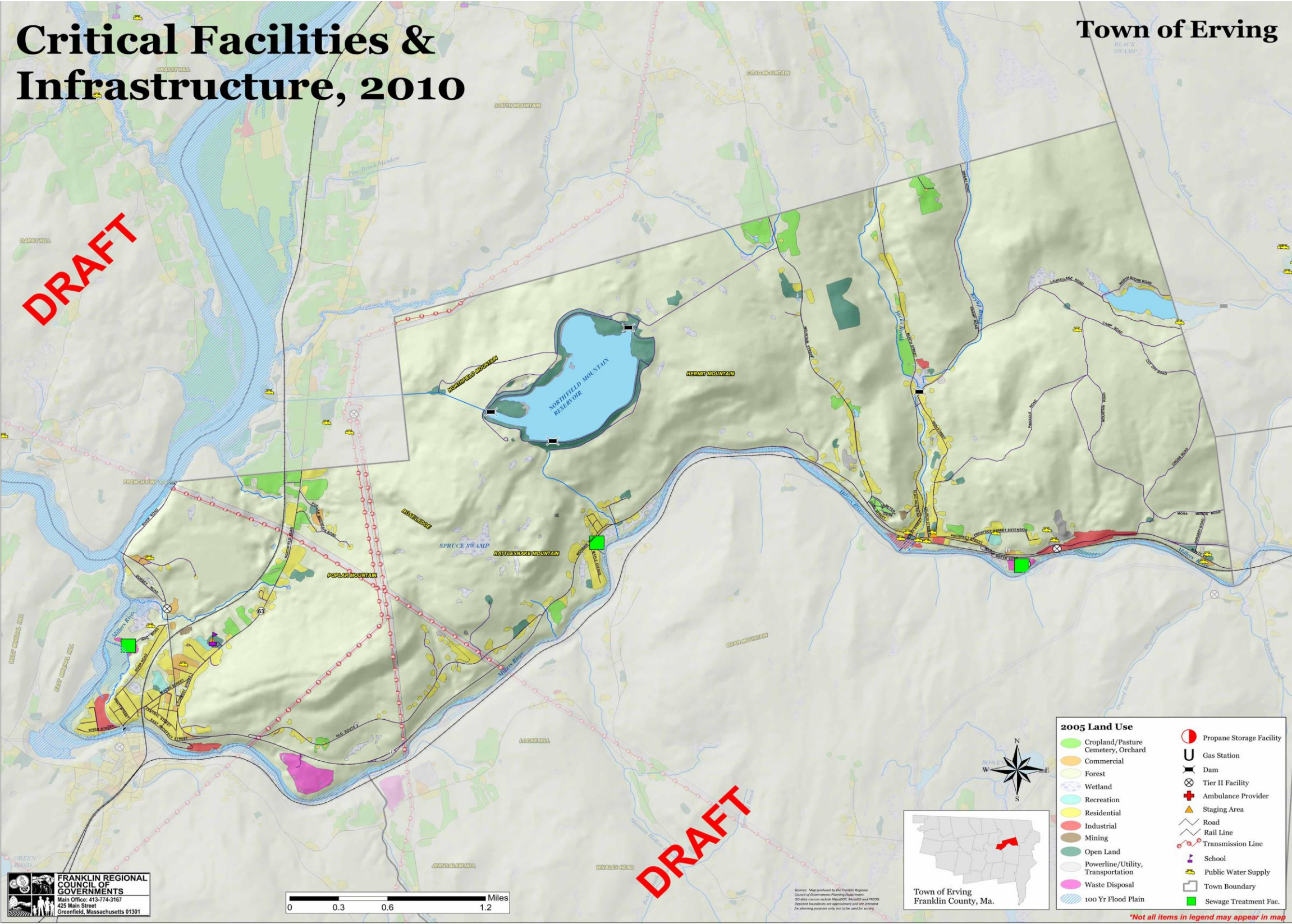
The total of 139 potential developable lots does not take into consideration constraints such as river buffers, highway setbacks, slopes and other constraining factors. But the fact remains there is a potential for more development along the beautiful Millers River and, with that development, the potential flooding impacts on structures and occupants. Couple this potential development with the fact that Erving currently has little zoning constraints on development in land in and along the flood hazard area other than those detailed in Table 4-1. In the 2005 Erving Natural Hazards Mitigation plan, Action Items included implementing a Floodplain District Overlay restricting or limiting development within the floodplain and within areas prone to flooding. This Action Item has not been addressed and remains a critical element of hazard mitigation, where flood hazards and development are concerned.

Map 3-1: Erving Zoning Map 2010³²



³² Erving 2010 Open Space and Recreation Plan, FRCOG.

Map 3-1: Erving 2010 Critical Facilities and Infrastructure



4 –MITIGATION STRATEGY

This section of the Hazard Mitigation Plan is the long-term blueprint for reducing the potential losses identified in the risk assessment.

CURRENT MITIGATION STRATEGIES

Flooding

The Critical Facilities, Infrastructure, 2005 Land Use & Natural Hazards Map for the Town of Erving 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 1% chance of occurring in any given year.

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

Management Plans

The Comprehensive Emergency Management (CEM) Plan for Erving 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 Erving is enrolled in the National Flood Insurance Program.
- Strict adherence should be paid to land use and building codes, (e.g., Wetlands Protection Act), and new construction should not be built in flood prone areas.
- Ensure that flood control works are in good operating condition at all times.
- Natural water storage areas should be preserved.
- Maintain plans for managing all flood emergency response activities including addressing potentially hazardous dams.

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

- Place emergency operations center (EOC) personnel on standby during stage of flood 'watch' and monitor NWS/New England River Forecast Center reports.

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

Evacuation Options

The majority of land in the 100-year floodplain in Erving is along the Connecticut and Millers rivers. Most of the residential and commercial development in Town is located outside but immediately adjacent to the 100-year floodplain. The Erving CEM plan lists one shelter for victims of flooding: Erving Elementary School on Northfield Road.³³ An additional shelter identified by the Committee is the Senior Center at 18 Pleasant Street, in the same section of town as the Elementary School. There is an estimated maximum peak population of 70 in the affected flooding area. According to natural hazard maps,³⁴ the school is well out of the 100-year floodplain and the Northfield Mountain Project inundation areas.

There is little potential 100-year floodplain hazard in Erving. Localized flooding and inundation due to dam failure are much greater hazards for the Town. Emergency management personnel should assess existing floodplain and dam failure data to determine an appropriate evacuation plan. Note should also be taken of the fact that the Town's wastewater treatment facilities lay within or adjacent to the floodplain. There is potential for the release of hazardous materials and infectious waste from those facilities during a flood.

³³ According to information provided by the Erving Assessor's Office, the Erving Elementary School was built circa 1974. A major addition and complete renovation was completed in 2002. The school has kitchen facilities and limited shower facilities (two 3/4 baths). The other identified shelter in Erving, the First Congregational Church, was built circa 1842. It has no kitchen or shower facilities.

³⁴ The Critical Facilities, Infrastructure, 2005 Land Use & Natural Hazards Map for the Town of Erving, prepared by the Franklin Regional Council of Governments for this project.

The three population centers in Town face very different flooding concerns and thus will address evacuation efforts in different ways. Erving is the area of Town situated at the confluence of the Connecticut and Millers Rivers. Residents in this area would likely be impacted by a failure of either the Northwest Dike or the Northfield Main Dam. The identified flooding shelter is the Erving Elementary School for this area of Town and this is the most likely destination for residents of Erving during a flood event. This is also the section of Town with the largest area within the 100-year floodplain and there is the potential for localized flooding in the River Street area.

The village of Farley is most susceptible to flooding damage as a result of the failure of the Northfield Main Dam. It is estimated that water from the reservoir would reach the Millers River in 13 minutes. Flooding along Briggs Brook would be immediate and have potentially catastrophic effects. Inundation maps for the Northfield Mountain Project suggest that an area of at least 500 feet on either side of the brook would be affected by a sunny day breach of the dam. There is no identified shelter for the residents of Farley. Route 2 runs through the affected area and is the most likely evacuation route residents will take in the event of a dam failure, although Committee members indicated that a failure of the Main Dam would likely entirely wash out the section of Route 2 through the village of Farley, leaving evacuation via this route unlikely at best.

Erving Center could be affected by the backwash due to dam failure at the Northfield Mountain Project. Additionally, localized flooding is a concern in this area. Keyup Brook is susceptible to periodic localized flooding in several areas, and West Main Street has also experienced flooding problems.

Flood Control Structures

FEMA has identified no flood control structures within the Town of Erving. Floods on the Connecticut River and portions of its major tributaries that are prone to backwater effects are controlled by nine flood control reservoirs located upstream in Massachusetts, New Hampshire, and Vermont.

Land Use Regulations that Mitigate Impacts from Flooding

The Town of Erving 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

Erving's Subdivision Rules and Regulations were adopted on December 11, 2000 for the purpose of "protecting the safety, convenience and the general welfare of the inhabitants of the Town of Erving by regulating the laying out and constructing of ways in subdivisions providing access to the several lots therein, but which have not become public ways, and ensuring sanitary conditions in subdivisions, and in proper cases, parks and open areas." The powers of the planning board shall be exercised to secure safety in the case of emergency situations. The Subdivision Rules and Regulations contain several provisions that mitigate the potential for flooding, including:

- (Section V Part C) Definitive Plan – Contents. Requires the proponent, in part, to identify:
 - Existing and proposed topography at 2 foot contour intervals for gentle slopes (less than 25%) and 5 foot contour intervals for steep slopes (greater than 25%) with elevations, shall be provided at 10 foot intervals;
 - Street frontage, land area, and identification number for each proposed lot;
 - Floodplains and drainage courses. Waterbodies, wetlands, swamps and marshes, rock or ledge outcroppings. Stone walls, trees, and other significant natural features;
 - Subsurface conditions on the tract, location and results of all tests made to ascertain subsurface soil, rock and water conditions, depth to ground water, and location of soil percolation tests if individual sewage disposal systems are proposed.
 - Size and location of existing and proposed water supply facilities;
 - Location of street paving, sidewalks, curbs, gutters, storm drains and drain lines and all easements with statements of purpose of each easement;
 - A storm drainage system showing invert and rim elevations of all catch basins and man-holes together with surface elevations of all waterways within the subdivision at 100 foot intervals and the approximate depth of water at these points. Surface elevation and approximate depth of water at the annual high water line shown at each point where the drainage point ends at a waterway. Drainage calculations prepared by the applicant's engineer, including design criteria used, drainage areas and other information sufficient for the Board to check the size of any proposed drain, or bridge. Existing storm sewage should be shown.
 - Cross sections and construction details including: a) roadway section showing paving, crown, berm, shoulder, sidewalks, curb and curbstones and all other components and features; b) details for catch basins, manholes, endwalls, and all other components and features, with specific references to the appropriate sections of the State Construction Standards; c) drainage trench or waterway relocation section.

The Definitive Plan is further required to include prints delineating significant features including streams and other waterbodies, wetlands, wetlands 100-foot buffer zone, floodplains and drainage easements, and open space and recreation areas.

- (Section 5 Part D) Performance Guarantee. Before approval of a Definitive Plan, the subdivider shall file a performance guarantee in an amount determined by the Board to be sufficient to cover the cost plus fifteen percent of all or any part of the improvements (including drainage improvements) specified in Section 8 Required Improvements of the Town of Erving Subdivision Regulations. Final release of the performance guarantee shall be contingent on the completion of improvements, within two and a half (2 1/2) years of date of bond or deposit. If the Board determines that said improvements have been completed as required, and that all

costs due the Town have been paid, and recording requirements have been met, it shall release the interest of the Town in the bond.

- (Section 8 Part B) Curbs and Gutters. Major streets shall have granite or concrete curbs at all intersections and grades of greater than six percent. Curbs may additionally be required on any street where the Planning Board deems that special conditions of topography, drainage, alignment, or unusually high densities so require. In all situations where curbing is not required, the roadway edge and adjoining grass plot shall be treated so as to adequately provide for the carrying of surface water runoff.
- (Section 8 Part E) Utilities. The adequate disposal of surface water shall be provided in accordance with good engineering practices.

Zoning Bylaws

The Town of Erving adopted new Zoning Bylaws in June 2005. The Bylaws were last amended in October 2009. The following sections from the Bylaws contain provisions that mitigate the potential for flooding.

Section 2.2 Environmental Controls.

- Section 2.2.1 Erosion Control. The Planning Board or Zoning Board of Appeals may require, for any proposed development requiring a Special Permit or variance, that the site design, building design or construction processes be modified so as to protect soil from erosion or excessive uncontrolled surface water runoff. A Special Permit is required for construction or grading on slopes of greater than 25%. Such permits will only be issued provided that demonstration has been made that adequate provision exists to protect against erosion, soil instability, uncontrolled surface water runoff and other environmental degradation. The Planning Board may require the developer to provide topographic data prior to acting upon an application for a Special Permit. The bylaw includes environmental controls that mitigate the potential for flooding.
- Section 2.4.4 Flooding. The floodway, as shown on the FIRM map for the Town of Erving, for any stream or river shall not be reduced by filling.
- Section 2.2.6 Removal of Natural Materials. The removal of sod, earth, mineral aggregates, stone or rock from a parcel of land shall require a Special Permit except where it is incidental to the construction of an approved building or is a routine part of normal farming or house maintenance operations.
- Section 2.2.7 Hillside Areas. Hillside areas shall be retained with vegetative cover as follows:

Average Slope (by %):	Minimum % of the slope that must remain covered with vegetation:
10.0 – 14.9	25
15.0 – 19.9	40

Average Slope (by %):	Minimum % of the slope that must remain covered with vegetation:
20.0 – 24.9	55
25.0 – 29.9	70
30+	85

- **Section 2.2.8 Stormwater Management.** All development shall comply with the stormwater management regulations promulgated by the Massachusetts Department of Environmental Protection and the U.S. Environmental Protection Agency and other reasonable requirements established by the Planning Board, Highway Superintendent, or Town Engineer.

Section 8.2 Conservation Development.

The purpose of a Conservation Development is to encourage the preservation of common land for conservation, agriculture, open space, forestry and recreational use; to preserve historical or archaeological resources; to protect existing or potential public or private water supplies; to protect the value of real property; to promote more sensitive siting of buildings and better overall site planning; to promote better utilization of land in harmony with its natural features and with the general intent of the Zoning Bylaw through a greater flexibility in design; and to allow more efficient provision of municipal services.

- **Section 8.2.3 Criteria for Approval.** The Planning Board may grant a Special Permit under this section only if it finds that the applicant has met certain criteria, including:
 - D. That it is superior to a conventional plan in preserving land, significant site features, or landscapes.
 - E. That it minimizes environmental disruption.
- **Section 8.2.4 Minimum Requirements.**
 - F. Each lot shall be of a size and shape to provide a building site which shall be in harmony with the natural terrain and other features of the land.
 - G. At least thirty-five percent (35%) of the total parcel of land shall be set aside as common land, not including wetlands, water bodies, floodplains, slopes greater than twenty-five (25%), roadways, and land prohibited from development by legally enforceable restrictions, easements or covenants, and other constraints dictated by the Erving Zoning Bylaw.
- **Section 8.2.6 Required Conservation Land.**
 - A. All land not devoted to dwellings, accessory uses, roads, or other development shall be set aside as common land for recreation, conservation, or agricultural uses which preserve the land in essentially its natural condition. As a general guidance, natural resource land such as wetlands or land that is suitable for extensive public recreational use, should be conveyed to the Town or to a land trust; whereas land

which will be principally used by the residents of the Conservation Development should be conveyed to a home owners association.

River and Stream Protection

The Town of Erving follows the standards established by the Wetlands Protection Act.

Erving Open Space and Recreation Plan

The 2010 Erving Open Space and Recreation Plan identifies the resources critical to the Town's future welfare, and devise and implement procedures to protect them. Results of a survey accompanying the plan show that Erving residents value the quality of natural resources in Town, and feel it is important to preserve resources such as clean drinking water, lakes, streams, and ponds.. The plan includes objectives that aid in mitigating flooding, including prioritizing Town-sponsored land protection projects that conserve forestland, drinking water, streams and ponds, open fields, scenic views, wildlife habitat, and wetlands.

National Flood Insurance Program

The Town of Erving participates in the National Flood Insurance Program. As of September 2010, there were two (2) policies in effect in Erving for a total of \$700,000 worth of insurance. The Town is not a member of the Community Rating System, which entitles policyholders to a discount on flood insurance premiums. The CRS ranking is based on the steps the town has taken to control flood losses.

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

Table 4-1: Existing Flood Hazard Mitigation Measures

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
Floodplain Overlay District	<ul style="list-style-type: none"> The Town does not have a floodplain overlay district. The Town follows the standards set by the Wetlands Protection Act. 	None	If adopted, can be effective for controlling development in flood prone areas.	The Town should consider establishing a floodplain overlay district for areas within the 100-year floodplain and those prone to localized flooding. The FRCOG has developed a model floodplain overlay district that could be used.	Recommended in 2005 Plan, not yet accomplished, still relevant
				The Town should consider limiting or otherwise discouraging development within these identified areas.	Recommended in 2005 Plan, not yet accomplished, still relevant
Subdivision Rules and Regulations	<ul style="list-style-type: none"> Requires a Definitive Plan for new subdivisions, including location of storm drainage systems, waterbodies, marshes, floodplains, and wetland areas. Performance guarantee ensures that subdividers cover the cost of construction and improvements for projects. 	Entire Town	Somewhat effective for mitigating or preventing localized flooding of roads and other infrastructure.	Consider adding Flood Prevention and Mitigation to purpose section of the Subdivision Rules and Regulations.	Recommended in 2005 Plan, not yet accomplished, still relevant
			Somewhat effective for controlling impacts from stormwater runoff.	Definitive plan should identify impacts and include flooding mitigation measures.	Recommended in 2005 Plan, not yet accomplished, still relevant
				Consider updating subdivision regulations with respect to watercourses and protection of natural features and reference current Wetlands	Recommended in 2005 Plan, not yet accomplished, still relevant

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
				<p>Protection Act and Rivers Protection Act.</p> <p>Consider requiring Impact Statements for construction beyond a set number of lots.</p> <p>Design standards should more clearly address stormwater runoff.</p> <p>Consider updating subdivision regulations to prohibit permanent alteration of watercourses or streams.</p>	<p>Recommended in 2005 Plan, not yet accomplished, still relevant</p> <p>Recommended in 2005 Plan, not yet accomplished, still relevant</p> <p>Recommended in 2005 Plan, not yet accomplished, still relevant</p>
Curb and Gutter Regulations	<ul style="list-style-type: none"> Major streets shall have granite or concrete curbs at all intersections and grades of greater than six (6) percent or for special circumstances. Where curbing is not required, roadway edge and adjoining plot shall be treated to provide for surface water runoff. 	Entire Town	Somewhat effective for mitigating or preventing localized flooding of roads and other infrastructure.	<p>Consider adding formal regulations for new driveway openings or curb cuts that include grade and design standards to prevent runoff and icing conditions.</p> <p>Driveway curb cut requests for ANR and subdivision plans should be submitted to Highway Superintendent for review and approval prior to the decision by the Planning Board and within the time frame established by Massachusetts General Law.</p>	<p>Recommended in 2005 Plan, not yet accomplished, still relevant</p> <p>Recommended in 2005 Plan, not yet accomplished, still relevant</p>

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
Environmental Controls	<ul style="list-style-type: none"> Guidelines establish that site design, building design and construction processes protect soil from erosion and uncontrolled surface water runoff. 	Entire Town.	Effective for mitigating or preventing localized flooding of roads and other infrastructure.	Consider requiring all Environmental Controls listed below for all new construction.	Recommended in 2005 Plan, not yet accomplished, still relevant
	<ul style="list-style-type: none"> Special permits are required for construction and grading on slopes greater than 25%. 		Effective for controlling impacts from stormwater runoff.		Recommended in 2005 Plan, not yet accomplished, still relevant
	<ul style="list-style-type: none"> The floodway, as shown on the FIRM map for the Town of Erving, for any stream or river should not be reduced by fill. 		Effective for controlling impacts from stormwater runoff.		Recommended in 2005 Plan, not yet accomplished, still relevant
	<ul style="list-style-type: none"> Removal of sod, earth, mineral aggregates, stone or rock from a parcel of land requires a Special Permit except when incidental to the construction of an approved building or part of normal farming or house maintenance operations. 		Effective for controlling erosion from flooding		Recommended in 2011 Plan
	<ul style="list-style-type: none"> A percentage of vegetative cover on hillside areas must be retained based on average slope. 		Effective for controlling erosion from flooding		Recommended in 2011 Plan
	<ul style="list-style-type: none"> All development must comply with the stormwater management regulations of the 		Effective for mitigating or preventing localized flooding of roads and other		Recommended in 2011 Plan

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
	Massachusetts Department of Environmental Protection and the U.S. Environmental Protection Agency		infrastructure.		
Conservation Development Bylaw	<ul style="list-style-type: none"> Requires at least 35% of total parcel to be set aside as common land for recreation, conservation or agricultural uses. 	Entire Town.	Effective for maintaining undisturbed corridors crucial for stormwater absorption	Consider adopting for Zoning or Subdivision Bylaws	Recommended in 2011 Plan
Participation in the National Flood Insurance Program	<ul style="list-style-type: none"> As of 2010, there were two (2) flood insurance policies in effect in the Town. 	Areas identified by the FEMA maps.	Somewhat effective, provided that the Town remains enrolled in the National Flood Insurance Program.	The Town should consider becoming a part of FEMA's Community Rating System.	Recommended in 2005 Plan, not yet accomplished, still relevant
State Building Code	<ul style="list-style-type: none"> The Town of Erving has adopted the Massachusetts State Building Code. 	Entire Town.	Effective	None	N/A
Town of Erving Open Space and Recreation Plan	<ul style="list-style-type: none"> Inventories natural features and promotes natural resource preservation in the Town, including areas in the floodplain, such as wetlands, aquifer recharge areas, farms and open space, rivers, streams, brooks. 	Entire Town.	<p>Effective in identifying sensitive resource areas, including floodplains.</p> <p>Encourages open space and farmland preservation to provide flood storage capacity.</p>	None	N/A

Severe Snow/Ice Storms

Winter storms can be especially challenging for emergency management personnel even though the duration and amount of expected amount of snowfall has usually been forecast. The Massachusetts Emergency Management Agency (MEMA) serves as the primary coordinating entity in the statewide management of all types of winter storms and monitors the National Weather Service (NWS) alerting systems during periods when winter storms are expected.³⁵

Management Plans

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

- Develop and disseminate emergency public information concerning winter storms, especially material that 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 Erving 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.

³⁵ Comprehensive Emergency Management Plan for the Town of Erving, April 2002.

- Dispatch search and rescue and emergency medical teams.
- Take measures to guard against further danger from power failure, downed trees and utility lines, ice, traffic problems, etc.
- Close roads and/or limit access to certain areas if appropriate.
- Provide assistance to homebound populations needing heat, food and other necessities.
- Provide rescue and sheltering for stranded/lost individuals.

Restrictions on Development

There are no restrictions on development that are directly related to severe winter storms.

The Town of Erving Subdivision Rules and Regulations set grade limits on streets (Section 7 Part A Design Standards), which, although not specified as weather hazard mitigation, can serve to minimize accident potential from severe winter storms.

- (Section 7 Part A Subset f) Design Standards – Streets. The maximum grade of streets shall be six (6) percent for major streets, nine (9) percent for secondary streets and twelve (12) percent for minor streets.
- (Section 8 Part E) Required Improvements – Utilities. Undergrounding of utilities will be determined by the Planning Board.

Other Mitigation Measures

Severe snowstorms or ice storms can often result in a small or widespread loss of electrical service. The Erving Water Department uses a pump to get water into the Town water tower, which distributes water from a gravity feed system. Should a natural hazard disable the pump, Town water supplies are anticipated to last for seven days. The wastewater treatment plants in Erving are equipped with standby power sources.

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. The Town of Erving is a member of the Franklin County Cooperative Building Inspection Program, which provides building inspection services.

Table 4-2: Existing Severe Snowstorms/Ice Storms Hazard Mitigation Measures

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
Subdivision Regulations – Design Standards for Roads	<ul style="list-style-type: none"> Standards include street grade regulations (twelve percent maximum). 	Entire Town	Effective	None	N/A
Subdivision Regulations – Utilities (electric and telephone)	<ul style="list-style-type: none"> The Planning Board has discretion over the undergrounding of utility lines in subdivisions. 	Entire Town	Somewhat effective for ensuring that utility service is uninterrupted by severe storms in new areas of residential development.	<p>Consider requiring utility lines be placed underground in new subdivisions.</p> <p>Encourage utility companies to underground existing utility lines in locations where repetitive outages occur.</p> <p>Encourage utility companies to underground new utility lines for ANR lots.</p> <p>Encourage regular tree maintenance to reduce number of limbs near overhead power lines.</p>	All Subdivision Regulation changes recommended in 2005 Plan, not yet accomplished, still relevant
State Building Code	<ul style="list-style-type: none"> The Town of Erving has adopted the Massachusetts State Building Code. 	Entire Town	Effective	None	N/A
Shelters	<ul style="list-style-type: none"> Shelters for victims of natural hazards in Erving have been identified. 	Entire Town	Effective	Ensure that identified shelters have sufficient back-up utility service in the event of primary power failure.	Recommended in 2005 Plan, not yet accomplished, still relevant

Hurricanes

Of all the natural disasters that could potentially impact Erving, 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).³⁶ 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.

Management Plans

The CEM Plan for Erving 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 Erving is enrolled in the National Flood Insurance Program.
- Develop and enforce local building codes to enhance structural resistance to high winds and flooding. Build new construction in areas that are not vulnerable to direct hurricane effects.
- Maintain plans for managing all hurricane emergency response activities.

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

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

³⁶ Comprehensive Emergency Management Plan for the Town of Erving, 2010.

- Activate mutual aid activities.
- Take measures to guard against further danger from downed trees and utility lines, debris, etc.

Evacuation Options

The Erving CEM plan lists the Erving Congregational Church and Erving Elementary School as shelters for hurricane victims. An estimated peak population of over 500 people would be affected by a hurricane in Erving.

Zoning

The Wireless Communication Zoning Bylaw establishes a Wireless Communication Overlay District in order to “designate areas in which wireless communication facilities may be located in order to protect Erving’s community character and minimize the harm to public health, safety, and general welfare.” The Bylaw requires that such facilities should be set back from property lines at a distance equal to the vertical height of the tower, all towers should be at least 500 feet away from any residential building and 1,000 feet from any school, and that the maximum height of such towers should be no more than 120 feet from natural ground level. Additionally, no new towers or monopoles may be erected in any scenic or historical area as identified by the Town’s Open Space Plan or Master Plan. The Bylaw requires a special permit from the Planning Board before such a facility can be erected.

Restrictions on Development

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

Mobile Homes

- (Section 4.2.2) Residential Uses. These regulations allow for mobile homes to be treated the same as other homes. Mobile home parks will need as much land as an apartment house with the same number of units. Specifically, mobile homes must meet State Sanitary Code requirements, be installed on a continuous concrete or masonry foundation, and meet all other requirements of the bylaws applicable to single-family dwellings.

State Building Code

For new or recently built structures, the primary protection against wind-related damage is construction according to the State Building Code, which addresses designing buildings to withstand high winds. The Town of Erving is a member of the Franklin County Cooperative Building Inspection Program, which provides building inspection services.

Tornadoes

Worcester County and areas just to its west, including portions of Franklin County, have been dubbed the “tornado alley” of the state because the majority of significant tornadoes in Massachusetts’s weather history have occurred in that region.³⁷ 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.³⁸ Like earthquakes, the location and extent of potential damaging impacts of a tornado are completely unpredictable. Most damage from tornadoes comes from high winds that can fell trees and electrical wires, generate hurtling debris and, possibly, hail.

As listed on the Erving Critical Facilities, Infrastructure, 2005 Land Use and Natural Hazards Map, On July 11, 1958, a tornado was reported in Erving and was ranked F2 (Significant Tornado) on the Fujita Scale of Tornado Intensity. The tornado touched down on the Connecticut River in an uninhabited area near Warner Road in Erving. The extent of damage it caused is unknown. Since the 1950s, there have been over twenty tornadoes that have touched down in Franklin County.

Management Plans

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

- Designate appropriate shelter space in the community that could potentially withstand tornado impact.
- Periodically test and exercise tornado response plans.
- Put emergency management on standby at tornado ‘watch’ stage.
- At tornado ‘warning’ stage, broadcast public warning/notification safety instructions and status reports.
- Conduct evacuation, reception and sheltering services to victims.
- Dispatch search and rescue and emergency medical teams.

³⁷ Comprehensive Emergency Management Plan for the Town of Erving, 2010.

³⁸ www.ibhs.org.

- Activate mutual aid agreements.
- Take measures to guard against further injury from such dangers as ruptured gas lines, downed trees and utility lines, debris, etc.
- Acquire needed emergency food, water fuel and medical supplies.
- Take measures relating to the identification and disposition of remains of the deceased.

Evacuation Plans

There is no shelter for tornado victims identified in the Erving CEM Plan.

Zoning

The Wireless Communication Zoning Bylaw establishes a Wireless Communication Overlay District in order to “designate areas in which wireless communication facilities may be located in order to protect Erving’s community character and minimize the harm to public health, safety, and general welfare.” The Bylaw requires that such facilities should be set back from property lines at a distance equal to the vertical height of the tower, all towers should be at least 500 feet away from any residential building and 1,000 feet from any school, and that the maximum height of such towers should be no more than 120 feet from natural ground level. Additionally, no new towers or monopoles may be erected in any scenic or historical area as identified by the Town’s Open Space Plan or Master Plan. The Bylaw requires a special permit from the Planning Board before such a facility can be erected.

Restrictions on Development

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

Mobile Homes

- (Section 4.2.2) Residential Uses. These regulations allow for mobile homes to be treated the same as other homes. Mobile home parks will need as much land as an apartment house with the same number of units. Specifically, mobile homes must meet State Sanitary Code requirements, be installed on a continuous concrete or masonry foundation, and meet all other requirements of the bylaws applicable to single-family dwellings.

State Building Code

For new or recently built structures, the primary protection against wind-related damage is construction according to the State Building Code, which addresses designing buildings to withstand high winds. The Town of Erving is a member of the Franklin County Cooperative Building Inspection Program, which provides building inspection services.

Table 4-3: Existing Hurricane & Tornado Hazard Mitigation Measures (Wind-related)

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
Zoning regulations for wireless communications facilities	<ul style="list-style-type: none"> Requires a special permit from the Planning Board. Wireless facilities should be set back from property lines at a distance equal to or greater than the vertical height of the tower. Facilities are not permitted within 500 feet of a residential lot line or 1,000 feet of a school. 	Entire Town	Effective	Add safety and prevention of wind-related damage as a stated purpose.	All Wireless regulations listed were recommended in 2005 Plan, not yet accomplished, still relevant
State Building Code	<ul style="list-style-type: none"> The Town of Erving has adopted the Massachusetts State Building Code. 	Entire Town	Effective	None	N/A
	<ul style="list-style-type: none"> A debris management plan could be developed.³⁹ 	Entire Town	Effective	Consider participation in the creation of a Regional Debris Management Plan.	A Regional Debris Management Plan was created in January of 2009

²⁷ 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>.

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
Zoning Regulations regulating new mobile homes	<ul style="list-style-type: none"> Town of Erving Zoning Bylaw allows mobile homes within the Town provided they meet State Sanitary Code requirements and requirements for single family dwellings. 	Entire Town.	Not effective.	<p>Require tiedowns for new mobile homes to prevent wind damage or disallow mobile homes.</p> <p>Consider using Community Development Block Grant home rehabilitation funds to assist homeowners in retrofitting grandfathered mobile homes.</p>	<p>Recommended in 2005 Plan, not yet accomplished, still relevant</p> <p>Recommended in 2005 Plan, not yet accomplished, still relevant</p>
Subdivision Regulations – Utilities (electric and telephone)	<ul style="list-style-type: none"> The Planning Board has discretion over the undergrounding of utility lines in subdivisions. 	Entire Town.	Somewhat effective for ensuring that utility service is uninterrupted by severe storms in new areas of residential development.	<p>Consider requiring utility lines be placed underground in new subdivisions.</p> <p>Encourage utility companies to underground existing utility lines in locations where repetitive outages occur.</p> <p>Encourage utility companies to underground new utility lines for ANR lots.</p> <p>Encourage regular tree maintenance to reduce number of overhead limbs near overhead electrical lines.</p>	<p>Recommended in 2005 Plan, not yet accomplished, still relevant</p> <p>Recommended in 2005 Plan, not yet accomplished, still relevant</p> <p>Recommended in 2005 Plan, not yet accomplished, still relevant</p>
Shelters	<ul style="list-style-type: none"> Shelters for victims of natural hazards 	Entire Town.	Effective, provided shelters have adequate	Ensure that identified shelters have sufficient	All shelter items recommended in 2005 Plan, not yet

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
	– except for tornadoes - in Erving have been identified.		facilities and capacity for estimated affected population.	<p>back-up utility service in the event of primary power failure.</p> <p>Ensure that shelters can withstand wind-related damage.</p> <p>Encourage the addition of an identified shelter for victims of tornadoes.</p>	accomplished, still relevant

Wildfires/Brushfires

Franklin County has approximately 356,174 acres of forested land, which accounts for 77% of total land area. Forest fires are therefore a potentially significant issue. Eighty-three percent of Erving is forested, including 2,524 acres of state park in the Erving State Forest. A large portion of the Town is therefore at risk of fire. In October 2001, 140 acres of Hermit Mountain burned. Fire control efforts extended over a week and required three days of assistance from two helicopters from the Air National Guard Station at Westover Reserve Air Base in Chicopee, Massachusetts.

Erving State Forest is occasionally thinned by the Department of Conservation and Recreation Bureau of Fire Control to prevent forest fires.

Management Plans and Regulatory Measures

The CEM Plan for Erving includes the following generic mitigation measures for wildfire planning and response:

- Promote fire safety measures such as fire-safe landscaping and construction practices to the public and business communities.

The CEM Plan for Erving includes the following generic preparedness and response measures for wildfires:

- Restrict outside burning etc. based on moisture levels, fuels supply conditions such as drought.
- Identify high vulnerability or problem areas.
- Utilize mutual aid, including the State Fire Mobilization Plan, as needed.

Burn Permits

The Erving Fire Chief personally oversees the dispensation of burn permits for the Town. In 2010, approximately 200 permits were issued. Each permit is issued on a case-by-case situation according to several factors including where the property is located and any past problems with burning on that property. The Fire Chief monitors permitted properties on a daily basis. Specific burn permit guidelines are established by the state, such as the burning season and the time when a burn may begin on a given day. It may be beneficial for the state to change some of their regulations to prevent wildfires and brushfires. Currently, the burning season extends from January 15th to May 1st. If the burning season were to start in November or December and end in April, this would allow for a longer season during the months found to be, traditionally, the least dry in Massachusetts. Currently, residents may only burn between 10 a.m. and 4 p.m. If state guidelines were changed to allow for an earlier start time, this would allow for most of the burning to be conducted in the morning before winds traditionally increase.

Subdivision Review

The Erving Fire Department reviews subdivision plans to ensure that their trucks will have adequate access and that the water supply is adequate for firefighting purposes. Cul-de-sac

streets are required to have a turn around sufficient to accommodate the Town's largest fire truck. (Section 7 Design Standards, Part A Streets, Subset h).

Public Education/Outreach

The Erving Fire Department has several ongoing educational programs to educate residents on fire safety. In lieu of state mandated guidelines requiring four annual fire drills in each school, the Erving fire Department runs 12 annual drills. The Erving Fire Department is actively involved in teaching fire safety during Fire Prevention Week.

Restrictions on Development

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

Final Draft

Table 4-4: Existing Wildfire/Brushfire Hazard Mitigation Measures

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
Burn Permits	<ul style="list-style-type: none"> Residents receive burn permits directly from the Erving Fire Chief. 	Entire Town	Effective	None	N/A
Subdivision Review	<ul style="list-style-type: none"> The fire department is involved in the review of subdivision plans. 	Entire Town	Effective	None	N/A
Public Education/Outreach	<ul style="list-style-type: none"> The fire department has an ongoing educational program in the schools. The fire department has initiated an ongoing junior firefighter program in the Town. 	Entire Town	Effective	None	N/A
Erving State Forest	<ul style="list-style-type: none"> Adequate and well-maintained fire roads provide access to state forest for firefighting purposes. 	Entire Town	Effective, providing roads are maintained.	The Town should coordinate with the state to ensure that roads useful for fighting forest fires are well-maintained.	Recommended in 2005 Plan, not yet accomplished, still relevant

Earthquakes

Although there are five mapped seismological faults in Massachusetts, there is no discernable pattern of previous earthquakes along these faults (including one which runs along the western side of the Town of Erving) nor is there a reliable way to predict future earthquakes along these faults or in any other areas of the state. Consequently, earthquakes are arguably the most difficult natural hazard to plan for. Most buildings and structures in the state were constructed without specific earthquake resistant design features.

Management Plans

The Erving 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 Erving 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.
- It is assumed that all special needs facilities could be affected to some extent by earthquake effects therefore preparedness measures should be in place to address the needs of all facilities listed in the Resource Manual.
- 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.
- Emergency warning/notification information and instructions will be broadcast to the public.
- Search and rescue and emergency medical teams will be dispatched.
- Firefighters will address fires/explosions and HAZMAT incidents.
- Law enforcement personnel will coordinate evacuation and traffic control as well as protecting critical facilities and conducting surveillance against criminal activities.
- Reception centers will be opened and staffed.
- Animal control measures will be taken.
- Immediate life-threatening hazards will be addressed such as broken gas lines, or downed utility wires.
- Emergency food, water and fuel will be acquired.
- Activate mutual aid.
- Measures will be taken by the chief medical examiner relating to identification and disposition of remains of the deceased.

Evacuation Options

The Erving CEM lists two shelters for victims of earthquakes, the Erving Congregational Church and Erving Elementary School. The CEM plan does not identify the maximum peak population affected by an earthquake.

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, 8th Edition of the Massachusetts State Building Code. Given that most structures in Massachusetts were built before 1975, many buildings and structures do not have specific earthquake resistant design features. According to the 2000 U.S. Census, 70% of the housing in Erving was built before 1970. In addition, built areas underlain by artificial fill, sandy or clay soils are particularly vulnerable to damage during an earthquake. The Town of Erving is a member of the Franklin County Cooperative Building Inspection Program, which provides building inspection services.

Restrictions on Development

There are no seismic-related restrictions on development.

Table 4-5: Existing Earthquake Hazard Mitigation Measures

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
State Building Code	<ul style="list-style-type: none"> The Town of Erving has adopted the 8th Edition of the State Building Code. 	Entire Town but applies to new construction only.	Effective for new buildings or substantial renovations of existing buildings only.	Evaluate older structures, particularly schools and shelters, to determine if they are earthquake resistant. If not, identify alternate structures as shelters for earthquake events.	Recommended in 2005 Plan, not yet accomplished, still relevant
Debris Management Plan	<ul style="list-style-type: none"> A debris management plan could be developed. 	Entire Town.	Effective.	Consider participation in the creation of a Regional Debris Management Plan.	A Regional Debris Management Plan was created in January of 2009.

Dam Failures

The only mitigation measures in place are the state regulations that control the construction and inspection of dams. The Erving CEM Plan states that there are three categories of dam failure or overspill and that action should be taken according to hazard rating:

Type 1: Slowly developing condition

- Activate EOC;
- Activate all communication networks and establish 24-hour communications with Command Post.
- Release public information;
- Notify the following:
 - MEMA region headquarters
 - American Red Cross
 - downstream communities;
- Review plans for evacuation and sheltering
 - Evacuation
 - Routes
 - Notification
 - Sheltering
 - Availability and capacity
 - Food, supplies and equipment
 - Shelter owners and managers
 - Other communities (if out of Town sheltering is required)
- Require 'stand by' status of designated emergency response forces.

Type 2: Rapidly developing condition

- Establish 24-hour communication from the damsite to EOC;
- Assemble, brief and assign specific responsibilities to emergency response forces;
- Release public information;
- Obtain and prepare required vehicles/equipment for movement; and,
- Prepare to issue warning.

Type 3: Practically instantaneous failure

- Issue warning;
- Commence immediate evacuation;

- Commit required resources to support evacuation;
- Activate shelters or coordinate activation of shelters located outside the community;
- Notify:
 - MEMA region headquarters
 - American Red Cross
- Initiate other measures as required to protect lives and property.

Management Plans and Regulatory Measures

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

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

The Erving 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 effects.
- Develop procedures for monitoring dam site conditions at first sign of any irregularity that could precipitate dam failure.
- Identify special needs populations, evacuation 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 earthmoving machinery.
- Establish incident command post as close to affected area as safely possible.
- Provide security for evacuated public and private property.

The MA DCR Office of Dam Safety provided information about five dams in Erving. They are the Krusiewick Pond Dam, the Millers Falls Tool Company Dam, the Northfield Mountain Main Dam, the Northfield Mountain Northwest Dike and Spillway and the Northfield Mountain West Dike Inlet.

All three Northfield Mountain Project dams are classified as Significant Hazards by the MA DCR Office of Dam Safety. The remaining two dams in Erving are classified as low hazard dams.

Northfield Mountain Facility informs Town officials when they are holding their annual safety drill and maintains a list of property owners on Briggs Brook who must be informed in the event of failure or imminent failure of the Main Dam on the Upper Reservoir. However, there is no similar provision for residents in other areas of Town.

Additional dams found upstream on the Connecticut River in neighboring states may pose a hazard to the Town of Erving. Some publicly owned reservoirs and dams that are located upstream of Erving include Townshend Lake and North Springfield Lake in Vermont, and Surry Mountain Lake and Otter Brook Lake in New Hampshire⁴⁰ as well as Vernon Dam and Moore Dam. Hazard ratings and inundation areas for these structures are not yet available. All are rated high hazard and have Emergency Action Plans in place, excepting Vernon Dam, which is rated low hazard.⁴¹ Vernon and Moore Dams are owned by TransCanada. According to their Emergency Action Plan for the Vernon Dam, there is no flood impact to Erving calculated, in the event of failure. For a Moore Dam failure, under “probable maximum flood” conditions, the EAP shows flooding in the low areas of Erving. The flood wave would arrive in Erving approximately 24 hrs after the breach and the TransCanada plan implies Erving would be notified by the National Weather Service radio alert system. In reality, all the towns and cities Western MA would already be on high alert and nearly everyone in the low areas would have been previously evacuated or at least notified.

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.

⁴⁰ New England River Basins Commission, *The River's Reach*, December 1976.

⁴¹ Low hazard dams are inspected by FERC at three-year intervals. By failing, a low hazard dam is not expected to lead to loss of life or property. However, cracks or leakages in any dam must be monitored and repaired.

Dam Inspections

The DCR requires that dams rated as Low Hazard Potential be inspected every ten (10) years, dams rated as Significant Hazard Potential be inspected every five (5) years, and dams rated as High Hazard Potential be inspected every two (2) years. Owners of dams are responsible for hiring a qualified engineer to inspect their dams and report the results to the DCR. Owners of High Hazard Potential dams and certain Significant Hazard Potential dams are also required to prepare, maintain, and update Emergency Action Plans. Potential problems may arise if the ownership of a dam is unknown or contested. Additionally, the cost of hiring an engineer to inspect a dam or to prepare an Emergency Action Plan may be prohibitive for some owners.

Zoning

There is no mention made regarding the construction of new dams in the Town of Erving's Zoning or subdivision regulations.

Restrictions on Development

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

Table 4-6: Existing Dam Failure Hazard Mitigation Measures

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
Permits required for new dam construction	<ul style="list-style-type: none"> State law requires a permit for the construction of any dam. 	Entire Town.	Effective. Ensures dams are adequately designed.	None.	N/A
Dam Inspections	<ul style="list-style-type: none"> DCR has an inspection schedule that is based on the hazard rating of the dam (low, significant, high hazard). FERC requires Emergency Action Plans for all high hazard dams it oversees. 	Entire Town.	Low. Since 2004, new State regulations have gone into effect placing the responsibility of dam inspections on the owners of the dams, rather than the DCR. Owners of High Hazard Potential and certain Significant Hazard Potential dams are also responsible for preparing Emergency Action Plans.	<p>Adequate staff and resources should be given to DCR to ensure the inspection schedules are maintained.</p> <p>Map dams and inundation areas.</p> <p>Identify sources of funding for dam safety inspections.</p> <p>Incorporate dam safety into development review process.</p> <p>Emergency action plans should be prepared for all High Hazard Potential dams impacting the Town, including those located in surrounding communities.</p>	All Dam Inspection items recommended in 2005 Plan, not yet accomplished, still relevant
Evacuation Plans	<ul style="list-style-type: none"> Comprehensive evacuation plans would ensure the safety of the citizens in the event of dam failure. 	Inundation areas in Town.	Not Effective. The preparation of inundation mapping and evacuation plans is expensive for owners of dams.	<p>Owners of High Hazard Potential dams should prepare inundation area mapping and up to date evacuation plans in cooperation with the Town.</p> <p>Encourage Northfield</p>	<p>Recommended in 2005 Plan, not yet accomplished, still relevant</p> <p>Complete - Northfield</p>

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/ Still Relevant?
				Mountain Facility to add all impacted residents to call list in case of imminent dam failure.	Mountain / FirstLight Power is meeting the FERC requirements in this matter
Subdivision Plans	<ul style="list-style-type: none"> Applicants should identify if new development is in inundation areas. 	Entire Town.	Effective for identifying areas of development requiring evacuation.	Try to minimize new development in inundation areas by requiring to the extent possible that new lots be located outside of inundation areas.	Recommended in 2005 Plan, not yet accomplished, still relevant

Landslides

Regulating land use and development to avoid construction on steep slopes and ensuring that construction does not reduce slope stability is one way to mitigate the hazard potential of landslides. The following regulations contain strategies that help reduce the risk of landslides in Erving.

Land Use Regulations

Subdivision Rules and Regulations

The Subdivision Rules and Regulations contain several provisions that mitigate the potential for landslides, including,

- (Section V Part C) Definitive Plan – Contents. Requires the proponent, in part, to identify:
 - Existing and proposed topography at 2 foot contour intervals for gentle slopes (less than 25%) and 5 foot contour intervals for steep slopes (greater than 25%) with elevations, shall be provided at 10 foot intervals;
 - Floodplains and drainage courses. Waterbodies, wetlands, swamps and marshes, rock or ledge outcroppings. Stone walls, trees, and other significant natural features;
 - Subsurface conditions on the tract, location and results of all tests made to ascertain subsurface soil, rock and water conditions, depth to ground water, and location of soil percolation tests if individual sewage disposal systems are proposed.
 - Size and location of existing and proposed water supply facilities;
 - Location of street paving, sidewalks, curbs, gutters, storm drains and drain lines and all easements with statements of purpose of each easement;
 - A storm drainage system showing invert and rim elevations of all catch basins and man-holes together with surface elevations of all waterways within the subdivision at 100 foot intervals and the approximate depth of water at these points. Surface elevation and approximate depth of water at the annual high water line shown at each point where the drainage point ends at a waterway. Drainage calculations prepared by the applicant's engineer, including design criteria used, drainage areas and other information sufficient for the Board to check the size of any proposed drain, or bridge. Existing storm sewage should be shown.
 - Cross sections and construction details including: a) roadway section showing paving, crown, berm, shoulder, sidewalks, curb and curbstones and all other components and features; b) details for catch basins, manholes, endwalls, and all other components and features, with specific references to the appropriate sections of the State Construction Standards; c) drainage trench or waterway relocation section.

The Definitive Plan is further required to include prints delineating significant features including streams and other waterbodies, wetlands, wetlands 100-foot buffer zone, floodplains and drainage easements, and open space and recreation areas.

- (Section 5 Part D) Performance Guarantee. Before approval of a Definitive Plan, the subdivider shall file a performance guarantee in an amount determined by the Board to be sufficient to cover the cost plus fifteen percent of all or any part of the improvements (including drainage improvements) specified in Section 8 Required Improvements of the Town of Erving Subdivision Regulations. Final release of the performance guarantee shall be contingent on the completion of improvements, within two and a half (2 1/2) years of date of bond or deposit. If the Board determines that said improvements have been completed as required, and that all costs due the Town have been paid, and recording requirements have been met, it shall release the interest of the Town in the bond.
- (Section 8 Part B) Curbs and Gutters. Major streets shall have granite or concrete curbs at all intersections and grades of greater than six percent. Curbs may additionally be required on any street where the Planning Board deems that special conditions of topography, drainage, alignment, or unusually high densities so require. In all situations where curbing is not required, the roadway edge and adjoining grass plot shall be treated so as to adequately provide for the carrying of surface water runoff.
- (Section 8 Part E) Utilities. The adequate disposal of surface water shall be provided in accordance with good engineering practices.

Zoning Bylaws

The Town of Erving adopted new Zoning Bylaws in June 2005. The Bylaws were last amended in October 2009. The following sections from the Bylaws contain provisions that mitigate the potential for landslides.

Section 2.2 Environmental Controls.

- Section 2.2.1 Erosion Control. The Planning Board or Zoning Board of Appeals may require, for any proposed development requiring a Special Permit or variance, that the site design, building design or construction processes be modified so as to protect soil from erosion or excessive uncontrolled surface water runoff. A Special Permit is required for construction or grading on slopes of greater than 25%. Such permits will only be issued provided that demonstration has been made that adequate provision exists to protect against erosion, soil instability, uncontrolled surface water runoff and other environmental degradation. The Planning Board may require the developer to provide topographic data prior to acting upon an application for a Special Permit. The bylaw includes environmental controls that mitigate the potential for flooding, including,
- Section 2.4.4 Flooding. The floodway, as shown on the FIRM map for the Town of Erving, for any stream or rivershall not be reduced by filling.

- Section 2.2.6 Removal of Natural Materials. The removal of sod, earth, mineral aggregates, stone or rock from a parcel of land shall require a Special Permit except where it is incidental to the construction of an approved building or is a routine part of normal farming or house maintenance operations.
- Section 2.2.7 Hillside Areas. Hillside areas shall be retained with vegetative cover as follows:

Average Slope (by %):	Minimum % of the slope that must remain covered with vegetation:
10.0 – 14.9	25
15.0 – 19.9	40
20.0 – 24.9	55
25.0 – 29.9	70
30+	85

- Section 2.2.8 Stormwater Management. All development shall comply with the stormwater management regulations promulgated by the Massachusetts Department of Environmental Protection and the U.S. Environmental Protection Agency and other reasonable requirements established by the Planning Board, Highway Superintendent, or Town Engineer.

Section 8.2 Conservation Development

The purpose of a Conservation Development is to encourage the preservation of common land for conservation, agriculture, open space, forestry and recreational use; to preserve historical or archaeological resources; to protect existing or potential public or private water supplies; to protect the value of real property; to promote more sensitive siting of buildings and better overall site planning; to promote better utilization of land in harmony with its natural features and with the general intent of the Zoning Bylaw through a greater flexibility in design; and to allow more efficient provision of municipal services.

- Section 8.2.3 Criteria for Approval. The Planning Board may grant a Special Permit under this section only if it finds that the applicant has met certain criteria, including:
 - D. That it is superior to a conventional plan in preserving land, significant site features, or landscapes.
 - E. That it minimizes environmental disruption.
- Section 8.2.4 Minimum Requirements.
 - F. Each lot shall be of a size and shape to provide a building site which shall be in harmony with the natural terrain and other features of the land.
 - G. At least thirty-five percent (35%) of the total parcel of land shall be set aside as common land, not including wetlands, water bodies, floodplains, slopes greater than twenty-five (25%), roadways, and land prohibited from development by legally enforceable restrictions, easements or covenants, and other constraints dictated by the Erving Zoning Bylaw.

- Section 8.2.6 Required Conservation Land.

- A. All land not devoted to dwellings, accessory uses, roads, or other development shall be set aside as common land for recreation, conservation, or agricultural uses which preserve the land in essentially its natural condition. As a general guidance, natural resource land such as wetlands or land that is suitable for extensive public recreational use, should be conveyed to the Town or to a land trust; whereas land which will be principally used by the residents of the Conservation Development should be conveyed to a home owners association.

Final Draft

Table 4-7: Existing Landslide Hazard Mitigation Measures

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes
Subdivision Rules and Regulations	<ul style="list-style-type: none"> Requires a Definitive Plan for new subdivisions, including existing and proposed topography, significant natural features, subsurface conditions, and a storm drainage system for the site. 	Entire Town	Effective.	N/A – this was added in 2011
Environmental Controls	<ul style="list-style-type: none"> Guidelines establish that site design, building design and construction processes protect soil from erosion and uncontrolled surface water runoff. Special permits are required for construction and grading on slopes greater than 25%. The floodway, as shown on the FIRM map for the Town of Erving, for any stream or river should not be reduced by fill. Removal of sod, earth, mineral aggregates, stone or rock from a parcel of land requires a Special Permit except when incidental to the construction of an approved building or part of normal farming or house maintenance operations. A percentage of vegetative cover on 	Entire Town	Effective.	N/A – this was added in 2011

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes
	<p>hillside areas must be retained based on average slope.</p> <ul style="list-style-type: none"> All development must comply with the stormwater management regulations of the Massachusetts Department of Environmental Protection and the U.S. Environmental Protection Agency 			

Ice Jams

The most common hazard associated with ice jams is flooding upstream of the ice jam. Therefore strategies to mitigate flooding are also appropriate for mitigating the impacts of ice jams.

Flood Control Structures

FEMA has identified no flood control structures within the Town of Erving. Floods on the Connecticut River and portions of its major tributaries that are prone to backwater effects are controlled by nine flood control reservoirs located upstream in Massachusetts, New Hampshire, and Vermont.

Land Use Regulations that Mitigate Impacts from Flooding

The Town of Erving 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.

Subdivision Rules and Regulations

Erving's Subdivision Rules and Regulations were adopted on December 11, 2000 for the purpose of "protecting the safety, convenience and the general welfare of the inhabitants of the Town of Erving by regulating the laying out and constructing of ways in subdivisions providing access to the several lots therein, but which have not become public ways, and ensuring sanitary conditions in subdivisions, and in proper cases, parks and open areas." The powers of the planning board shall be exercised to secure safety in the case of emergency situations. The Subdivision Rules and Regulations contain several provisions that mitigate the potential for flooding, including,

- (Section V Part C) Definitive Plan – Contents. Requires the proponent, in part, to identify:
 - Existing and proposed topography at 2 foot contour intervals for gentle slopes (less than 25%) and 5 foot contour intervals for steep slopes (greater than 25%) with elevations, shall be provided at 10 foot intervals;
 - Street frontage, land area, and identification number for each proposed lot;
 - Floodplains and drainage courses. Waterbodies, wetlands, swamps and marshes, rock or ledge outcroppings. Stone walls, trees, and other significant natural features;
 - Subsurface conditions on the tract, location and results of all tests made to ascertain subsurface soil, rock and water conditions, depth to ground water, and location of soil percolation tests if individual sewage disposal systems are proposed.
 - Size and location of existing and proposed water supply facilities;
 - Location of street paving, sidewalks, curbs, gutters, storm drains and drain lines and all easements with statements of purpose of each easement;
 - A storm drainage system showing invert and rim elevations of all catch basins and man-holes together with surface elevations of all waterways within the subdivision at 100 foot intervals and the approximate depth of water at these points. Surface elevation and approximate depth of water at the annual high

water line shown at each point where the drainage point ends at a waterway. Drainage calculations prepared by the applicant's engineer, including design criteria used, drainage areas and other information sufficient for the Board to check the size of any proposed drain, or bridge. Existing storm sewage should be shown.

- Cross sections and construction details including: a) roadway section showing paving, crown, berm, shoulder, sidewalks, curb and curbstones and all other components and features; b) details for catch basins, manholes, endwalls, and all other components and features, with specific references to the appropriate sections of the State Construction Standards; c) drainage trench or waterway relocation section.

The Definitive Plan is further required to include prints delineating significant features including streams and other waterbodies, wetlands, wetlands 100-foot buffer zone, floodplains and drainage easements, and open space and recreation areas.

- (Section 8 Part B) Curbs and Gutters. Major streets shall have granite or concrete curbs at all intersections and grades of greater than six percent. Curbs may additionally be required on any street where the Planning Board deems that special conditions of topography, drainage, alignment, or unusually high densities so require. In all situations where curbing is not required, the roadway edge and adjoining grass plot shall be treated so as to adequately provide for the carrying of surface water runoff.
- (Section 8 Part E) Utilities. The adequate disposal of surface water shall be provided in accordance with good engineering practices.

Zoning Bylaws

The Town of Erving adopted new Zoning Bylaws in June 2005. The Bylaws were last amended in October 2009. The following sections from the Bylaws contain provisions that mitigate the potential for flooding.

Section 2.2 Environmental Controls.

- Section 2.2.1 Erosion Control. The Planning Board or Zoning Board of Appeals may require, for any proposed development requiring a Special Permit or variance, that the site design, building design or construction processes be modified so as to protect soil from erosion or excessive uncontrolled surface water runoff. A Special Permit is required for construction or grading on slopes of greater than 25%. Such permits will only be issued provided that demonstration has been made that adequate provision exists to protect against erosion, soil instability, uncontrolled surface water runoff and other environmental degradation. The Planning Board may require the developer to provide topographic data prior to acting upon an application for a Special Permit. The bylaw includes environmental controls that mitigate the potential for flooding, including,
- Section 2.4.4 Flooding. The floodway, as shown on the FIRM map for the Town of Erving, for any stream or river shall not be reduced by filling.

- Section 2.2.6 Removal of Natural Materials. The removal of sod, earth, mineral aggregates, stone or rock from a parcel of land shall require a Special Permit except where it is incidental to the construction of an approved building or is a routine part of normal farming or house maintenance operations.
- Section 2.2.7 Hillside Areas. Hillside areas shall be retained with vegetative cover as follows:

Average Slope (by %):	Minimum % of the slope that must remain covered with vegetation:
10.0 – 14.9	25
15.0 – 19.9	40
20.0 – 24.9	55
25.0 – 29.9	70
30+	85

- Section 2.2.8 Stormwater Management. All development shall comply with the stormwater management regulations promulgated by the Massachusetts Department of Environmental Protection and the U.S. Environmental Protection Agency and other reasonable requirements established by the Planning Board, Highway Superintendent, or Town Engineer.

Section 8.2 Conservation Development

The purpose of a Conservation Development is to encourage the preservation of common land for conservation, agriculture, open space, forestry and recreational use; to preserve historical or archaeological resources; to protect existing or potential public or private water supplies; to protect the value of real property; to promote more sensitive siting of buildings and better overall site planning; to promote better utilization of land in harmony with its natural features and with the general intent of the Zoning Bylaw through a greater flexibility in design; and to allow more efficient provision of municipal services.

- Section 8.2.3 Criteria for Approval. The Planning Board may grant a Special Permit under this section only if it finds that the applicant has met certain criteria, including:

- D. That it is superior to a conventional plan in preserving land, significant site features, or landscapes.
- E. That it minimizes environmental disruption.

- Section 8.2.4 Minimum Requirements.

F. Each lot shall be of a size and shape to provide a building site which shall be in harmony with the natural terrain and other features of the land.

G. At least thirty-five percent (35%) of the total parcel of land shall be set aside as common land, not including wetlands, water bodies, floodplains, slopes greater than twenty-five (25%), roadways, and land prohibited from development by

legally enforceable restrictions, easements or covenants, and other constraints dictated by the Erving Zoning Bylaw.

- **Section 8.2.6 Required Conservation Land.**

A. All land not devoted to dwellings, accessory uses, roads, or other development shall be set aside as common land for recreation, conservation, or agricultural uses which preserve the land in essentially its natural condition. As a general guidance, natural resource land such as wetlands or land that is suitable for extensive public recreational use, should be conveyed to the Town or to a land trust; whereas land which will be principally used by the residents of the Conservation Development should be conveyed to a home owners association.

River and Stream Protection

The Town of Erving follows the standards established by the Wetlands Protection Act.

Erving Open Space and Recreation Plan

The 2010 Erving Open Space and Recreation Plan identifies the resources critical to the Town's future welfare, and devise and implement procedures to protect them. Results of a survey accompanying the plan show that Erving residents value the quality of natural resources in Town, and feel it is important to preserve resources such as clean drinking water, lakes, streams, and ponds.. The plan includes objectives that aid in mitigating flooding, including prioritizing Town-sponsored land protection projects that conserve forestland, drinking water, streams and ponds, open fields, scenic views, wildlife habitat, and wetlands.

National Flood Insurance Program

The Town of Erving participates in the National Flood Insurance Program. As of September 2010, there were two (2) policies in effect in Erving for a total of \$700,000 worth of insurance. The Town is not a member of the Community Rating System, which entitles policyholders to a discount on flood insurance premiums. The CRS ranking is based on the steps the town has taken to control flood losses.

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

Table 4-8: Existing Ice Jam Hazard Mitigation Measures

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes
Subdivision Rules and Regulations	<ul style="list-style-type: none">Requires a Definitive Plan for new subdivisions, including location of storm drainage systems, waterbodies, marshes, floodplains, and wetland areas.	Entire Town	Somewhat effective for mitigating or preventing localized flooding of roads and other infrastructure.	N/A – this was added in 2011

Manmade Hazards

Timely, informative and accurate notification of a hazardous material emergency is critical for an effective emergency response and for the safety and protection of Erving's citizens. With the frequency of transportation of hazardous materials via Route 2 and railroad, the possibility exists of a catastrophic accident or spill. Strategies to plan for the evacuation of residents and for the cleanup of any chemical spill are key to hazard mitigation.

Management Plans and Regulatory Measures

The following are generic preparedness and response measures for manmade hazards listed in the Town CEM Plan, specifically hazardous materials emergencies:

- The immediate notification of the community emergency coordinator and the State is required when a release of an extremely hazardous substance or hazardous chemical in an amount above the Reportable Quantity (RQ) occurs. Specific information is required by the notification such as chemical name, method of release, health effects, medical attention and protective actions.
- The Hazardous Materials Release Report Form must be used in the event of the release of a hazardous substance
- Both local and State response personnel, including the DEP must be notified immediately of a release. The local point of contact is the local fire department through the 911 dispatch Center.

Evacuation Options

Evacuation of an incident site could be required upon the recommendation of the on-scene commander. The routes of evacuation and staging areas for the evacuees will be determined by the Incident Commander. Once the incident site has been evacuated, law enforcement officials will support expanded evacuation if required. The necessity for additional evacuation will be determined by the Incident Commander.

Zoning Bylaws

Section 4.3 Groundwater Protection

The purpose of the Groundwater Protection District Bylaw is, among other things, to prevent temporary and permanent contamination of the environment. The Critical Facilities and Infrastructure Map shows the location of the District. The following uses, listed in 4.3.6 Use Regulations and related to hazardous materials are prohibited in the District:

- Storage of liquid petroleum products, except the following: a. normal household use, outdoor maintenance, and heating of a structure
- Storage of sludge or septage
- Landfilling of sludge or septage
- Facilities that generate, treat, store, or dispose of hazardous waste
- Automobile graveyards and junkyards
- Some treatment works that are subject to 314 CMR 5.00 including privately owned sewage treatment facilities (see Zoning Bylaws for complete description)

- Storage of hazardous materials, as defined in MGL Chapter 21E, unless they are in free-standing containers within buildings having an impervious floor surface which will contain any spill or in above ground covered tanks with a secondary containment area adequate to contain a spill equal to 110% of the size of the container's total storage.
- Industrial and commercial uses which discharge process wastewater on-site.
- Stockpiling and disposal of snow and ice containing deicing chemicals if brought in from outside the district.
- Storage of commercial fertilizers, as defined in MGL Chapter 128, Section 64, unless such storage is within a structure designated to prevent the generation and escape of contaminated runoff or leachate.
- The use of septic system cleaners which contain toxic or hazardous chemicals.

While the existence of this Bylaw, in and of itself, would not prevent hazardous materials accidents, it could potentially minimize the possibility of such accidents occurring in an area containing a drinking water source.

Table 4-9: Existing Manmade Hazard Mitigation Measures

Type of Existing Protection	Description	Area Covered	Effectiveness	2011 Potential Changes	Accomplished/Still Relevant?
Groundwater Protection Overlay District	<ul style="list-style-type: none">The Town of Erving has adopted Groundwater Protection Overlay District to protect areas important to drinking water supplies.	District	Effective for all new construction, reconstruction, or expansion of existing buildings and new or expanded uses.	None	N/A

FUTURE MITIGATION STRATEGIES

Hazard Mitigation Goal Statements and Action Plan

As part of the natural hazards mitigation planning process undertaken by the Erving Natural Hazards Mitigation Planning Committee, existing gaps in protection and possible deficiencies were identified and discussed. The committee then 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, Town department(s) responsible for implementation, and the proposed timeframe for implementation for each category of natural hazard are described below. There are also several general action items that were developed.

Action items from the previous plan were carried over where they were still applicable and/or where the item had not yet been completed. Those action items that have been completed since the last plan are listed below in the **2005 Action Items Completed** section.

Action Items were evaluated for potential costs and benefits. Several of the action items have multiple benefits because, if implemented, these action items will mitigate or prevent damages from more than one type of natural hazards. For example, updating the Subdivision Regulations to require 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. Action Items were prioritized and assigned completion dates based also upon available funds and resources and whether the project had already been started and was likely close to completion. Implementation was assigned to responsible departments / boards by the Committee.

2005 ACTION PLAN ITEMS COMPLETED

Action Item: *Identify shelters that are equipped with an auxiliary power supply in the event of primary power failure, are earthquake resistant and are outside of floodplain and inundation areas. Disseminate this information to appropriate Town departments.*

Responsible Department/Board: Building Inspector, Emergency Management Director

Proposed Completion Date: Completed 2010

Action Item: *Inventory supplies at existing shelters.*

Responsible Department/Board: Emergency Management Director, Planning Board, Fire Department, Police Department

Proposed Completion Date: Completed 2010

Action Item: *Develop a preliminary project proposal and cost estimate for Reverse 911.*

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

Proposed Completion Date: 2010

2011 GENERAL MITIGATION ACTION ITEMS

Goal Statement: To provide adequate shelter, water, food and basic first aid to displaced residents in the event of a natural disaster.

Action Item: *Develop a needs list and storage requirements. Establish arrangements with local or neighboring vendors for supplying shelters with potable water, food and first aid supplies in the event of a natural disaster.*

Responsible Department/Board: Emergency Management Director, Planning Board, Fire Department, Police Department

Proposed Completion Date: 2011

Action Item: *Identify a shelter location that is in a separate part of town from the existing two shelters – the Elementary School and the Senior Center – to ensure the town has viable shelter options should the existing shelters not be accessible due to a hazard event.*

Responsible Department/Board: Building Inspector, Emergency Management Director

Proposed Completion Date: 2011

Action Item: *Identify a shelter location to accommodate tornado events.*

Responsible Department/Board: Building Inspector, Emergency Management Director

Proposed Completion Date: 2011

Goal Statement: To provide adequate notification and information regarding evacuation procedures, etc., to residents in the event of a natural disaster.

Action Item: *Implement Reverse 911 project proposal.*

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

Proposed Completion Date: 2011

Action Item: *Collect, periodically update, and disseminate information on which local radio stations provide emergency information, what to include in a 'home survival kit,' how to prepare homes and other structures to withstand flooding and high winds, and the proper evacuation procedures to follow during a natural disaster or dam failure.*

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

Proposed Completion Date: Updated completion date of 2012. EMD stated they are using New Salem model and Western Mass Ready model.

Flooding

Overall, the Town of Erving's existing land use regulations reduce or eliminate localized flooding events, and control the quantity and quality of stormwater runoff. Long-range planning documents such as the Town's **2010 Open Space and Recreation Plans** also address flood prevention and mitigation either directly or indirectly in the goals and objectives listed in these documents. The Natural Hazards Planning Mitigation Committee did identify several ways to further strengthen the Town's flood prevention and mitigation efforts, as described below.

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

Action Item: *Consider implementing a Floodplain District Overlay Zoning Bylaw. Special consideration should be given to restricting or limiting new development within the 100-year floodplain and areas prone to localized flooding. Review the FRCOG model floodplain overlay district.*

Responsible Department/Board: Planning Board

Proposed Completion Date: 2013

Action Item: *As appropriate, consider adding flood prevention and mitigation to the Purpose Section of the Land Use regulations reviewed in Section 4 and noted in Table 4-1 of this report.*

Responsible Department/Board: Planning Board

Proposed Completion Date: 2013

Action Item: *Review evacuation procedures for the flood prone areas in Town (identified on the map⁴²) and update. These procedures should take into account ongoing MassDOT safety improvement projects on Route 2.*

Responsible Department/Board: Police Department, Fire Department

Proposed Completion Date: Ongoing

Action Item: *Review evacuation procedures for the Farley section of Town including alert radio testing and public outreach and awareness.*

Responsible Department/Board: Police Department, Fire Department, First Light Power

Proposed Completion Date: 2012

Action Item: *Coordinate with state and regional agencies to identify a location(s) for the temporary storage of contaminated/hazardous flood debris.*

Responsible Department/Board: Emergency Management Director, Planning Board, Franklin County Regional Emergency Planning Committee (REPC)

Proposed Completion Date: 2012

⁴² The Critical Facilities, Infrastructure, 2005 Land Use & Natural Hazards Map for the Town of Erving, created by the Franklin Regional Council of Governments for this project.

Action Item: *Support local and regional, watershed-wide open space protection efforts, particularly in floodplain areas.*

Responsible Department/Board: Planning Board, Select Board

Proposed Completion Date: Ongoing

Action Item: *Address streambank stabilization concerns to mitigate potential damming and flooding of Keyup Brook .*

Responsible Department/Board: Conservation Commission, Planning Board

Proposed Completion Date: Ongoing

Action Item: *Consider becoming a member of the Community Rating System through the National Flood Insurance Program.*

Responsible Department/Board: Planning Board

Proposed Completion Date: 2013

Severe Snow Storms/Ice Storms

Goal Statement: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to severe snow and ice storms.

Action Item: *Identify alternate shelters in Town with adequate shower and kitchen facilities as well as sufficient capacity to accommodate estimated number of victims.*

Responsible Department/Board: Emergency Management Director, Select Board

Proposed Completion Date: 2011

Hurricanes and Tornadoes

The action items listed above, under flooding, address the flooding that can result from a hurricane. The committee developed several action items to address the potential damage from high winds that often accompany hurricanes and tornadoes and the threat to public safety posed by these natural hazards.

Goal Statement: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to high winds associated with hurricanes and tornadoes.

Action Item: *Review and update Erving Zoning Bylaws that regulate wireless communication facilities. Consider adding 'the prevention of wind-related damage' as one of the purposes of the bylaw.*

Responsible Department/Board: Planning Board

Proposed Completion Date: 2013

Action Item: *Enforce the State Building Code to ensure new buildings are designed to withstand high winds.*

Responsible Department/Board: Building Inspector
Proposed Completion Date: Ongoing

Action Item: *Require tiedowns for mobile homes to prevent wind-related damage or disallow mobile homes.*

Responsible Department/Board: Building Inspector
Proposed Completion Date: Ongoing

Action Item: *Enforce the State Building Code to ensure for construction of new homes to guarantee four (4) foot wall foundation such that basements or crawl spaces provide shelter during a tornado, hurricane or other storm event with high winds.*

Responsible Department/Board: Building Inspector
Proposed Completion Date: Ongoing

Wildfires/Brushfires

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

Action Item: *Encourage forest stewardship practices that produce more stable, successional forested landscapes and which reduce the risk of fire hazards (such as the removal of slash).*

Responsible Department/Board: Conservation Commission, Planning Board, Fire Department.

Proposed Completion Date: Ongoing – Training for wildfire / urban interface pending for 2011.

Dam Failure

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

Action Item: *Evaluate the need for dam inspections. Town officials should review dam records and safety inspection reports kept by the Office of Dam Safety, including inundation areas, to determine if any dams should be inspected or re-inspected.*

Responsible Department/Board: Emergency Management Director, Planning Board

Proposed Completion Date: Ongoing

Action Item: *Map Dams and Inundation Areas. The Town of Erving can prepare a GIS map that shows the location of all dams in the Town and immediately upstream of the Town's borders and the areas that are likely to be flooded in the event of a dam failure. All public safety officials in the Town can be given a copy of the map.*

Responsible Department/Board: Emergency Management Director,
Planning Board
Proposed Completion Date: 2013

Action Item: *Incorporate Dam Safety into Subdivision Regulations. Applicants should consult the Dam and Inundation Areas map during their preparation of major development proposals, especially subdivisions. The applicant should assess the risk to the proposed development from the dam and supply that information along with mitigation measures to the Town as part of the review process.*

Responsible Department/Board: Emergency Management Director,
Planning Board, Zoning Board of Appeals
Proposed Completion Date: 2013

Action Item: *Identify locations of existing beaver activity and dams. Evaluate areas for potential flooding.*

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

Action Item: *Identify locations for emergency shelters and evacuation routes for people who live in an inundation area.*

Responsible Departments/Board: Police Department, Fire Department,
Planning Board

Proposed Completion Date: 2012 – Shelters and routes established in CEM but information still needs to be disseminated to public.

Action Item: *The Town and Northfield Mountain Facility should coordinate efforts to ensure that appropriate municipal officials and departments are properly informed of potential impacts to the Town of a dam failure.*

Responsible Departments/Board: Police Department, Fire Department,
Planning Board, Northfield Mountain Facility

Proposed Completion Date: Ongoing

Earthquakes

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

Action Item: *Town Departmental Review of Critical Facilities: The Town should review its municipal buildings and structures to determine if they are particularly vulnerable to earthquake damage and determine if any retrofitting measures could mitigate this vulnerability.*

Responsible Department/Board: Building Inspector, Emergency
Management Director, Planning Board

Proposed Completion Date: 2015

Action Item: *Ensure Compliance with the Massachusetts State Building Code: The Building Inspector should ensure that all new construction complies with the appropriate seismic requirements of the State Building Code.*

Responsible Department/Board: Building Inspector

Proposed Completion Date: Ongoing

Ice Jams

Goal Statement: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to ice jams. See relevant Action Items in Flood Section.

Action Item: *Monitor the Millers River for potential ice buildup and ice jams.*

Responsible Department/Board: Emergency Management Director, Fire Department

Proposed Completion Date: Ongoing

Manmade Hazards

Goal Statement: To minimize the loss of life, damage to property, and the disruption of governmental services and general business activities due to manmade hazards, particularly chemical spills or accidents in fixed structures and in transportation.

Action Item: *Develop an evacuation plan and notification system in the event of a chemical spill in a fixed structure or in a transportation setting such as Route 2 or the railroad.*

Responsible Department/Board: Emergency Management Director, Planning Board, Franklin County Regional Emergency Planning Committee (REPC)

Proposed Completion Date: 2012

Action Item: *Seek technical assistance to ensure annual update of Town of Erving CEM Plan.*

Responsible Department/Board: Emergency Management Director,

Proposed Completion Date: 2011

NATIONAL FLOOD INSURANCE PROGRAM COMPLIANCE

The Town of Erving participates in the National Flood Insurance Program. The goals of the National Flood Insurance Program (NFIP) are to provide flood insurance to property owners, to encourage flood loss reduction activities by communities, and to save taxpayers' money.

As of September 2010, there were two policies in effect in Erving for a total of \$700,000 worth of insurance.

NFIP Community Rating System (CRS)⁴³

The town is not a member of the NFIP Community Rating System, which entitles policyholders to a discount on flood insurance premiums. The Community Rating System is a part of NFIP and provides incentives and tools to further these goals. The goals of the CRS are to recognize, encourage, and reward, by the use of flood insurance premium adjustments, community and state activities beyond the minimum required by the NFIP that:

- Reduce flood damage to insurable property,
- Strengthen and support the insurance aspects of the NFIP, and
- Encourage a comprehensive approach to floodplain management.

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. It provides lower insurance premiums under the National Flood Insurance Program. The premium reduction is in the form of a CRS Class, similar to the classifications used for fire insurance. For example, a Class 1 provides a 45% premium reduction while a Class 10 provides no reduction. The CRS Class is based on the floodplain management activities a community implements. In many cases, these are activities already implemented by the community, the state, or a regional agency. The more activities implemented, the better the CRS class.

Benefits of participating in the Community Rating System:

- Money stays in the community instead of being spent on insurance premiums.
- Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.
- The activities credited by the CRS provide direct benefits to the community, including:
 - Enhanced public safety,
 - Reduction in damage to property and public infrastructure,
 - Avoidance of economic disruption and losses,
 - Reduction of human suffering, and
 - Protection of the environment.
- Local flood programs will be better organized and more formal.
- The community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.

⁴³ <http://training.fema.gov/EMIWeb/CRS/>

- Technical assistance in designing and implementing some activities is available at no charge.
- The community will have an added incentive to maintain its flood programs over the years.
- The public information activities will build a knowledgeable constituency interested in supporting and improving flood protection measures.

Costs to the local government to participate in the Community Rating System:

- The community must designate a CRS Coordinator who prepares the application papers and works with FEMA and the Insurance Services Office (ISO) during the verification visit.
- Each year the community must recertify that it is continuing to implement its activities. It must provide copies of relevant materials (e.g., permit records).
- The community must maintaining elevation certificates, permit records, and old Flood Insurance Rate Maps forever.
- The community must maintain other records of its activities for five years, or until the next ISO verification visit, whichever comes sooner.

Community Rating System Process

One of the actions that Erving can take to improve their CRS rating (and subsequently lower their premiums) is to develop a CRS plan. The CRS 10-step planning process provides additional points for activities that communities can take during their planning process that go above the minimum described below, thus possibly lowering insurance rates. At a minimum, an *approved* multi-hazard mitigation plan that addresses floods could qualify for CRS credit. Although communities are not required to participate in CRS in order to receive approval of a Local Natural Hazards Mitigation Plan, FEMA encourages jurisdictions to integrate the CRS planning steps into their multi-hazard mitigation plans.

Credit is provided for preparing, adopting, implementing, evaluating, and updating a comprehensive floodplain management plan or repetitive loss area analyses. The Community Rating System does not specify what must be in a plan, but it only credits plans that have been prepared and kept updated according to CRS standard planning process. Credit is also provided for implementing a habitat conservation plan.

Community Rating System Credit Points⁴⁴

A total of up to 359 points are provided for three elements. Up to 294 points are provided for adopting and implementing a floodplain management plan (FMP) that was developed using the following standard planning process. There must be some credit for each of the 10 planning steps:

Step	Maximum Points
• Organize to prepare the plan	10
• Involve the public	85
• Coordinate with other agencies	25
• Assess the hazard	20

⁴⁴ FEMA Local Multi-Hazard Mitigation Planning Guidance, July 1, 2008.

Step	Maximum Points
• Assess the problem	35
• Set goals	2
• Review possible activities	30
• Draft an action plan	70
• Adopt the plan	2
• Implement, evaluate, and revise	15

Up to 50 additional points are provided for conducting repetitive loss area analyses (RLAA) and up to additional 15 points are provided for adopting and implementing a Habitat Conservation Plan (HCP).

More information is available at <http://www.fema.gov/business/nfip/crs.shtm>. A copy of the “Local Official’s Guide to Saving Lives, Preventing Property Damage, and Reducing the Cost of Flood Insurance” is including in the Appendix of this plan or can be downloaded at <http://www.fema.gov/library>.

5 – PLAN ADOPTION & MAINTENANCE

PLAN ADOPTION

The Franklin Regional Council of Governments (FRCOG) provided support to the Erving Local Natural Hazards Mitigation Planning Committee as they underwent the planning process. Town officials such as the Emergency Management Director and Town Administrator were invaluable resources to the FRCOG and provided background and policy information and municipal documents, which were crucial to facilitating completion of the plan.

When the preliminary draft of the Local Natural Hazards Mitigation Plan was completed, copies were disseminated to the Erving Local Natural Hazards Mitigation Planning Committee for comment and approval. The Committee was comprised of representatives of Town boards and departments who bear the responsibility for implementing the action items and recommendations of the completed plan. The committee was asked to submit any further comments before the final draft was submitted to the Erving Select Board. No comments were received.

Copies of the Final Draft Local Hazards Mitigation Plan for the Town of Erving were distributed to the Town boards and to Northfield Mountain Facility for their review and comment. A copy of the plan was also posted on the town website for public review. On _____, the Select Board voted to forward the plan to the Massachusetts Emergency Management Agency (MEMA) and the Federal Emergency Management Agency (FEMA) for their approval.

PLAN MAINTENANCE PROCESS

The implementation of the Erving Local Natural Hazards Mitigation Plan will begin following its approval by MEMA and FEMA and formal adoption by the Erving Select Board. Specific Town departments and boards will be responsible for ensuring the development of policies, bylaw revisions, and programs as described in Section 4 of this plan. The Erving Natural Hazards Planning Committee will oversee the implementation of the plan.

Monitoring, Evaluating, and Updating the Plan

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

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

committee will review and update the plan every five years, beginning in the fall of 2014. The meetings of the committee will be organized and facilitated by the staff of the Erving Town Administrator. Increasing committee membership to include entities such as the Planning Board and the Conservation Commission could help improve the completion rate of action items.

Incorporating the Plan into Existing Planning Mechanisms

Upon approval of the Erving Local Hazards Mitigation Plan by MEMA, the Committee will provide all interested parties and implementing departments with a copy of the plan. The committee should also consider initiating a discussion with each department on how the plan can be integrated into that department's ongoing work. At a minimum, the plan should be distributed to and reviewed with the following entities:

- Fire Department
- Emergency Management Director
- Police Department
- Public Works / Highway Department
- Planning Board
- Zoning Board of Appeals
- Conservation Commission
- Franklin County Regional Emergency Planning Committee
- Building Inspector
- Select Board
- Northfield Mountain Facility

The previous Erving Local Hazards Mitigation Plan was not incorporated into existing planning mechanisms to the fullest extent possible. Some possible planning mechanisms could include:

- Incorporation of relevant Hazards Mitigation information into the Open Space and Recreation Plan. There are opportunities to discuss findings of the hazard mitigation plan and incorporate them into Environmental Inventory and Analysis section of the OSRP and to include appropriate action items from the hazard mitigation plan in the OSRP Action Plan.
- Any future updates of master plans and scenic byway plans, such as the Route 2 Scenic Byway Plan, could incorporate relevant material from this plan into sections such as the Natural Resources section and any action plans
- When the Final Draft Local Hazards Mitigation Plan for the Town of Erving is distributed to the Town boards for their review, a letter asking each board to endorse any action item that lists that board as a responsible party would help to encourage completion of action items.
- The Planning Board could include discussions of the Hazards Mitigation Plan Action Items in one meeting annually and assess progress.

Continued Public Involvement

The Town of Erving is dedicated to continued public involvement in the hazard mitigation planning and review process. During all phases of plan maintenance, the public will have the

opportunity to provide feedback. The 2011 Plan will be maintained and available for review on the Town website through 2014. Individuals will have an opportunity to submit comments for the Plan update at any time. Any public meetings of the Committee will be publicized. This will provide the public an opportunity to express their concerns, opinions, or ideas about any updates/changes that are proposed to the Plan.

Final Draft

6 – APPENDIX

Appendix 1: Erving Select Board Approval Memorandum

Appendix 2: Meeting Minutes, Sign In Sheets and Correspondence

Final Draft

Appendix 1: Meeting Minutes, Sign In Sheets, Correspondence and Publicity

MEMA Natural Hazards Mitigation Erving Project

Wednesday, November 17, 2010 Meeting

Attendance:

Name	Email	Position/Affiliation
Christopher Blair	chiefblair@comcast.net	Police Chief
Almon Meattey	chiefmeattey@yahoo.com	Fire Chief
Luke Hartnett	ervingemd@comcast.net	Emergency Management
Mary Praus	mpraus@frcog.org	Franklin Regional Council of Governments
Tom Sharp	ervingadmin@comcast.net	Erving Town Administrator
Bill Cody	wfcody@student.umass.edu	Erving Intern
Alyssa	alarose@frcog.org	Franklin Regional Council of Governments
Kimberly MacPhee	natres@frcog.org	Franklin Regional Council of Governments

Introductions by Bill Cody

Review by Kimberly MacPhee:

- Reviewed timeline and expectations for remaining project timeline
- 2004 plans expired in June 2010
- Approved plan by MEMA/FEMA = grant eligibility
- MEMA wants more public involvement
- Expectation that committee will have to meet 1 or 2 times without FRCOG attendance due to budget
- MEMA wants to see tangible action items and projects and emphasis on vulnerable structures/sites
- FRCOG is hiring consultant for benefit / cost analysis for hazard mitigation projects
- Luke questioned whether there was still time to apply for Dec grants – will discuss independently with Kimberly

Plan Section Review by Alyssa LaRose:

- Specific recollections and details captured in updated plan but not detailed in minutes
- Past flooding events
 - Committee members expressed concern about Pete's Pond Dam
 - Identified Pearl B Care building (historic structure) as potentially threatened by Keyup Brook
 - Q: Is there funding available for trimming of trees along Keyup Brook
 - A: MEMA doesn't generally fund maintenance projects, but if the project was framed as a streambank stabilization project, it might qualify
- Ice storm events
 - Committee power outages, shelters opened and number of people effected in 2008
 - Identified existing shelters in Erving
- Tropical storm events
 - No significant damages from Tropical Storm Floyd

- Comment was made that Erving is in a protective “bowl”, shelters on all four sides by mountain ridges
- No significant damage from 2010 microburst
- Brushfire events
 - Three fires in 2010 – one 50 acres in size on Horse Hill caused by dry lightning
 - Concern about the fire load in the form of dead limbs from past ice storm
- Dam Failure
 - Need to access information from CEM plan
 - Northfield Mountain Facility representative should be included in any future meetings
 - Northfield Mountain Facility not currently sponsoring evacuation drills
 - Town has special radios but they haven’t been inspected and are not used in drills
 - Concern about Farley area of Erving – would flood in 13 minutes if Northfield Mountain dam fails
- Landslide events
 - None identified
 - Potential exists due to large areas of ledge on which town is built
- Ice jam events
 - None identified
- Hazardous materials events
 - Committee indicated that many hazardous materials transported daily through Erving via rail and road
 - CEM needs updating
 - Need evacuation plan and reverse 911 for hazardous materials release or spill

Q: Is Erving up to date on it CEM plan?

A: Mostly but could use support from MEMA.
- Other notes
 - Erving Critical Facilities and Infrastructure Map – FRCOG to send to Committee

Potential Projects Identified:

1. Riverbank stabilization / tree removal and trimming on Keyup Brook
2. Identify shelter site in different part of town from existing shelters
3. Farley flood preparation – radio inspection, drills, public outreach and awareness
4. Reverse 911 / Hazardous chemical release or spill evacuation plan
5. Obtain technical assistance on CEM Plan.
6. Flood-proof Pearl B. Care building.

Committee Action Items:

1. Determine total damages incurred from 1986 Keyup Brook event – Table 3-15, Page 29
2. Report on winter storm events (Paul from highway department)
3. Total costs incurred for the 50-acre Horse Hill fire in 2010.
4. Get recent Northfield Mountain Facility action plan and update dam information
5. When was Millers Falls dam removed
6. Identify other sites housing hazardous materials
7. Obtain data layers from Northfield Mountain Facility for inundation information
8. Obtain assessed value for structures in flood hazard / floodplain area

MEMA Natural Hazards Mitigation Erving Project

Wednesday, February 9, 2011 Meeting

In attendance: Tom Sharp, Erving Town Administrator; Luke Hartnett, Erving Emergency Management Director; Eugene Klepadlo, Erving Board of Selectmen; Chuck Monmie, Northfield Mountain Facility; Mary Praus, Franklin Regional Council of Governments; Alyssa Larose, Franklin Regional Council of Governments

Committee members reviewed the memo sent by Mary prior to the meeting, outlining information needed from the committee.

- Page 8, cultural and natural resources: it was noted that a list of these resources is included in the CEM Plan, but that it may not be the most up to date source of information. Mary mentioned that she included properties from the state MACRIS database in this section of the plan. Committee members reviewed the properties that were included in the plan and made suggestions for changes and additions.
- Page 10 Keyup Brook damage estimates: Luke could not find records of the dollar amount of damages. Language about dollar amount will be removed from the plan.
- Page 29 total building value: Assessor information will be collected for the value of the Pearl B. Care building and the Usher Plant. The Pearl B. Care building was determined to fall under the category of Education Schools/Libraries in table 3-17, meaning that the building contents value will be calculated as 100% of the building value. It was noted that the Usher Plant has no contents.
- Page 33 ice storm damage figures: The Fire Chief will provide the figures, Luke will follow up and send to FRCOG. Tom and Luke will research any additional incidents for this section but think it is only the one ice storm.
- Page 42 Horse Hill damages: Luke will get from the Fire Chief.
- Page 45 Beaver dam locations: Pete's Pond dam would impact Keyup Brook if it broke. The dam has not caused a large impact on the pond, however. Lately more beaver activity has been occurring in the flats along Route 2 and the Millers River, but would not have much of an impact.
- Mary asked if there was any new development occurring in Erving. The senior center is being built on Route 63, but otherwise no. The last large development occurred on Ridge Road. Recently the zoning was changed to slow development.

The committee reviewed the Critical Facilities and Infrastructure Map: Areas that experience regular flooding will be added to the map. Areas identified were Keyup Brook, Pete's Pond, West Main Street near the turn out, and the River Street area in Erving side.

Chuck Monmie from the Northfield Mountain Facility had some comments on the plan:

- P 17: FERC classifies the Northfield dams as "High Hazard." Currently the plan states that the dams are "Significant Hazard" dams, but this means something different Northfield Mountain.
- Drills: FERC determines when drills are held, typically every five years. Northfield Mountain Facility anticipates doing a drill in the next few years. These consist of a test of the emergency alert systems, and a table top exercise involving all emergency personnel from the surrounding towns. They get together in a room and simulate an emergency. FERC is moving towards a more realistic drill where vehicles will have to be on site and people go to locations. This is a fallout from a dam failure at a pump storage facility in a western state that did not go so well. Chuck will find out when the last drill was held and will let Mary know.

- P 19: Northfield Mountain Facility has distributed 50 radios to the residents in Farley Village. The National Weather Service tests these radios weekly every Wednesday. Residents get letters every year, batteries for the radio, and new radios when needed. Soon however the radio system will be replaced by Reverse 911 by the end of 2011. Currently the notification system works by Northfield Mountain Facility notifying the National Weather Service, who then notify the residents of Farley. Northfield Mountain Facility also notifies the appropriate emergency preparedness people, who then are responsible for evacuating the town and notifying residents outside of the inundation area.
- It was noted that the town is interested in its own Reverse 911 system, and would like to work with Northfield Mountain Facility on possible collaboration.
- Route 2 would be inundated in a Main Dam failure.
- The evacuation routes in the CEM Plan are broad, not specific to an event.
- Inundation maps in the Emergency Action Plan for Northfield Mountain Facility have not changed in 15 years. If new homes have been built, the maps might not show them.
- P. 81: "Four Mile Brook" should be "Briggs Brook."
- "U.S. GEN New England" should be "TransCanada." They do have an Emergency Action Plan, but Erving may not have received it if they are not in the breach path. Luke will check into this.
- The Emergency Action Plan for Northfield Mountain Facility is produced by First Light Power Resources, not Northeast Utilities.

P 24 manmade hazards: It notes that there are no evacuation plans for manmade hazards. In the Standard Operating Procedures for the fire department and police department, there are procedures for evacuating, so the language in the plan should be changed.

The committee performed a Hazard Vulnerability Risk Analysis, which determined that dam failure was the highest risk for the town.

The committee reviewed the action items from the previous plan to determine if any had been completed and whether they were still relevant.

A meeting to review the final draft of the plan was set for March 2, 2-3 p.m. at the Erving Town Hall.

MEMA Natural Hazards Mitigation Project
Erving Meeting – February 9, 2011
Attendance Sheet

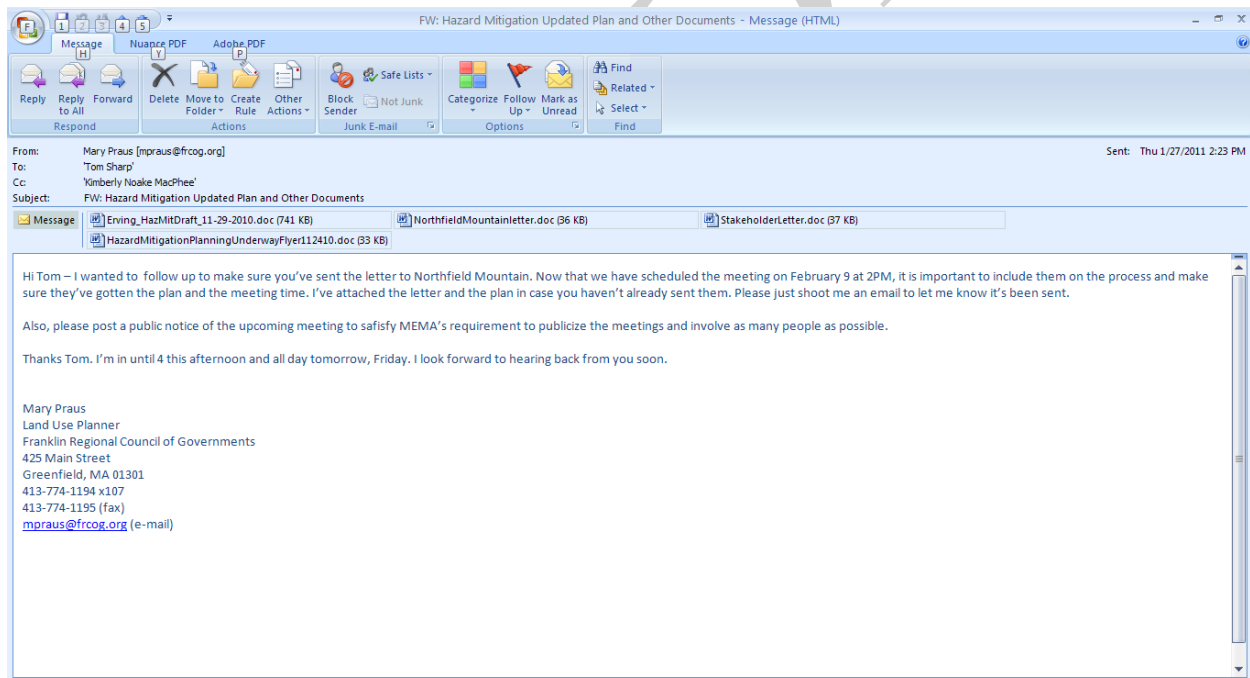
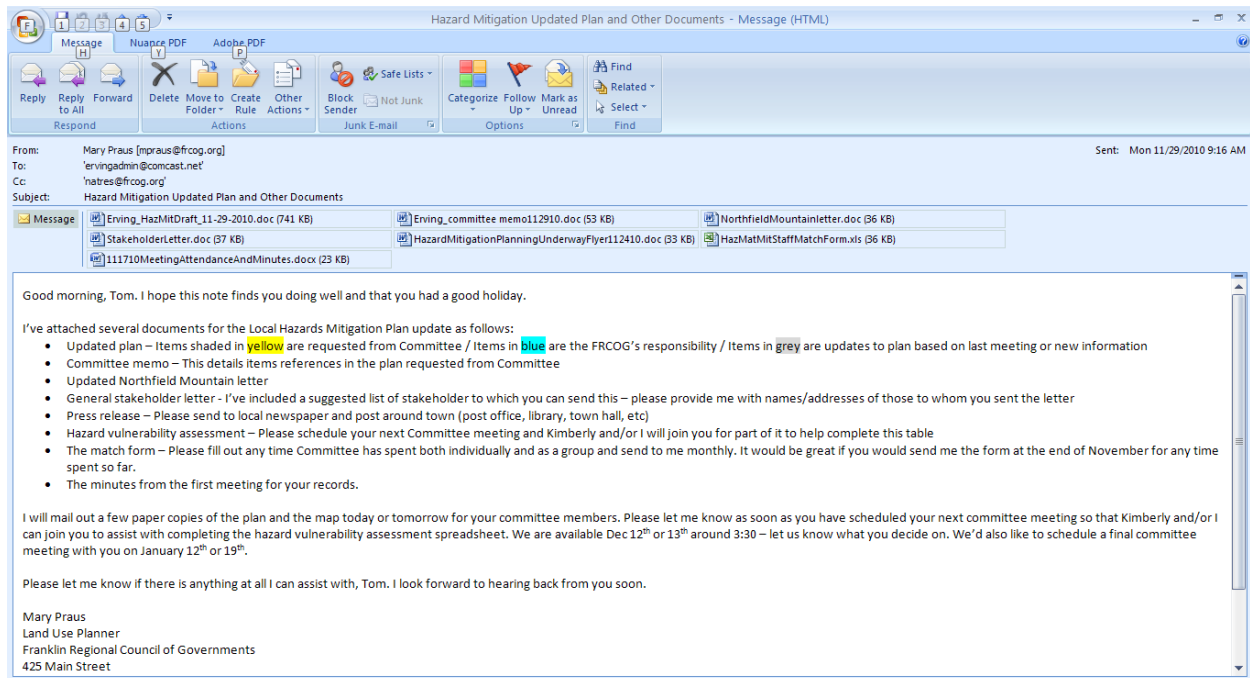
Name	Email Address	Affiliation
Luke Hartnett	ervingemd@comcast.net	Emergency Manager
EUGENE KLEPADLO	e-eklep@Comcast.net	SEI/SET Board.
Chcek Momniji	Charles. Momniji@GDSABENAC.com	Northfield Mtn.
Alyssa Harose		FRCOG
Mary Prais	mprais@frco.org	FRCOG
Tom Sharp	ervingadmiral@comcast.net	Erving Admin

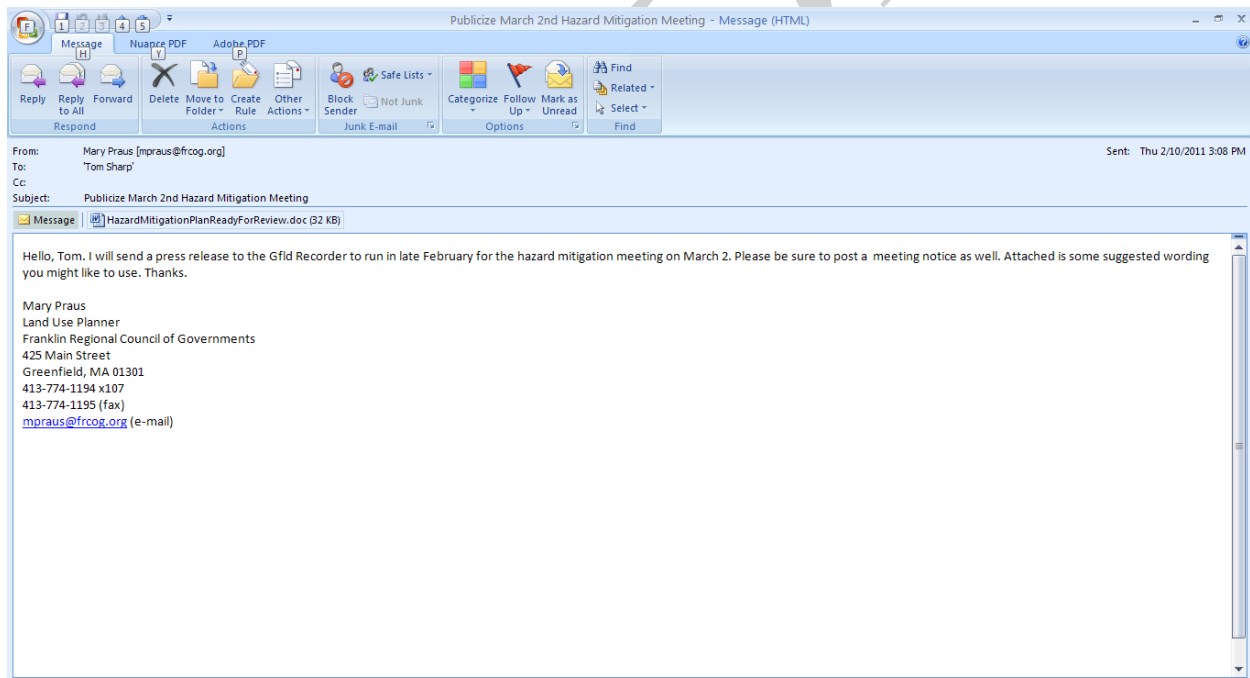
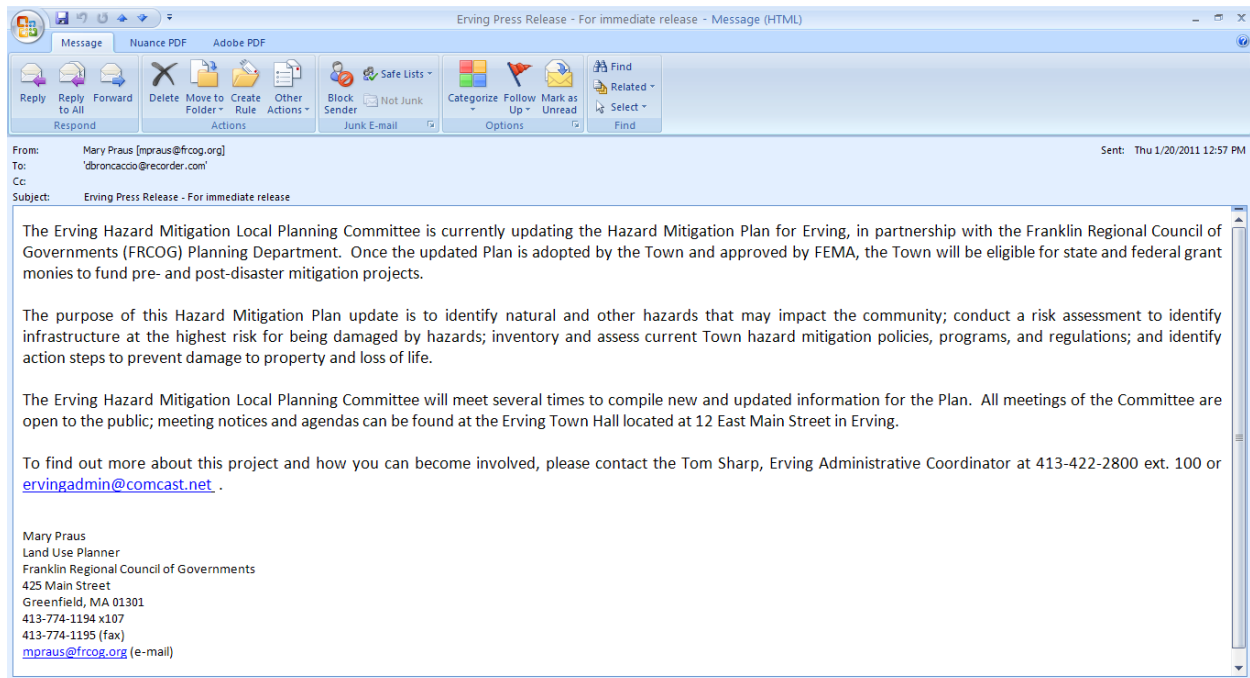
Erving Meeting
Attendance Sheet for Wednesday, November 17, 2010

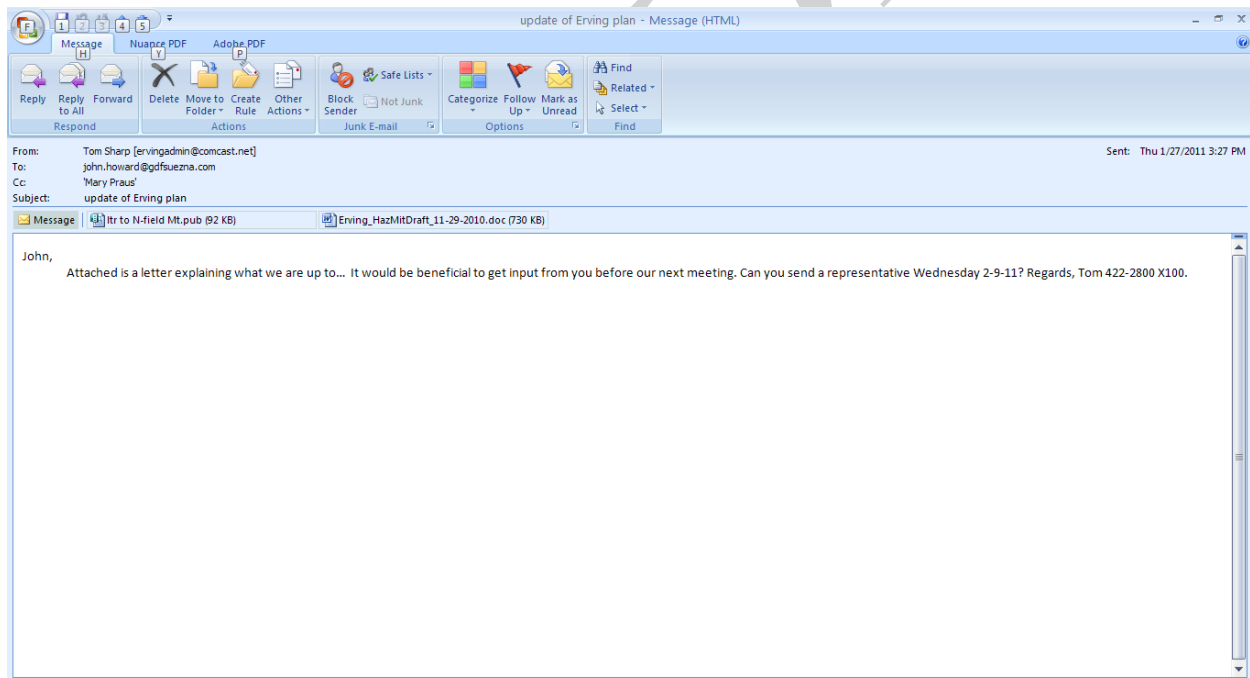
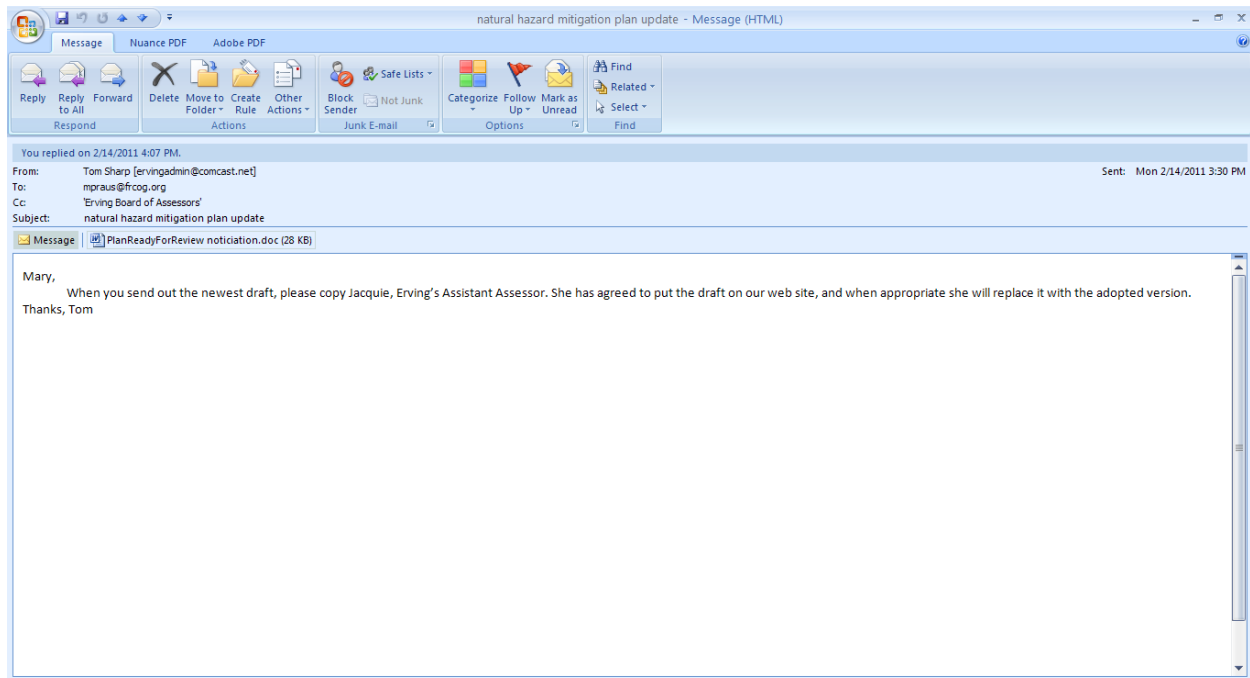
Erving Meeting

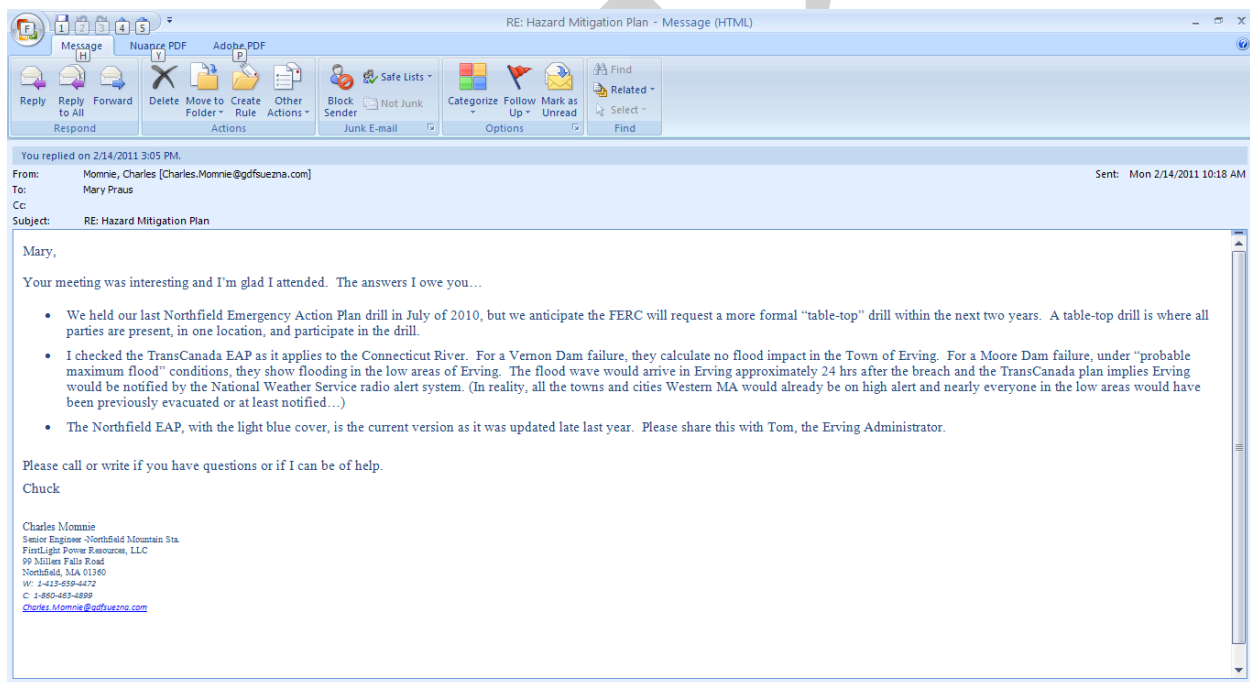
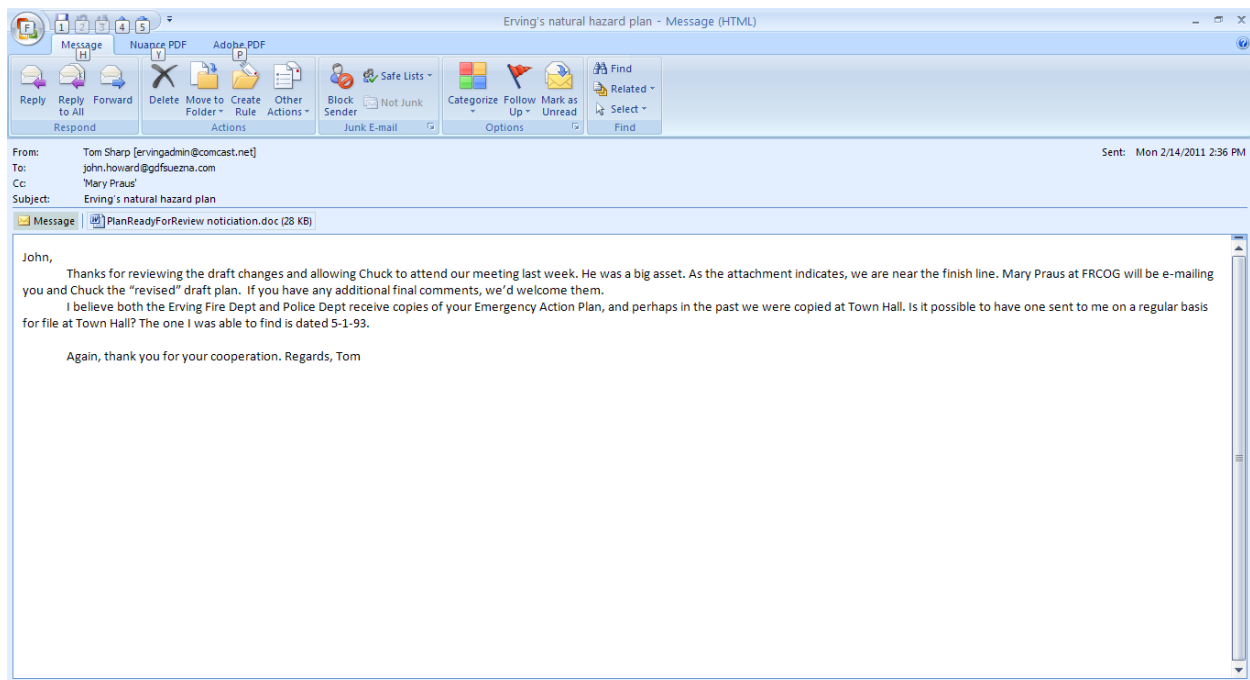
Attendance Sheet for Wednesday, November 17, 2010

Name	Email Address	Affiliation
Christopher BLAIR	Chiefblair@comcast.net	Police Chief
Almond MEATTEY	CHIEF MEATTEY@VALTGO.COM	FIRE CHIEF
LUKE HARTNETT	ERVINGEND@COMCAST.NET	EMERGENCY MANAGEMENT
MARY PRAUS	MPRAUS@FRCOG.ORG	FRCOG
Tom Morp	ervingadwin@ecucort.net	Tom Morp
Bill Cody	wfcody@ ecucort student.umass.edu	Erving
Alyssa Larose	alarose@frco.org	FRCOG
Kimberly MacPhee	natres@frcbg.org	FRCOG









Appendix 2: Erving Select Board Approval Memorandum

Final Draft