Town of Rye, NH

Natural Hazard Mitigation Plan Update

Final Plan- August 2010

Approved and Adopted by the

Rye Board of Selectmen

Prepared with the Assistance of the

Rockingham Planning Commission

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NH Department of Safety, Homeland Security and Emergency Management

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EXECUTIVE SUMMARY

The *Rye Hazard Mitigation Plan* (herein also referred to as the *Plan*) was compiled to assist the Town of Rye in reducing and mitigating future losses from natural hazard events. The *Plan* was developed by the Rockingham Planning Commission and participants from the Town of Rye *Natural Hazard Mitigation Committee* and contains the tools necessary to identify specific hazards, and aspects of existing and future mitigation efforts.

The following *natural* hazards are addressed:

- Flooding
- Hurricane-High Wind Event
- Severe Winter Weather
- Wildfire
- Earthquake

The list of *critical facilities* includes:

- Municpal facilities;
- Communication facilities;
- Fire stations and law enforcement facilities;
- Schools;
- Shelters;
- Evacuation routes; and
- Vulnerable Populations

The *Rye Hazard Mitigation Plan* is considered a work in progress and should be revisited frequently to assess whether the existing and suggested mitigation strategies are successful. Copies have been distributed to the Town Hall and the Emergency Operations Center. A copy of the *Plan* is also on file at The Rockingham Planning Commission, the New Hampshire Department of Safety, Homeland Security and Emergency Management (HSEM) and the Federal Emergency Management Agency (FEMA). This Document was approved by both agencies prior its adoption at the local level.

CHAPTER I. INTRODUCTION

Background

The New Hampshire DEPARTMENT OF SAFETY, HOMELAND SECURITY AND EMERGENCY MANAGEMENT (HSEM) has a goal for all communities within the State of New Hampshire to establish local hazard mitigation plans as a means to reduce and mitigate future losses from natural hazard events. The NH (HSEM) outlined a process whereby communities throughout the State may be eligible for grants and other assistance upon completion of a local hazard mitigation plan. A handbook entitled *Hazard Mitigation Planning for New Hampshire Communities* was created by NH (HSEM) to assist communities in developing local plans. The State's Regional Planning Commissions are charged with providing assistance to selected communities to develop local plans.

The *Rye Hazard Mitigation Plan* was prepared by participants from the Town of Rye Hazard Mitigation Team with the assistance and professional services of the Rockingham Planning Commission (RPC) under contract with the New Hampshire Bureau of Emergency Management ((HSEM)) operating under the guidance of Section 206.405 of 44 *CFR* Chapter 1 (10-1-97 Edition). The *Rye Hazard Mitigation Plan* serves as a strategic planning tool for use by the Town of Rye in its efforts to identify and mitigate the future impacts of natural and/or man-made hazard events. Upon adoption of the *Plan* by the Rye Board of Selectmen and approval by the Rye Planning Board, it will become an official appendix to the Rye Master Plan.

Methodology

In 2009, the Rockingham Planning Commission (RPC) organized the first meeting with emergency management officials from the Town of Rye to begin the initial planning stages of the Rye Hazard Mitigation Plan Update. This meeting precipitated the development of the Natural Hazards Mitigation Committee (herein after, the Committee). RPC and participants from the Town developed the content of the Plan using the ten-step process set forth in the Hazard Mitigation Planning for New Hampshire Communities. The following is a summary of the ten-step process conducted to compile the Plan.

As per FEMA requirements of review of the Plan within five (5) years, the Committee followed the same process and methodology as in the initial development of the Plan in 2005. Rockingham Planning Commission contacted the Town in April 2009 to notify them of a grant to help with assistance to update the All Hazard Mitigation Plan. There were changes to the committee members, a new committee was formed and the review process began using the similar approach mentioned below. Notices were posted around town and on the website in order to notify abutting towns, academia etc to participate in the plan development meetings held on May 5th, 25th, and June 2nd, and 16th. A final public hearing and adoption was held August 4, 2010.

Step 1 – Map the Hazards

Participants in the Committee identified areas where damage from historic natural disasters have occurred and areas where critical man-made facilities and other features may be at risk in the future for loss of life, property damage, environmental pollution and other risk factors. RPC generated a set of base maps with GIS (Geographic Information Systems) that were used in the process of identifying past and future hazards.

Step 2 – Identify Critical Facilities and Areas of Concern

Participants in the Committee then identified facilities and areas that were considered to be important to the Town for emergency management purposes, for provision of utilities and community services, evacuation routes, and for recreational and social value. Using a Global Positioning System, RPC plotted the exact location of these sites on a map.

Step 3 – Identify Existing Mitigation Strategies

After collecting detailed information on each critical facility in Rye, the Committee and RPC staff identified existing Town mitigation strategies relative to flooding, wind, fire, ice and snow events and earthquakes. This process involved reviewing the Town's Masterplan, Capitol Improvements Program (CIP), Zoning Ordinance, Subdivision Regulations, Site Plan Review Regulations, and participation in the (National Flood Insurance Program) NFIP. This allowed to committee to identify portions of the Town's existing mitigation strategies. The Committee could see how natural hazards were dealt with in the context of the Master Plan which outlines the vision for the Town and how capitol expenditures were planned to increase the Town's preparedness for Natural Disasters.

Step 4 – Identify the Gaps in Existing Mitigation Strategies

The existing strategies were then reviewed by the RPC and the Committee for coverage and effectiveness, as well as the need for improvement.

Step 5 – Identify Potential Mitigation Strategies

A list was developed of additional hazard mitigation actions and strategies for the Town of Rye.

Step 6 – Prioritize and Develop the Action Plan

The proposed hazard mitigation actions and strategies were reviewed and each strategy was rated (good, average, or poor) for its effectiveness according to several factors (e.g., technical and administrative applicability, political and social acceptability, legal authority, environmental impact, financial feasibility). Each factor was then scored and all scores were totaled for each strategy. Strategies were ranked by overall score for preliminary prioritization then reviewed again under Step 7.

Step 7 - Determine Priorities

The preliminary prioritization list was reviewed in order to make changes and determine a final prioritization for new hazard mitigation actions and existing protection strategy improvements identified in previous steps. RPC also presented recommendations to be reviewed and prioritized by emergency management officials.

Step 8 - Develop Implementation Strategy

Using the chart provided under Step 9 in the handbook, an implementation strategy was created which included person(s) responsible for implementation (who), a timeline for completion (when), and a funding source and/or technical assistance source (how) for each identified hazard mitigation actions.

Step 9 - Adopt and Monitor the Plan

RPC along with the Rye Planning Staff compiled the steps 1 to 9 in a draft document, as well as helpful and informative materials from the State of NH Community Hazard Mitigation Planning Guide. After acceptance by the committee, the plan was made available for public review at the Town Offices and a public hearing was held on August 9, 2010 during a regular Board of Selectmen meeting. The Plan was then submitted to New Hampshire Department of Safety, Homeland Security and Emergency Management (NHSEM) and to FEMA for formal final approval. The Board of Selectmen formally approved the Plan on August 9, 2010. Letters of approval from FEMA will be placed within the appendices to this plan upon receipt from FEMA.

Hazard Mitigation Goals and Objectives of the State of New Hampshire

The *State of New Hampshire Natural Hazards Mitigation Plan*, which was prepared and is maintained by the New Hampshire Bureau of Emergency Management (NH (HSEM)), sets forth the following related to overall hazard mitigation goals and objectives for the State of New Hampshire:

1. To improve upon the protection of the general population, the citizens of the State and guests, from all natural and man-made hazards.
2. To reduce the potential impact of natural and man-made disasters on the State's Critical Support Services.
3. To reduce the potential impact of natural and man-made disasters on Critical Facilities in the State.
4. To reduce the potential impact of natural and man-made disasters on the State's infrastructure.
5. To improve Emergency Preparedness.
6. Improve the State's Disaster Response and Recovery Capability.
7. To reduce the potential impact of natural and man-made disasters on private property.
8. To reduce the potential impact of natural and man-made disasters on the State's economy.
9. To reduce the potential impact of natural and man-made disasters on the State's natural environment.
10. To reduce the State's liability with respect to natural and man-made hazards generally.
11. To reduce the potential impact of natural and man-made disasters on the State's specific historic treasures and interests as well as other tangible and intangible characteristics which add to the quality of life of the citizens and guests of the State.
12. To identify, introduce and implement cost effective Hazard Mitigation measures so as to accomplish the State's Goals and Objectives and to raise the awareness of, and acceptance of Hazard Mitigation generally.

Through the adoption of this Plan the Town of Rye concurs and adopts these goals and objectives.

Acknowledgements

The Rye Board of Selectmen extends special thanks to those that assisted in the development of this *Plan* by serving as member of Natural Hazards Mitigation Committee:

Michael Farrell, Interim, Town Administrator
Cyndi Gillespie, Assistant Town Administrator
Kimberly Reed, Town Planner
Bud Jordan, Public Works Director
Kevin Walsh, Police Chief
William (Skip) Sullivan, Fire Chief
Susan Labrie, Building Inspector
Alan Gould, Emergency Management Director

The Rye Board of Selectmen offers thanks to the New Hampshire Department of Safety, Homeland Security and Emergency Management (HSEM) which provided the model and funding for this *Plan*.

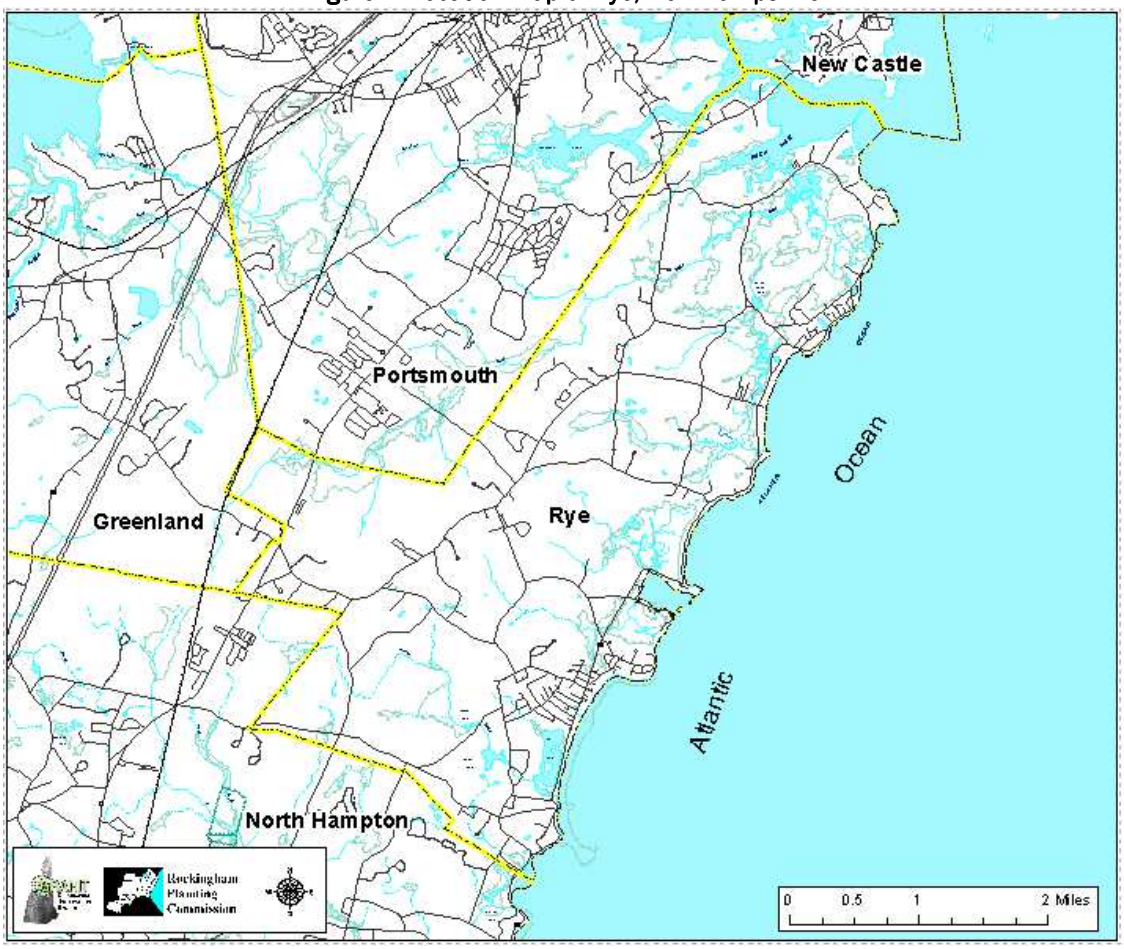
In addition, thanks are extended to the staff of the **Rockingham Planning Commission** for professional services, process facilitation and preparation of this document.

CHAPTER II. COMMUNITY PROFILE

Natural Features

The Town of Rye is located in New Hampshire in Rockingham County. Rye is bordered by the New Hampshire towns Portsmouth, New Castle, Greenland, and North Hampton, as seen below in Figure 1. The town was incorporated in 1726 and had a population of 5,182 recorded during the 2000 US Census[1]. From 1990 to 2000, Rye's population grew by 12.4 percent. The median age is 44 years, with 22 percent of the population under the age of 18 and 19 percent age 65 and older. As of April 1, 2000, there were 2,645 housing units. The population density in 2002 was 417 persons per square mile.

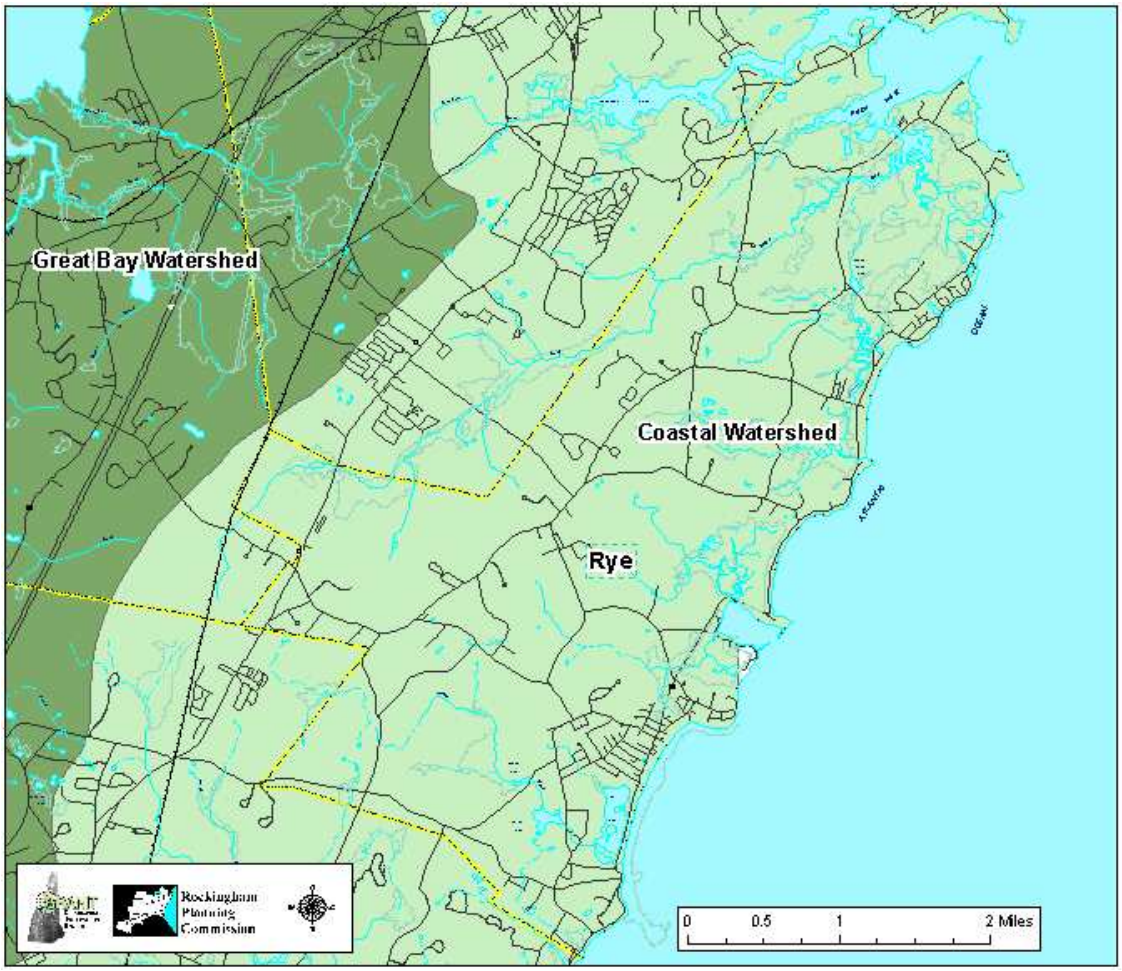
Figure 1: Location Map of Rye, New Hampshire



Rye contains 12.6 square miles of land are and 0.5 miles of inland water area. The community is characterized by a scenic coastline along the Atlantic Ocean.

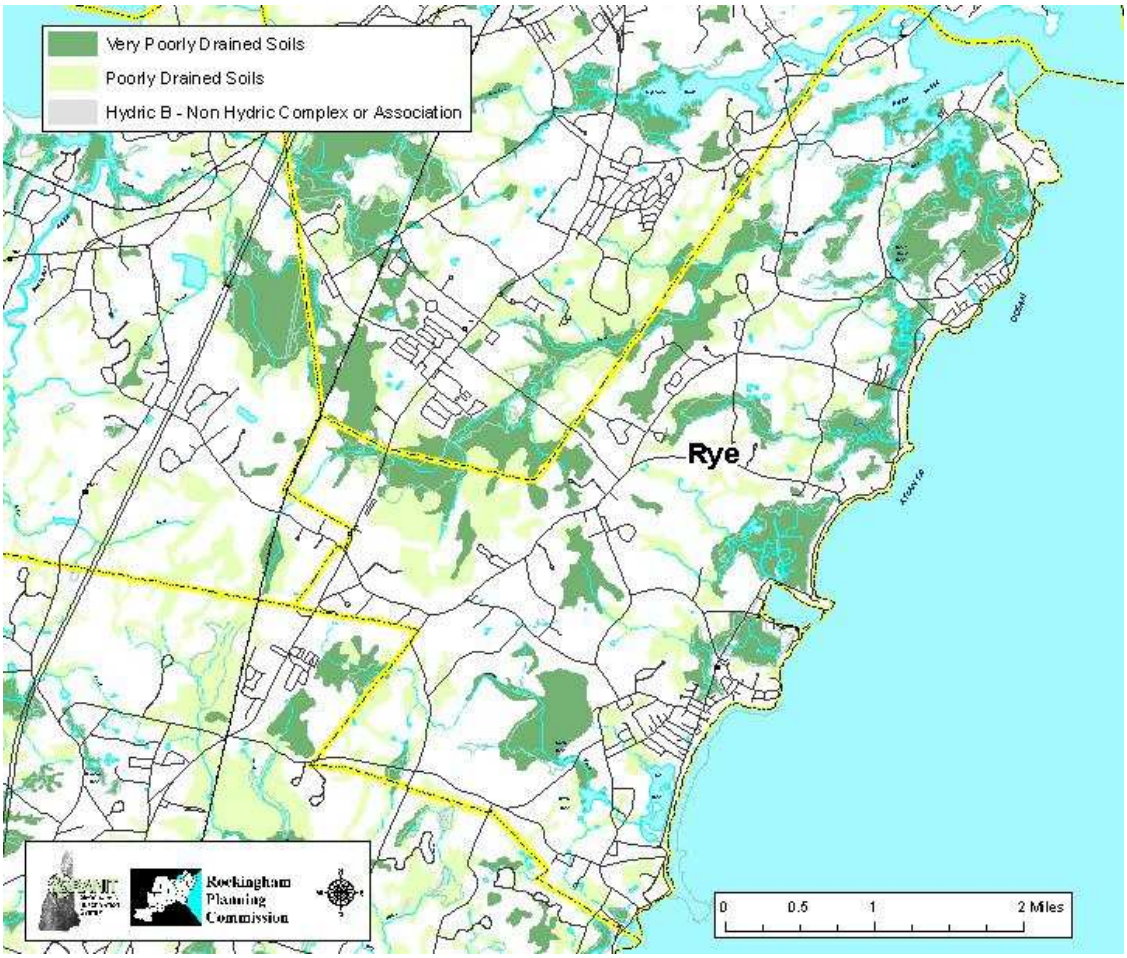
[1] Economic & Labor Market Information Bureau, NH Employment Security

Figure 2: Watersheds, in and near Rye, New Hampshire



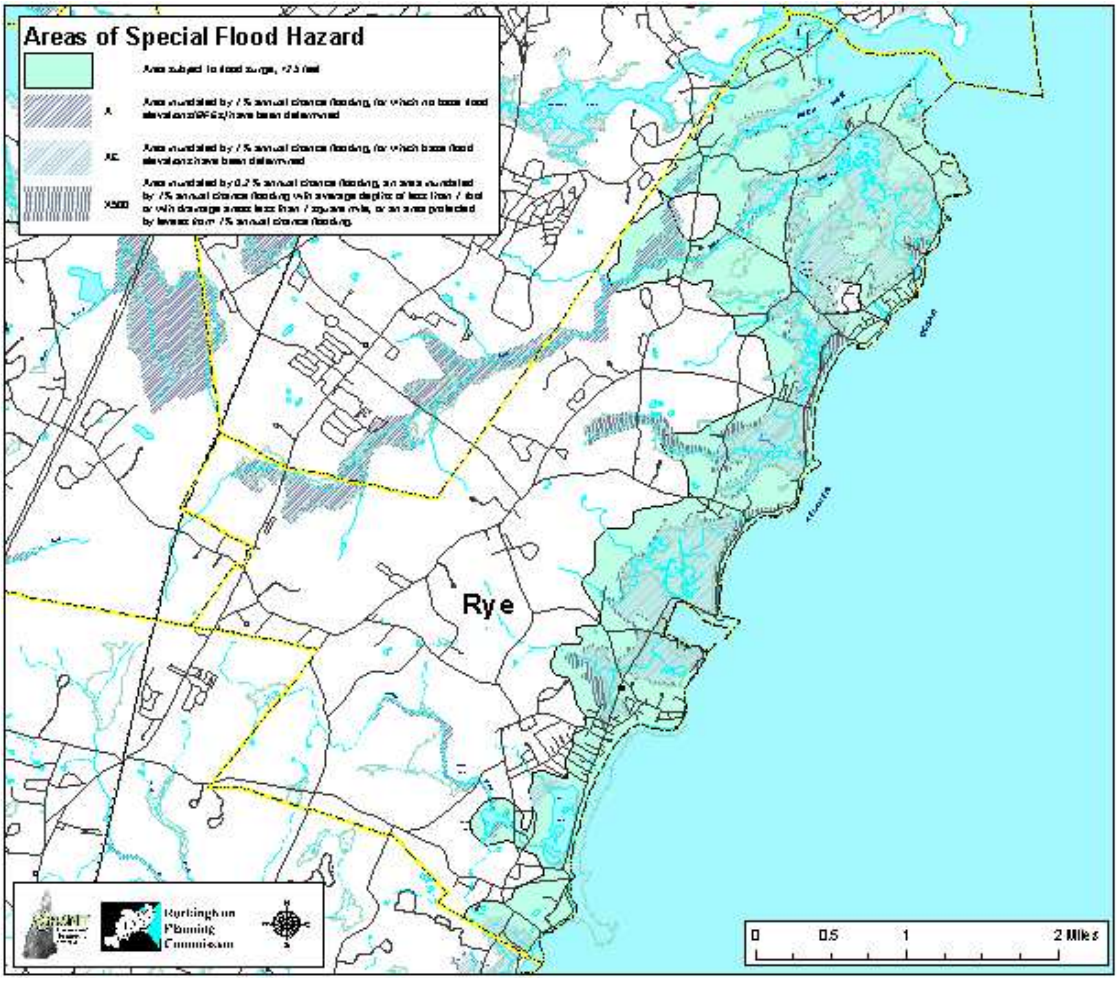
Wetlands are an important part of the Town of Rye's surface water. Most of the Town's wetlands occur associated with the Cedar Swamp Run watershed. Wetland, or hydric, soils include poorly and very poorly drained soils. These soil types are often associated with marine silts and clays where the water table is at or near the surface for five to nine months of the year

Figure 3: Wetlands Map of Rye, New Hampshire. Wetland delineated as poorly and very poorly drained soils, and Wetlands from the National Wetland Inventory.



Floodplains for this *Plan* are defined as the 100-year and 500-year flood hazard zones, as depicted on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM). Floodplains in the Town of Rye are shown below in Figure 4. Rye maintains participation in the National Flood Insurance Program administered by FEMA. The Town also participates in the Community Rating System (CRS) administered by FEMA Insurance Services Offices, Inc. Development should be located away from wetlands and floodplains whenever possible. The filling of wetlands for building construction not only destroys wetlands and their numerous benefits, but may also lead to groundwater contamination. Building within a flood zone may also reduce the floodplain's capacity to absorb and retain water during periods of excessive precipitation and runoff. Moreover, in regard to building within floodplains, contamination may result from flood damage to septic systems.

Figure 4: Floodplains of Rye, New Hampshire



Current and Future Development Trends

Current Development is predicated on the Town of Rye's Zoning Ordinance. For more information on these specific zones see the Rye Zoning Ordinance.

The Town of Rye completed a build-out analysis in 2002 to assist with planning efforts. The general parameters of expected growth are outlined in the 2006 Master Plan. The expected population growth for the Town is expected not to exceed 6,800 by the year 2020 according to projections by the New Hampshire Office of Energy and State Planning. The commercial growth is expected to be concentrated along Route 1 and to include the renovation and replacement of some of the existing businesses by others that involve more intense utilization of the real estate.

INSERT MAP 1 – EXISTING LAND-USE

CHAPTER III. NATURAL HAZARDS IN THE TOWN OF RYE

What are the Hazards?

The first step in planning for natural hazard mitigation is to identify hazards that may affect the Town. Some communities are more susceptible to certain hazards (i.e., flooding near rivers, hurricanes on the seacoast, etc.). The Town of Rye is prone to several types of natural hazards. These hazards include: flooding, hurricanes or other high-wind events, severe winter weather, wildfires and earthquakes. Other natural hazards can and do affect the Town of Rye, but these were the hazards prioritized by the Committee for mitigation planning. These were the hazards that were considered to occur with regularity and/or were considered to have high damage potential, and are discussed below.

Natural hazards that are included that are not included in the *Plan* include: drought, extreme heat, landslide, subsidence, radon, avalanche and ice jams. Subsidence and avalanche are rated by the State as having Low and No risk in Rockingham County, respectively; due to this they were left out of the *Plan*. Rye has no record of landslides and little chance of one occurring that could possibly damage property of cause injury; so landslides were not included in this *Plan*. The State of New Hampshire's Natural Hazard Mitigation Plan indicates that Rockingham County is at Moderate risk to drought, extreme heat, and radon; these hazards were not included in the *Plan*. When compared natural hazards that could be potentially devastating to the Town (earthquakes or hurricanes) or natural hazards that occur with regularity (flooding or severe winter weather) it was not considered an effective us of the Committee time to include drought, extreme heat, and radon in the *Plan* at this time. Ice jams were not included in the plan because of there infrequency and low potential for damage in Rye, NH. Rye is coastal and completely contained in the Coastal Watershed (see Figure 2). Due to this streams and rivers in Rye have small drainage basins and relatively short lengths; there is little chance of damaging ice building up on any of these small water bodies. When the *Plan* is revised and updated in the future, possible inclusion of these hazards will be reevaluated.

Definitions of Natural Hazards

Flooding

Floods are defined as a temporary overflow of water onto lands that are not normally covered by water. Flooding results from the overflow of major rivers and tributaries, storm surges, and/ or inadequate local drainage. Floods can cause loss of life, property damage, crop/livestock damage, and water supply contamination. Floods can also disrupt travel routes on roads and bridges.

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however, floods can occur at any time of the year. A sudden thaw in the winter or a major downpour in the summer can cause flooding because there is suddenly a lot of water in one place with nowhere to go. Coastal flooding can be caused by hurricanes or other coastal storms or possibly from a tsunami.

100-year Floodplain Events

Floodplains are usually located in lowlands near rivers, and flood on a regular basis. The term 100 year flood does not mean that flood will occur once every 100 years. It is a statement of probability that scientists and engineers use to describe how one flood compares to others that

are likely to occur. It is more accurate to use the phrase "1% annual chance flood". What this means is that there is a 1% chance of a flood of that size happening in any year. The flood hazard areas that are identified in Rye are defined as follows (according to FEMA's websites: http://www.fema.gov/business/nfip/fhamr.shtm#79 http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/flood_zones.shtm)

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.

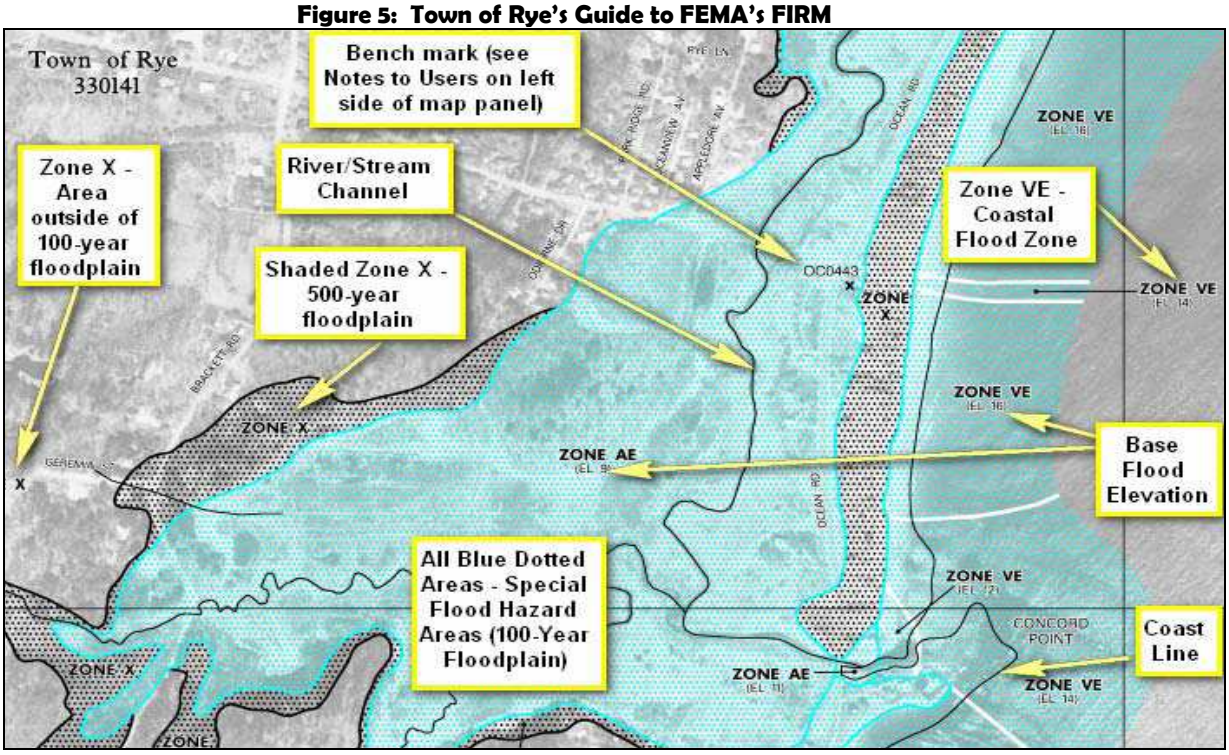
Zones AE and A1-A30 are the flood insurance rate zones that correspond to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, Base Flood Elevations (BFEs) derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. The depth should be averaged along the cross section and then along the direction of flow to determine the extent of the zone. Average flood depths derived from the detailed hydraulic analyses are shown within this zone. In addition, alluvial fan flood hazards are shown as Zone AO on the FIRM. Mandatory flood insurance purchase requirements apply.

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

Zone X is the flood insurance rate zones that correspond to areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

Figure 5: Town of Rye's Guide to FEMA's FIRM



Special Flood Hazard Areas (100-year Floodplain) Shown on Map as a Blue Dotted Area	
Zone A	Areas where no Base Flood Elevations have been determined.
Zone AE	Areas where Base Flood Elevations have been determined from a detailed hydraulic analysis and are shown on the map and in the Flood Insurance Study.
Zone AO	Areas that are prone to flood to depths of 1 to 3 feet. The average depth of flooding in these areas has been determined from a detailed hydraulic analysis and is shown on the map.
Zone VE	Coastal flood areas with velocity hazard (wave action). These areas include Base Flood Elevations, which have been determined from a detailed hydraulic analysis and are shown on the map and in the Flood Insurance Study.
Other Areas (Town's Floodplain Regulations not Enforced)	
Zone X	Areas outside of 100-year and 500-year floodplain
Shaded Zone X	Areas of the 500-year floodplain; areas of the 100-year floodplain with an average depth of less than 1 foot or with drainage areas less than 1 square mile.

Erosion and Mudslides
Erosion is the process of wind and water wearing away soil. Typically in New Hampshire, the land along rivers is relatively heavily developed. Mudslides may be formed when a layer of soil atop a slope becomes saturated by significant precipitation and slides along a more cohesive layer of soil or rock. Erosion and mudslides become significant threats to development during floods. Floods speed up the process of erosion and increase the risk of mudslides.

Rapid Snow Pack Melt
Warm temperatures and heavy rains cause rapid snowmelt. Quickly melting snow coupled with moderate to heavy rains are prime conditions for flooding.

Dam Breach and Failure
Dam failure results in rapid loss of water that is normally held by the dam. These kinds of floods are extremely dangerous and pose a significant threat to both life and property.

Coastal Storm Surge
Storm Surge is most often associated with the landfall of a hurricane. Strong winds and low pressure combine to cause waves that can be 1 to 10 meters above normal[2]. Strong winds blowing toward shore cause the water to pile up at the shore, causing the storm surge. These affects are most intense on the right side of the hurricane eye where the winds are blowing on shore.

Tsunami
The National Tsunami Hazard mitigation Program (http://www.pmel.noaa.gov/tsunami-hazard/terms.html) defines a Tsunami as Japanese term derived from the characters "tsu" meaning harbor and "nami" meaning wave. The international scientific community describes a series of traveling waves in water produced by the displacement of the sea floor associated with submarine earthquakes, volcanic eruptions, or landslides.

Severe Storms
Flooding associated with severe storms can inflict heavy damage to property. Heavy rains during severe storms are a common cause of inland flooding.

Hurricane-High Wind Events

Significantly high winds occur especially during hurricanes, tornadoes, winter storms and thunderstorms. Falling objects and downed power lines are dangerous risks associated with high winds. In addition, property damage and downed trees are common during high wind occurrences.

Hurricanes
A hurricane[3] is a tropical cyclone in which winds reach speeds of 74 miles per hour or more and blow in a large spiral around a relatively calm center. The eye of the storm is

[2] University of Illinois, World Weather 2010 Project http://ww2010.atmos.uiuc.edu/
[3] The Saffir/Simpson Hurricane Scale can be viewed in Appendix C

usually 20-30 miles wide and may extend over 400 miles. High winds are a primary cause of hurricane-inflicted loss of life and property damage.

Tornadoes

A tornado is a violent windstorm characterized by a twisting, funnel shaped cloud. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. The atmospheric conditions required for the formation of a tornado include great thermal instability, high humidity and the convergence of warm, moist air at low levels with cooler, drier air aloft. Most tornadoes remain suspended in the atmosphere, but if they touch down they become a force of destruction.

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

The Fujita Scale[4] is the standard scale for rating the severity of a tornado as measured by the damage it causes. A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud "freight train" noise. In comparison with a hurricane, a tornado covers a much smaller area but can be more violent and destructive.

Severe Thunderstorms

All thunderstorms contain lightning. During a lightning discharge, the sudden heating of the air causes it to expand rapidly. After the discharge, the air contracts quickly as it cools back to ambient temperatures. This rapid expansion and contraction of the air causes a shock wave that we hear as thunder, which can damage building walls and break glass.

Lightning

Lightning is a giant spark of electricity that occurs within the atmosphere or between the atmosphere and the ground. As lightning passes through air, it heats the air to a temperature of about 50,000 degrees Fahrenheit, considerably hotter than the surface of the sun. Lightning strikes can cause death, injury and property damage.

Hail

Hailstones are balls of ice that grow as they're held up by winds, known as updrafts, which blow upwards in thunderstorms. The updrafts carry droplets of super-cooled water – water at a below freezing temperature – but not yet ice. The super-cooled water droplets hit the balls of ice and freeze instantly, making the hailstones grow. The faster the updraft, the bigger the stones can grow. Most hailstones are smaller in diameter than a dime, but stones weighing more than a pound have been recorded. Details of how hailstones grow are complicated, but the results are irregular balls of ice that can be as large as baseballs, sometimes even bigger. While crops are the major victims, hail is also a hazard to vehicles and windows.

[4] The Fujita Tornado Scale can be viewed in Appendix D.

Severe Winter Weather

Ice and snow events typically occur during the winter months and can cause loss of life, property damage and tree damage.

Heavy Snow Storms

A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period.

Ice Storms

An ice storm involves rain, which freezes upon impact. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires and similar objects. Ice storms also often produce widespread power outages.

Wildfire

Wildfire is defined as an uncontrolled and rapidly spreading fire.

Forest Fires and Grass Fires

A forest fire is an uncontrolled fire in a woody area. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. Grass fires are uncontrolled fires in grassy areas.

Earthquakes

Geologic events are often associated with California, but New England is considered a moderate risk earthquake zone. An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, and avalanches. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is determined by the use of scales such as the Richter scale[5] and Mercalli scale.

Profile of Past and Potential Natural Hazards

As discussed above the natural hazards that affect, or potentially could affect Rye, New Hampshire, that were identified for designation in this *Plan* include: flooding, hurricanes-high wind events, severe winter weather, wildfire and earthquakes. The hazard profiles below include: a description of the events included as part of the natural hazard, the geographic location of each natural hazard (if applicable), the extent of the natural hazard (e.g. magnitude or severity), probability, past occurrences, and community vulnerability. Past occurrences of natural hazards were mapped if possible (Map 2: Past and Future Hazards). Some of the natural hazards have not occurred within the Town of Rye (within written memory), for these hazards the *Plan*

[5] A copy of the Richter scale is displayed in Appendix E.

refers to a table of hazards that have occurred regionally and statewide (Table 3). Community vulnerability identifies the specific areas, general type of structures, specific structures, or general vulnerability of the Town of Rye to each natural hazard.

Flooding

Description: Flooding events can include hurricanes, 100-year floods, 500-year floods, debris-impacted infrastructure, erosion, mudslides, rapid snow pack melt, dam breach and/or failure, coastal storm surge, and tsunami.

Location: Rye is vulnerable to flooding in several locations. Generally, the Town is at risk within the Flood Zones identified by FEMA on Flood Insurance Rate Maps (FIRM). As can be seen in Figure 4 in Chapter 2, Rye has several major flood zones: A, AE, AO, VE and X. These Zones are defined in the previous section. These flood zones correspond to the Special Flood Hazard Area (100-year flood zone) and the 500-year flood zone respectively. There are also several areas susceptible to flooding that are not within these flood zones, these areas are described below and displayed on Map 2: Past and Future Hazards.

Extent: The extent of the flood zones can be seen in Map 2: Past and Future Hazards. This area includes FIRM Zones that have been identified in Rye, as well as, areas of locally chronic flood problems. Map 2 also shows the potential storm surge inundation zone for categories 1 though 4. The data was developed by the National Hurricane Center and Provide by the US Army Corps of Engineers.

Probability: **High**.

Table 1: Probability of Flooding based on return interval

Flood Return Interval	Chance of Occurrence in Any Given Year
10-year	10%
50-year	2%
100-year	1%
500-year	0.2%

Past Occurrence: Flooding is a common hazard for the Town of Rye. Several locations were identified by the Committee as areas of chronic reoccurring flooding or high potential for future flooding. These areas are listed below. Larger flood events are listed in Table 3.

Community Vulnerability: Flooding is most likely to occur in the 100-year flood zones, especially along the Atlantic coastline. The coastline is vulnerable to both coastal flooding from storm surge, and flooding from other causes including heavy rain. The community has many structures that currently exist in the flood zones. As of May 28, 2008, Rye had 301 Flood insurance policies in force (Community Information System: https://Portal.fema.gov/cis/insurenceview.jsp). These policies total $69,429,900 of insurance coverage. The number of Paid losses in Rye is 168 for a total of $1,628,674.03 of damage. The insured structures include seven that are identified as repetitive loss

structures under the NFIP. Repetitive loss structures are defined as an NFIP-insured structure that has had at least two paid flood losses of more than $1,000 each in any 10-year period since 1978[6]. (See Table 2 below for total in payments that have been made to repetitive loss structures in Rye provided by NH Floodplain Management Coordinator) Other areas of vulnerability would include any roadways or infrastructure within the flood zones.

National Flood Insurance Program (NFIP)

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer funded disaster relief for flood victim and the increasing amount of damage caused by floods. The Federal Insurance and Mitigation Administration (FIMA) a component of the Federal Emergency Management Agency (FEMA) manages the NFIP, and oversees the floodplain management and mapping components of the program.

Communities participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce flood damage. In exchange, the NFIP makes federally subsidized flood insurance available to homeowners, renters, and business owners in these communities. Flood insurance, Federal Grants and loans, Federal disaster assistance and federal mortgage insurance is unavailable for the acquisition or construction of structures located in the floodplain shown on the NFIP maps for those communities that do not participate in the program.

To get secure financing to buy, build or improve structures in the Special Flood Hazard areas, it is legally required by federal law to purchase flood insurance. Lending institutions that are federally regulated or federally insured must determine if the structure is located in the SFHA and must provide written notice requiring flood insurance. Flood insurance is available to any property owner located in a community participating in NFIP.

Flood damage is reduced by nearly $1 billion a year through partnerships with communities, the insurance industry, and the lending industry. Further, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance. Additionally, every $3 paid in flood insurance claims saves $1 in disaster assistance payments.

The NFIP is self-supporting for the average historical loss year, which means that operating expenses and flood insurance claims are not paid for by the taxpayer, but through premiums collected for flood insurance policies. The program has borrowing authority from the U.S. Treasury for times when losses are heavy, however, these loans are paid back with interest.

Repetitive Loss Properties

A specific target group of repetitive loss properties is identified and serviced separately from other NFIP policies by the Special Direct Facility (SDF). The target group includes every NFIP insured property that, since 1978 and regardless of any change(s) of ownership during that period, has experienced four or more paid losses, two paid flood losses within a 10-year period that equal or exceed the current value of the insured property, or three or more paid losses that

[6] http://www.fema.gov/about/regions/regioni/r1mithome.shtm

equal or exceed the current value of the insured property, regardless of any changes of ownership, since the buildings construction or back to 1978. Target group policies are afforded coverage, whether new or renewal, only through the SDF.

The FEMA Regional Office provides information about repetitive loss properties to State and local floodplain management officials. The FEMA Regional Office may also offer property owners building inspection and financial incentives for undertaking measures to mitigate future flood losses. These measures include elevating buildings from the flood area, and in some cases drainage improvement projects. If the property owners agree to mitigation measures, their property may be removed from the target list and would no longer be serviced by the SDF.

Table 2: Total payments made to Rep Loss Structures in Rye

Tot Building Payment	Tot Contents Payment	Losses	Total Paid
13,404.05	1,904.15	3	15,308.20
16,632.77	7,820.58	4	24,453.35
27,496.78	2,673.50	2	30,170.28
9,120.49	0.00	2	9,120.49
20,063.33	0.00	3	20,063.33
4,887.86	0.00	2	4,887.86
48,030.00	6,847.94	6	54,877.94
28,336.90	8,401.70	4	36,738.60
91,593.22	22,904.48	3	114,497.70
14,739.85	0.00	2	14,739.85
27,015.28	0.00	2	27,015.28
5,443.08	739.20	2	6,182.28
4,303.03	0.00	2	4,303.03
73,930.06	34,021.66	2	107,951.72
SUM	SUM	AVG	SUM
384,996.70	85,313.21	2.79	470,309.91

As part of the Community Rating System (CRS), the Town receives a list of Repetitive Losses each year. The 2008 notification listed 14 Repetitive losses. The Town notifies these homeowners of the potentials and participates in public outreach programs to mitigate further losses and to notify the public of the hazards of flooding and what to do when and if it occurs. A source of materials is kept at the Rye Public Library.

Areas of Local Flooding:

- Route 1A where it intersects Sagamore Road
- Ocean Road next to Eel Pond
- Red Mill Lane at the outflow of Burke Pond
- Rye Harbor
- Huntervale Avenue
- Burke Pond, off Central Road, the water flows to Sawyer's Beach
- Brown's Pond, off Love Lane.

Floodplain Management Goals/Reducing Flood Risks

A major objective to floodplain management is to continue participation in the NFIP. Communities that agree to manage Special Flood hazard Areas shown on NFIP maps participate in the NFIP by adopting minimum standards. The minimum requirements are the adoption of the floodplain Ordinances and Subdivision/Site Plan Review requirements for land designated as Special Flood hazard Areas. Under Federal Law, any structure located in the floodplain is required to have flood insurance. Federally subsidized flood insurance is available to any property owner located in a community participating in the NFIP. Communities that fail to comply with the NFIP will be put on probation and/or suspended. Probation is a first warning where all policy holders receive a letter notifying them of a $50 increase in their insurance. In the event of suspension, the policyholders lose their NFIP insurance and are left to purchase insurance in the private sector, which is of significantly higher cost. If a community is having difficulty complying with NFIP policies, FEMA is available to meet with staff and volunteers to work through the difficulties and clear up any confusion before placing the community on probation or suspension.

Potential Administrative Techniques to Minimize Flood Losses in Rye

In order to reduce flood risks, the zoning enforcement officer should be familiar with the Floodplain Ordinance and the NFIP. In addition, the Planning Board should be familiar with the NFIP policies, especially those regulations that are required to be incorporated into the Subdivision/Site Plan Review regulations. A workshop sponsored by the NH Bureau of Emergency Management or the NH Office of Energy and Planning would be appropriate to educate current staff and volunteers on a bi-yearly basis.

An essential step in mitigating flood damage is participating in NFIP. Rye should work to consistently enforce NFIP compliant policies to continue its participation in this program.

Hurricanes-High Wind Events

Description: High wind events can include hurricanes, tornadoes, "Nor'-Easters," downbursts and lightning/thunderstorm events.

Location: Hurricane events are more potentially damaging with increasing proximity to the coast. Rye's immediate proximity to the Atlantic Coast makes hurricanes and high wind events severe threats. For this *Plan*, high-wind events were considered to have an equal chance of affecting any part of the Town of Rye.

Extent: Rye is located within Zone II hurricane-susceptible region (indicating a design wind speed of 160 mph)[7]. From 1950 to 1995 Rockingham County was subject to 9 tornado events, these included 2 type F0 (Gale Tornado, 40-72 mph), 2 type F1 (Moderate Tornado, 73-112 mph), 4 type F2 (Significant Tornado, 113-157 mph) and 1 type F3 (Severe Tornado, 158-206 mph)[8]. Type 3 tornados can cause severe damage including tearing the roofs and walls from well-constructed homes, trees can be uprooted, trains

[7] "Understanding Your Risks, Identifying Hazards and Estimating Losses", FEMA
[8] The tornado project .com

over-turned, and cars lifted off the ground and thrown[9]. Between 1900 and 1996 2 hurricanes have made landfall in New Hampshire, a category 1 and a category 2. In Maine, 5 hurricanes have made landfall (all category 1). In Massachusetts, 6 hurricanes have made landfall (2 category 1, 2 category 2 and 2 category 3). From this information it can be extrapolated that Rye is a high risk to a hurricane event, with wind speeds variable between 74 – 130 mph (category 1-3).

Probability: **High**. The State of New Hampshire's Natural Hazards Mitigation Plan rates Rockingham County with high likelihood of hurricane, tornado and "Nor'-Easters" events. Also, it rates the risk of downbursts, lightning and hail events as moderate.

Past Occurrence:
Between 1635 and 1991, 10 hurricanes have impacted the State of New Hampshire. The worst of these occurred on September 21, 1938, with wind speeds of up to 186 mph in MA and 138mph elsewhere. Thirteen of 494 people killed by this storm were residents of New Hampshire. The Storm caused $12,337,643 in damages (1938 dollars), timber not included. Two of those storms occurred within a short period of time. The Hurricane of August 18-20 1991 was the 15th costliest hurricane and estimated 2.5 million dollars in damages in New Hampshire. Hurricane Grace, Also known as "The Perfect Storm" occurred two months later on October 30, 1991.

October 20 to the 21st of 1996, a Nor' Easter combined with Hurricane Lili to cause devastating floods on the Seacoast.

Rockingham tornado history is as follows: Category F0 tornados occurred on Oct. 03, 1970 and June 09, 1978. Category F1 tornados occurred on July 31, 1954 and July 26, 1966. Category F2 tornados occurred on Aug. 21, 1951, June 19, 1957, July 02, 1961 and June 09, 1963. The category F3 tornado occurred on June 09, 1953.

A Tornado hit central New Hampshire in July 2008 and traveled 40 miles through 11 towns, creating a swath of destruction a third of a mile wide in some areas according to the National Weather Service. The Storm killed one person and 6 to 12 other homes not including the one were the fatality occurred collapsed and about 200 were damaged.

Community Vulnerability:
- Power lines,
- Shingled roofs,
- Chimneys, and
- Trees

Severe Winter Weather

Description: There are three types of winter events**:** blizzards, ice storms and extreme cold. All of these events are a threat to the community with subzero temperatures from extreme wind chill and storms causing low visibility for commuters. Snow storms are known to collapse buildings. Ice storms disrupt power and communication services.

[9] "Understanding Your Risks, Identifying Hazards and Estimating Losses", FEMA

Extreme cold affects the elderly. None of these storms affect one area of town more than another.

Location: Severe winter weather events have and equal chance of affecting any part of the Town of Rye.

Extent: Large snow events in Southeastern New Hampshire can produce 30 inches of snow. Portions of central New Hampshire recorded snowfalls of 98" during one slow moving storm February of 1969. Ice storms occur with regularity in New England. Seven severe ice storms have been recorded that affected New Hampshire since 1929. These events caused disruption of transportation, loss of power and millions of dollars in damage.

Probability: **High**. The State of New Hampshire's Natural Hazards Mitigation Plan rates Rockingham County with high likelihood of heavy snows and ice storms.

Past Occurrence: A list of past winter storm events is displayed below, in Table 4.

Community Vulnerability:

- Power lines,
- Trees, and
- Elderly Populations

Wildfires

Description: Wildfires include grass fires, forest fires and issues with isolated homes and residential areas.

Location: The Committee identified one large wooded area of Town as at-risk to wildfires, see Map 2: Past and Future Hazards.

Extent: A wildfire in the Town of Rye is unlikely, but if a crown fire were to occur it could be very damaging to several small sections of Town, such as the Town Forest.

Probability: **Moderate**. The State of New Hampshire's Natural Hazards Mitigation Plan rates Rockingham County with moderate risk to wildfires.

Past Occurrence: The majority of wildfires in Rye are minor brush fires. No Large fires have occurred within recent memory.

Community Vulnerability:

- Structures located near large open vegetated areas prone to lightning strike

Earthquakes

Description: including landslides and other geologic hazards related to seismic activity.

Location: An earthquake has an equal chance of affecting all areas in the Town of Rye.

Extent: New England is particularly vulnerable to the injury of its inhabitants and structural damage because of our built environment. Few New England States currently include seismic design in their building codes. Massachusetts introduced earthquake design requirements into their building code in 1975 and Connecticut very recently did so. However, these specifications are for new buildings, or very significantly modified existing buildings only. Existing buildings, bridges, water supply lines, electrical power lines and facilities, etc. have rarely been designed for earthquake forces (New Hampshire has no such code specifications).

Probability: **Moderate**. The State of New Hampshire's Natural Hazard Mitigation Plan ranks all of the Counties in the State with at moderate risk to earthquakes. The Town of Rye's Peak Ground Acceleration (PGA) values range between 6.1 and 21.0[10]. These numbers are associated with how much an earthquake is felt and how much damage it may cause (Table 3).

Table 3: Peak Ground acceleration (PGA) values for Rye (information from State and Local Mitigation Planning, FEMA).

PGA	Chance of being exceeded in the next 50 years	Perceived Shaking	Potential Damage
6.1	10%	Moderate	Very Light
10.6	5%	Strong	Light
21.0	2%	Very Strong	Moderate

Past Occurrence: Large earthquakes have not affected the Town of Rye within recent memory. A list of earthquakes that have affected the region is displayed in Table 4.

According to NH Emergency Management Agency, a mild earthquake shook the State's Seacoast area June 2, 2007. It was reported as a 1.4 intensity earthquake hit at 10:30 P.M., and was centered about a mile and half north of Exeter, NH.

Community Vulnerability:

- Dams,
- Bridges,
- Brick Structures,
- Infrastructure,
- Water and Gas lines, and
- Secondary hazards such as fire, power outages, or hazardous material leak or spill.

Table 4: Past Hazard Events in Rye and Rockingham County

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description

[10] http://geohazards.cr.usgs.gov/eq/pubmaps/us.pga.050.map.gif

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description
Flood	March 11-21, 1936	Statewide	$133,000,000 in damage throughout New England, 77,000 homeless.	Double Flood; snowmelt/heavy rain.
Flood	September 21, 1938	Statewide	Unknown	Hurricane; stream stage similar to March 1936
Flood	July 1986 – August 10, 1986	Statewide	Unknown	**FEMA DR-771-NH**: Severe storms; heavy rain, tornadoes , flash flood, severe wind
Flood	August 7-11 1990	Statewide	Road Network	**FEMA DR-876-NH**: A series of storms with moderate to heavy rains; widespread flooding.
Flood	August 19, 1991	Statewide, Primarily Rockingham and Strafford Counties	Road Network	**FEMA DR-917-NH:** Hurricane Bob; effects felt statewide; counties to east hardest hit.
Flood	October 20 – 21 1996	Rockingham County	Unknown	**Hurricane Lili combined with Nor Easter**
Flood	October 28, 1996	Rockingham County	Unknown - Typically structures and infrastructure in the floodplain	North and west regions; severe storms.
Flood	June – July 1998	Rockingham County	Heavy damage to secondary roads occurred	**FEMA DR-1231-NH:** A series of rainfall events
Flood	May 13-16 2006	Rye, Rockingham County and other portions of State	Foyes Circle, Red Mill and Huntervale Avenue	**Mother's Day Flood**
Flood/Nor Easter	April 16-18 2007	Portions of State	Ocean Blvd, Concord Pt., and all coastal properties	**Patriots Day Flood with high winds**
Hurricane	October 18,19 1778	Portions of State	Unknown	40-75 mph winds
Hurricane	1804	Portions of State	Unknown	
Hurricane	September 8, 1869	Portions of State	Unknown	> 50 mph winds
Great Hurricane Of 1938	September 21, 1938	All of Southern New England	2 billion board feet of timber destroyed; electric and telephone disrupted, structures damaged, flooding; statewide 1,363 families received assistance.	Max. wind speed of 186 mph in MA and 138mph max. elsewhere 13 of 494 dead in NH; $12,337,643 total storm losses (1938 dollars), timber not included.

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description
Hurricane Carol	August 31, 1954	Southern New England	Extensive tree and crop damage in state.	SAFFIR/SIMPSON HURRICANE SCALE[11] - Category 3, winds 111-130 mph
Hurricane Donna	September 12, 1960	Southern and Central NH	Unknown	Category 3 Heavy Flooding
Hurricane Belle	August 10, 1976	Southern New England	Unknown	Category 1, winds 74-95 mph Rain and flooding in NH
Hurricane Gloria	September 27, 1985	Southern New England	Unknown	Category 2, winds 96-110 mph >70 mph winds; minor wind damage and
Tropical Storm Floyd	September 16-18 1999	Statewide	Unknown	
Hurricane Grace	October 30 1991	Unknown	Unknown	The Perfect Storm
Ice Jam	Feb 29, 2000	Brentwood, NH Exeter River	Unknown	Discharge 570 cfs
Ice Jam	Mar 29, 1993	Epping, NH Lamprey River	Road flooding	
Tornado	May 21, 1814	Rockingham County	Unknown	F2[12]
Tornado	May 16, 1890	Rockingham County	Unknown	F2
Tornado	August 21, 1951	Rockingham County	Unknown	F2
Tornado	June 9, 1953	Rockingham County	Unknown	F3
Tornado	June 19, 1957	Rockingham County	Unknown	F2
Tornado	July 2, 1961	Rockingham County	Unknown	F2
Tornado	June 9, 1963	Rockingham County	Unknown	F2

[11] For a complete description of the Saffir/Simpson Hurricane Scale see Appendix C.
[12] For a complete description of the Fujita Tornado Damage Scale see Appendix D

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description
Tornado	July 26 2008	Portions of State	One Fatality, some injuries 12 homes collapsed and about 200 homes damaged and many trees and power lines downed	Winds as strong as 120 mph
Downburst	July 6, 1999	Stratham, NH	Five fatalities and eleven injuries. Major tree damage, power outages	Microburst $2,498,974 in damages
Downburst	August 3, 2006	Rye and North Hampton	Downed trees, snapped and uprooted, houses damaged power outages	Microburst
Ice Storm	December 17-20 1929	NH	Telephone, telegraph and power disrupted.	
Ice Storm	December 29-30 1942	NH	Unknown- Typically damage to overhead wires and trees.	Glaze storm; severe intensity
Ice Storm	December 22 1969	Parts of NH	Power disruption	Many communities affected
Ice Storm	January 17, 1970	Parts of NH	Power disruption	Many communities affected
Ice Storm	January 8-25 1979	NH	Major disruption of Power and transportation	
Ice Storm	March 3-6 1991	Southern NH	Numerous power outages in southern NH	Numerous in Southern NH
Ice Storm	January 7, 1998	Rockingham County	Power and phone disrupted, communication tower collapsed.	$17,000,000 in damages to PSNH equipment.
Ice Storm	December 11 2008	Rye, Statewide and parts of New England	Unknown	Damage by fallen trees, widespread power outages
Snowstorm	February 4-7 1920	New England	Disrupt transportation for weeks	Boston 37-50cm of sleet , ice and snow
Snowstorm	February 15, 1940	New England	Paralyzed New England	30cm of snow with high wind.
Snowstorm	February 14-17 1958	Southern NH	Unknown	20-33" of snow
Snowstorm	March 18-21 1958	South central NH	Unknown	22-24"of snow
Snowstorm	March 2-5 1950	Southern NH	Unknown	25"of snow
Snowstorm	January 18-20 1961	Southern NH	Unknown	Blizzard Conditions; 50cm of snow
Snowstorm	February 8-10 1969	Southeastern NH	Paralyzing snow	27"of snow and high winds
Snowstorm	February 22-28 1969	Central NH	Unknown	34-98"of snow; very slow moving
Snowstorm "Blizzard of'78"	February 5-7 1978	Statewide	Trapped commuters on highways, businesses closed	Hurricane force winds; 25-33"of snow. People disregard warnings due to a series of missed forecasts

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description
Snowstorm	April 5-7 1982	Southern NH	Unknown	Late season with thunderstorms and 18-22" of snow
Earthquake	November 18, 1929	Grand Banks Newfoundland	No damage	Richter Magnitude Scale: 7.2[13]
Earthquake	December 20, 1940	Ossipee	Ground Cracks and damage over a broad area	Richter Magnitude Scale: 5.5; Felt over 341 miles away.
Earthquake	December 24, 1940	Ossipee	Ground Cracks and damage over a broad area	Richter Magnitude Scale: 5.5; Felt over 550 KM away.
Earthquake	June 15, 1973	Quebec/NH border	Minor damage	Richter Magnitude Scale: 4.8
Earthquake	June 19, 1982	West of Laconia	Little damage	Richter Magnitude Scale: 4.5
Earthquake	June 2, 2007	Seacoast	Unknown	1.4 intensity earthquake hit at 10:30 PM and centered about a mile and ½ north of Exeter
Drought	1929-36	Statewide	Unknown	Regional
Drought	1939-44	Statewide	Unknown	Severe in southeast NH
Drought	1947-50	Statewide	Unknown	Moderate
Drought	1960-69	Statewide	Unknown	Longest recorded continuous period of below normal precipitation
Drought Warning	June 6, 1999	Most of State	Unknown	Governors office declaration; Palmer Drought Survey Index indicate "moderate drought" for most of state.

Sources: New Hampshire Bureau of Emergency Management, 2000; Town of Rye;
Northeast States Emergency Consortium (NESEC) Website: http://www.nesec.org;
US Army Corp of Engineers Ice Jam Database, http://www.crrel.usace.army.mil/cgi-bin/ice/ijdb;
Tornado Project, http://www.tornadoproject.com
NH WMUR, Channel 9 News Station, http://www.wmur.com/index.html

[13] For a complete description of the Richter Magnitude Scale see Appendix E.

Map 2: Past and Future Hazards

CHAPTER IV. CRITICAL FACILITIES

The Critical Facilities List for the Town of Rye has been identified by Rye's Hazard Mitigation Committee. The Critical Facilities List has been broken up into four categories. The *first category* contains facilities needed for Emergency Response in the event of a disaster. The *second category* contains Non-Emergency Response Facilities that have been identified by the committee as non-essential. These are not required in an emergency response event, but are considered essential for the everyday operation of Rye. The *third category* contains Facilities/Populations that the committee wishes to protect in the event of a disaster. The *fourth category* contains Potential Resources, which can provide services or supplies in the event of a disaster. Map 3: Critical Facilities at the end of this Chapter identifies the location of the facilities and the evacuation routes. A detailed description of critical facilities can be found in Table 4 through Table 7.

Table 5: Category 1 - Emergency Response Services and Facilities:

Critical Facility Name	Address	Comments	Hazard Vulnerability
Police Station	Washington Road		All
Fire Station	Washington Road		All
Public Works	Grove Road	Fuel Tank	All
Town Hall	Central Road		All
Water Tanks	Washington Road	Two water tanks	All
Water Tank	Lafayette Road		All
Water Tank	Central Road		All
Water Department Office	Sagamore Road		All
Water Supply Wells	Garland Road	Two wells	All
Cell Tower	Washington Road		All
Cell Tower	Grove Road		All
Cell Tower	Lafayette Road		All
Electric Substation	Central Road		All
Electric Substation	Lafayette Road		All
Electric Substation	Sagamore Road		All
Aquarion Well	Central Road		All

Table 6: Category 2 - Non Emergency Response Facilities:
The town has identified these facilities as non-emergency facilities; however, they are considered essential for the everyday operation of Rye.

Critical Facility Name	Address	Comments	Hazard Vulnerability
Sewage Pump	Old Beach Road		All, Flooding, Storm Surge
Emergency Fuel	Grove Road		All
Sewage Pump Station	Church Road		All
Sewage Pump Station	Central Road		All
Sea Walls/Shale Piles	Route 1A		All, Coastal Storms, Storm Surge

Table 7: Category 3 - Facilities/Populations to Protect:
The third category contains people and facilities that need to be protected in event of a disaster.

Critical Facility Name	Address	Comments	Hazard Vulnerability
Rye Country Day School	1245 Washington Road		All
Webster at Rye Nursing Home	Washington Road		All
Post Office	301 Central Road		All
Post Office	830 Central Road		All
Recreation Center	Recreation Road		All
Parsons Field	Washington Road		All
Rye Congregational Church	580 Washington Road		All
Rye Public Library	581 Washington Road		All
Rye Elementary School	461 Sagamore Road		All
Rye Junior High School	501 Washington Road		All
St. Theresa Church	Central Road		All
St. Andrews by the Sea Church	Church Street		All
Rye Town Museum	Old Parish Road		All
Rye Harbor State Park	Route 1A		All, Flooding, Storm Surge
Wallis Sands State Park	Route 1A		All Flooding, Storm Surge
Briar Patch Day Care	Wentworth Road		All
Children's House Montessori School and Day Care	80 Sagamore Road		All
Learning Skills Academy	1245 Washington Road		All

Table 8: Category 4 - Potential Resources:
This category contains facilities that provide potential resources for services or supplies in the event of a natural disaster.

Critical Facility Name	Address	Comments	Hazard Vulnerability
Home Depot	35 Lafayette Road, North Hampton	Building supplies	All
Rand Lumber Yard	511 Wallis Road	Building supplies	All
Rye Junior High School	501 Washington Rd	Shelter	All
Rye Elementary School	461 Sagamore Road	Shelter	All
Lowe's Lumber	RT 33, Greenland	Building supplies	All
Home Depot	100 Durgin Lane, Portsmouth	Building supplies	All

Map 3: Critical Facilities

CHAPTER V. DETERMINING HOW MUCH WILL BE AFFECTED

Identifying Vulnerable Facilities

It is important to determine which critical facilities are the most vulnerable and to estimate their potential loss. The first step is to identify the facilities most likely to be damaged in a hazard event. To do this, the location of critical facilities illustrated on Map 3 was compared to the location of various topographical elements, floodplains, roads, and water bodies using GIS (Geographic Information Systems). Vulnerable facilities were identified by comparing their location to possible hazard events. For example, all of the structures within the 100-year and 500-year floodplains were identified and used in conducting the potential loss analysis for flooding. (Critical Facilities Map was changed in 2009 to take traffic away from Ocean Blvd during coastal storms).

Calculating the Potential Loss

The next step in completing the loss estimation involved assessing the level of damage from a hazard event as a percentage of the facility's structural value. The Federal Emergency Management Agency (FEMA) has developed a process in which replacement values for structures located in the 100 and 500-year floodplains can be calculated according to the amount of damage suffered[14]. In Rye, the assessed values were determined for every structure identified in the floodplain based on the 2008 Tax Maps.

The potential loss was then calculated by multiplying the assessed value of the structure by the percent of damage expected from a hazard event (i.e., 100-year, 4-foot flood, etc.). The following discussion summarizes the potential loss estimates to structures (residential and non-residential) due to natural hazard events.

Flooding

Flooding is often associated with hurricanes, rapid snow melt in the spring and heavy rains.

The average replacement value was calculated by adding up the assessed values of all structures in the 100 and 500 year floodplains. These structures were identified by overlaying Mylar Maps made from the digital versions of FEMA's FIRM maps over the 2008 Town Tax Maps. Because of the scale and resolution of the FIRM maps and imagery this is only an approximation of the total structures located within the 100 and 500 year floodplains. (There are approximately 572 structures.) The Federal Emergency Management Agency (FEMA) has developed a process to calculate potential loss for structures during flood. The potential loss was calculated by multiplying the replacement value by the percent of damage expected from the hazard event. Residential and non-residential structures were combined. The costs for repairing or replacing bridges, railroads, power lines, telephone lines, and contents of structures are not included in this estimate. In addition, the figures used were based on buildings which are one or two stories high with basements. The percentage of structural damage and contents damage that could be expected for each flood depth is shown in Table 8, along with estimates of functional downtime (how long a business/residence would be down before relocating) and displacement time (how long a business/residence would be displaced from its flooded location).

[14] "Understanding Your Risks, Identifying Hazards and Estimating Losses", FEMA, page 4-13.

The following calculation is based on eight-foot flooding and assumes that, on average, one or two story buildings with basements receive 49% damage (Understanding Your Risks, Identifying Hazards and Estimating Losses, FEMA page 4-13):

As per the 2008 assessment records determined by the Town of Rye Assessor, the following figure below lists the valuations.

FIGURE 6: Assessment Values and numbers of structures within Town of Rye

	Assessed Valuation	Structures	Average (rounded)
Residential	$817,556,700	2,769	$300,000
Mobile Homes	$2,357,700	63	$37,000
Commercial	$40,566,200	104	$390,000
Exempt Buildings	$37,938,700	164	$231,400
Totals	$898,419,300	3100	$300,000

Approximately 572 structures within the SFHA based on methodology stated above, assessed at average of $300,000 = $171,600,000

Potential Structure Damage: 49%
Approximately 572 structures assessed at $300,000 = $84,084,000

The following calculation is based on four-foot flooding and assumes that, on average, one or two story buildings with basements receive 28% damage:

Potential Structure Damage: 28%
Approximately 572 structures assessed at $300,000 = $48,048,000 potential damage

The following calculation is based on two-foot flooding and assumes that, on average, one or two story buildings with basements receive 20% damage (Understanding Your Risks, Identifying Hazards and Estimating Losses, FEMA page 4-13):

Potential Structure Damage: 20%
Approximately 572 structures assessed at $300,000 = $34,320,000 potential damage

Table 9: Percentages of structural and content damage, based on the assessed value of a flooded parcel. Also shows the functional downtime and displacement time for each flood event.

Flood Depth	One-foot	Two-foot	Four-foot
% Structural Damage: Buildings	15%	20%	28%
% Structural Damage: Mobile Homes	44%	63%	78%
% Contents Damage: Buildings	22.5%	30%	42%
% Contents Damage: Mobile Homes	30%	90%	90%
Flood Functional Downtime: Buildings	15 days	20 days	28 days
Flood Functional Downtime: Mobile Homes	30 days	30 days	30 days

Flood Displacement Time: Buildings	70 days	110 days	174 days
Flood Displacement Time: Mobile Homes	302 days	365 days	365 days

~Dam Breach and Failure

Dam breach and failure could impact Rye through flooding. Potential losses will depend on the extent of the breach and could include both residential and non-residential damage, including town owned facilities. There are three dams in Rye, NH, that could cause damage to residents and/or infrastructure and they include: Locke Pond Dam (also known as Brown's Pond off Love Lane), Burke Pond Dam and Eel Pond Dam. These three dams are on the same watercourse and progress in the order above. These three dams are rated A or AA which indicate low hazard risk according to Damsafety.org (www.**dam**safety.org/documents/pdf/NH.pdf) Damage estimates for dam breech of these three dams would be as follows:

Locke Pond Dam: Hazard Class AA
Water flooding from a breech of Locke Pond Dam would affect no houses. The flooding could washout one road that is not a major route.

Burke Pond Dam: Hazard Class AA
A breech of Burke Pond dam would damage no roadways but could cause damage to as many as 7 homes before reaching Eel Pond. Assuming 100% structural damage = $4,200,000 in potential damage.

Eel Pond Dam: Hazard Class A
A breech of Eel Pond Dam could affect 8 homes plus the Beach Club but would also washout NH Route 1A. The Damage to the structures could be $5,800,000 (Assuming 100% structural damage). Route 1A is a major route through Rye and could be used as an evacuation route during an emergency in Rye or a neighboring community.

Hurricane/ High Wind Events

~Hurricane **$8,984,193 to $44,920,965**

Hurricanes do affect the Northeast coast periodically. Since 1900, 2 hurricanes have made landfall in the State of New Hampshire. Due to the coastal location of the Town of Rye, hurricanes and storm surges present a real hazard to the community. Even degraded hurricanes or tropical storms could still cause significant damage to the structures and infrastructure of the Town of Rye. The assessed value of all residential and commercial structures in the Town of Rye, including exempt structures such as schools and churches, is $898,419,300 (Assuming 1% to 5% damage, a hurricane could result in $8,984,193 to $44,920,965 of structure damage.

~Tornado **$8,984,193 to $44,920,965**

Tornadoes are relatively uncommon natural hazards in New Hampshire. On average, about six touch down each year. Damage largely depends on where the tornado strikes. If is strikes an inhabited area, the impact could be severe. In the State of New Hampshire, the total cost of tornadoes between 1950 and 1995 was $9,071,389 (The Disaster Center). The assessed value of all

residential and commercial structures in the Town of Rye is $898,419,300 (Assuming 1% to 5% damage, a tornado could result in $8,984,193 to $44,920,965 of structure damage.

The Tornado of 2008 that went through 11 communities in New Hampshire and ended one life and had a financial cost to date of $1,691,240.19 in Public Assistance damages.

~Severe Lightning

The amount of damage caused by lightning will vary according to the type of structure hit and the type of contents inside. There is now record of monetary damages inflicted in the Town of Rye from lightning strikes.

Severe Winter Weather

~Heavy Snowstorms

Heavy snowstorms typically occur during January and February. New England usually experiences at least one or two heavy snow storms with varying degrees of severity each year. Power outages, extreme cold and impacts to infrastructure are all effects of winter storms that have been felt in Rye in the past. All of these impacts are a risk to the community, including isolation, especially of the elderly, and increased traffic accidents. Damage caused as a result of this type of hazard varies according to wind velocity, snow accumulation and duration. Heavy Snowstorms in Rye could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm.

~Ice Storms

Ice storms often cause widespread power outages by downing power lines, making power lines at risk in Rye. They can also cause severe damage to trees. In 1998, an ice storm inflicted $12,466,202 worth of damage to New Hampshire as a whole. Ice storms in Rye could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm.

Rye's total damage was $19,651.40 due to the Ice Storm that hit in December and the State sustained a total to date of $19,965,118.02 in Public Assistance funds per our Sr. Representative with the NH Department of Safety Division of Homeland Security and Emergency Management

Wildfire

Wildfires have not damaged homes in Rye in recent memory. Due to the ability and coordination of the emergency response services in Rye and the surrounding Towns, a catastrophic wildfire is highly unlikely. In an extreme drought year the potential would increase for a severe fire that could damage homes. If a fire were to occur in a drought year it would still be rapidly contained but still has the potential to destroy a number of homes. Single family homes of wood-frame construction would be at the highest risk. Damage estimates would be the number of homes destroyed multiplied by the average assessed value which is $300,000.

Earthquakes

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and are often associated with landslides and flash floods. Four earthquakes in New Hampshire between the years of 1924-1989 had a magnitude of 4.2 or more. Two of these occurred in Ossipee, one west of Laconia, and one near the Quebec border. If an earthquake were to impact the Town of Rye, underground lines would be susceptible. In addition, buildings that are not built to a high seismic design level would be susceptible to structural damage. The assessed value of all residential and commercial structures in Rye is $898,419,300, including exempt structures such as schools and churches. Based on Table 9 below, an earthquake could cause a range of damage depending on the construction and materials used to build the structures. Making the assumption that all of the structures in Rye are single family homes built Pre-code, and wood frame construction, an earthquake could result in $4,514,172 of damage for a 0.07 PGA earthquake to $37,241,919 of damage for a 0.20 PGA earthquake.

Table 10: Earthquake Damage and Loss of Function Table. Building Damage and Functional Loss are based on the type of Structure and the PGA (g). Two PGA (Peak Ground Acceleration) were chosen for this Table, 0.07 and 0.20 which represent a low and high example of potential earthquake in Rye, NH.

		Wood Frame Construction				Reinforced Masonry				Unreinforced Masonry	
PGA (g)		High	Mod.	Low	Precode	High	Mod.	Low	Precode	Low	Precode
0.07	**Single Family**	**0.1**	**0.2**	**0.3**	**0.4**	**0.1**	**0.2**	**0.4**	**0.5**	**0.6**	**1.0**
0.20		**1.3**	**1.7**	**2.8**	**3.3**	**1.3**	**2.5**	**6.1**	**9.0**	**6.5**	**9.4**
0.07		0	0	1	1	0	1	2	7	6	12
0.20		2	3	9	15	4	16	58	106	64	114
0.07	**Apartment**	**0.1**	**0.2**	**0.3**	**0.3**	**0.1**	**0.2**	**0.4**	**0.5**	**0.6**	**0.8**
0.20		**1.5**	**1.9**	**3.0**	**3.2**	**1.5**	**2.6**	**5.4**	**6.9**	**5.5**	**7.5**
0.07		0	0	1	1	0	1	2	8	7	13
0.20		2	3	10	16	4	19	72	129	76	147
		Steel Frame (Braced)				**Reinforced Masonry**				**Unreinforced Masonry**	
		High	Mod.	Low	Precode	High	Mod.	Low	Precode	Low	Precode
0.7	**Retail Trade**	**0.2**	**0.3**	**0.4**	**0.5**	**0.1**	**0.2**	**0.4**	**0.6**	**0.7**	**1.0**
0.20		**2.4**	**2.8**	**3.8**	**5.6**	**1.5**	**2.7**	**5.9**	**8.3**	**6.1**	**8.7**
0.07		0	0	0	0	0	0	0	1	1	2
0.20		2	3	6	12	1	3	12	22	14	24
		Pre-Cast Concrete Tilt-up				**Light Metal Building**					
		High	Mod.	Low	Precode	High	Mod.	Low	Precode		
0.07	**Wholesale Trade**	**0.2**	**0.4**	**0.5**	**0.6**	**0.4**	**0.7**	**1.0**	**1.6**		
0.20		**2.6**	**4.1**	**8.3**	**10.8**	**3.8**	**5.4**	**10.3**	**14.8**		
0.07		0	1	1	2	1	2	3	6		
0.20		4	8	22	36	6	13	28	43		
0.07	**Office Building**	**0.2**	**0.3**	**0.4**	**0.6**	**0.2**	**0.3**	**0.4**	**0.5**		
0.20		**2.0**	**2.9**	**5.6**	**8.1**	**2.5**	**2.9**	**3.7**	**5.2**		
0.07		0	0	0	1	0	0	0	1		
0.20		1	3	11	21	2	3	5	11		
		Pre-cast Concrete Tilt-up									
		High	Mod.	Low	Precode						
0.07	**Light Industrial**	**0.1**	**0.4**	**0.4**	**0.5**						
0.20		**2.6**	**3.9**	**6.0**	**7.4**						
0.07		0	1	1	2						
0.20		4	7	21	34						

2.0	Building Damage = % of damage based on value
2	Loss of Function (# of Days)
	No Information

High, Moderate, Low and Precode refer to general seismic design level

CHAPTER VI. EXISTING HAZARD MITIGATION PROGRAMS

The next step involves identifying existing mitigation strategies for the hazards likely to affect the town and evaluate their effectiveness. This section outlines those programs and recommends improvements and changes to these programs to ensure the highest quality emergency service possible.

Table 11: Existing Hazard Mitigation Programs for the Town of Rye.

Existing Protection	Description-Area Covered	Responsible Local Agent	Effectiveness (Poor, Avg., Good)	Recommended Changes-Actions-Comments
Emergency Operations Plan	Town-wide	Emergency Management Director	Good	None
Town Master Plan	Town-wide	Town Planner, Planning Board	Good	Adopted 2006 and currently being reviewed
Town Capitol Improvement Plan	Town-wide	Selectmen, CIP Committee, Town Planner, and Town Administrator	Good	Updated in 2003 and currently being reviewed will be Annually
Town Building Code	Town-wide	Building Inspector Planning Board	Good	Review Annually
NFIP Floodplain Ordinance	Development restriction in Special Flood Hazard Area (100-yr floodplain)	Building Inspector, Planning Board	Good	None
Community Rating System (C.R.S.)	Town-wide	CRS Coordinator, Town Planner	Good	None
Hazardous Materials Permitting, Zoning 220-14	Town must give permit for transport, storage, treatment, or disposal of hazardous materials	Fire Department, Dept. of Public Works, and Town Planner	Good	None
Hazardous Materials Household Waste Day	Town-wide collection of household hazardous waste	Public Works Dept.	Good	None
25-year Storm Drainage Requirements	25-year storm drainage required in Site Plans	Building Inspector and Town Engineer, OEST	Good	Currently being reviewed
Emergency Services	Town-wide	Emergency Management Director, Police Chief, Fire Chief	Good	None
CEMPS (Comprehensive Emergency Management Planning for Schools)	Schools	Emergency Management Director	Good	None
Storm Drainage-Culvert Maintenance Program	Town-wide	Road Agent	Good	None
Wellhead Protection	Town-wide	Rye Water District and Building Inspector	Good	None
Aquifer Protection	Town-wide	Town Planner, Planning Board and Zoning Officer, Building Inspector	Good	None

Existing Protection	Description-Area Covered	Responsible Local Agent	Effectiveness (Poor, Avg., Good)	Recommended Changes-Actions-Comments
Wetlands Protection	Wetland Setbacks required	Conservation Commission, Planning Board and Building Inspector	Good	None
Police and Fire Mutual Agreements Mutual Aid	Town-wide	Police Chief and Fire Chief	Good	None
Hazardous Tree Program	Town Roads	Road Agent	Good	None
Hurricane Plan	Town Wide	EMD, Fire, Police and DPW Departments	Good	Approved 2008
1998 Drainage Analysis Plan	Town Wide	DPW	Good	Currently being reviewed

CHAPTER VII. NEWLY IDENTIFIED MITIGATION STRATEGIES/ ACTIONS

• Potential Mitigation Strategies

The Action Plan was developed by analyzing the existing Town programs, the proposed improvements and changes to these programs. Additional programs were also identified as potential mitigation strategies. These potential mitigation strategies were ranked in five categories according to how they accomplished each item:

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

The Committee brainstormed a list of strategies and actions that could be taken to mitigation future hazards; these ideas are compiled in Table 12. The highlighted actions are actions and strategies to address gaps in response capabilities and preparedness. The process and review used to identify these are outlined in the Methodology of this Plan on page 3.

Table 12: List of hazard mitigation strategies or actions developed by the Natural Hazard Mitigation Committee

Mitigation Strategies or Action	Hazard(s) Mitigated	Add/change/Delete and Reason
New Generator for Junior High School	All Hazards	Unchanged, continue to work on it
New Base Unit/Police Communications	All Hazards	Unchanged, continue to work on it
4-x 4 Vehicle for Evacuation/Hazmat Situations for Police	All Hazards, Hurricanes	Changed - need it for Police, Fire all set
Trailer Mounted Electric Sign for Traffic Control	All Hazards	Unchanged, continue to work on it
SPOT (State Police Telecommunications System) Terminal for Station	All Hazards	Changed –need just for Station not cars
Local Cable Television Channel for Public Outreach: channel could relay	All Hazards	Unchanged, continue

information on emergence preparedness,		to work on it
Update Master Plan to Incorporate Hazard Mitigation Recommendations	All Hazards	Changed – Plan revised Sept 09 and ongoing
Earthquake proof Primary Shelter (Jr. High)	Earthquake	Unchanged, continue to work on it
Investigate using Flood grant money to Purchase or raise the repetitive loss structures in Rye	Flooding	Unchanged, continue to work on it
Improve participation in the CRS program to reduce Flood insurance and potential for future flood losses.	Flooding	Updated application sent in revised CRS and continuing to work on improving status
Review Building Codes to insure adequate compliance for wind speed.	High Wind Events	Unchanged, continue to work on it
Review Zoning, Subdivision and Site Plan Regulations for vegetation setback and fire protection requirements and determine if more is required	Wildfire	Unchanged, continue to work on it
Drainage Analysis Plan Update	All Hazard	Added as an identified strategy
Mapping Station – Town of Rye plot roads that are open/closed instantaneously	All Hazard	Added as an identified strategy
Control Release of Water Control for Eel Pond by Town and State	All Hazard	Added as an identified strategy
Control Release of Water Control for Burke's Pond	All Hazard	Added as an identified strategy
Update Drainage Improvements to Hundervale Avenue and Red Mill and Love Lane		Added as an identified problem area
~~Public Safety Building~~	~~All Hazards~~	Deleted – New building built in 2006
~~Emergency Operations Center~~	~~All Hazards~~	Deleted –New EOC Built in Safety Building
~~New Radio Tower~~	~~All Hazards~~	Deleted, radio already taken care of

CHAPTER VIII. FEASIBILITY AND PRIORITIZATION OF PROPOSED MITIGATION STRATEGIES

The goal of each strategy or action is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each proposed strategy. A set of questions developed by the Committee that included the STAPLEE method was developed to rank the proposed mitigation actions. The STAPLEE method analyzes the Social, Technical, Administrative, Political, Legal, Economic and Environmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. The following questions were asked about the proposed mitigation strategies identified in Table 10:

- Does it reduce disaster damage?
- Does it contribute to other goals?

- Does it benefit the environment?
- Does it meet regulations?
- Will historic structures be saved or protected?
- Does it help achieve other community goals?
- Could it be implemented quickly?

STAPLEE criteria:

- **Social**: Is the proposed strategy socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical**: Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative**: Can the community implement the strategy? Is there someone to coordinate and lead the effort?
- **Political**: Is the strategy politically acceptable? Is there public support both to implement and to maintain the project?
- **Legal**: Is the community authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?
- **Economic**: What are the costs and benefits of this strategy? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental**: How will the strategy impact the environment? Will the strategy need environmental regulatory approvals?

Each proposed mitigation strategy was evaluated using the above criteria and assigned a score (Good = 3, Average = 2, Poor = 1) based on the above criteria. An evaluation chart with total scores for each strategy can be found in the collection of individual tables under Table 13a – 13 p.

Table 13a: Mitigation Action: Generator for Junior High

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Good	3
Does it contribute to other goals?	Good	3
Does it benefit the environment?	Good	3
Does it meet regulations?	Good	3
Will historic structures be saved or protected?	Poor	1
Does it help achieve other community goals?	Good	3
Could it be implemented quickly?	Poor	1
S: Is it Socially acceptable?	Average	2
T: Is it Technically feasible and potentially successful?	Good	2
A: Is it Administratively workable?	Good	2
P: Is it Politically acceptable?	Average	2
L: Is there Legal authority to implement?	Good	3
E: Is it Economically beneficial?	Average	2
E: Are other Environmental approvals required?	Good	3
	Score	**33**

Table 13b: Mitigation Action: New Base Unit/Police Communications

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Good	3
Does it contribute to other goals?	Good	3
Does it benefit the environment?	Good	3
Does it meet regulations?	Good	3
Will historic structures be saved or protected?	Good	3
Does it help achieve other community goals?	Good	3
Could it be implemented quickly?	Good	3
S: Is it Socially acceptable?	Good	3
T: Is it Technically feasible and potentially successful?	Good	3
A: Is it Administratively workable?	Good	3
P: Is it Politically acceptable?	Good	3
L: Is there Legal authority to implement?	Good	3
E: Is it Economically beneficial?	Good	3
E: Are other Environmental approvals required?	Good	3
	Score	**42**

Table 13c: Mitigation Action: 4 x 4 for Evacuation/Hazmat Situations for Police

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	2
Does it contribute to other goals?	Good	3
Does it benefit the environment?	Good	3
Does it meet regulations?	Good	3
Will historic structures be saved or protected?	Poor	1
Does it help achieve other community goals?	Good	3
Could it be implemented quickly?	Good	3
S: Is it Socially acceptable?	Average	2
T: Is it Technically feasible and potentially successful?	Good	3
A: Is it Administratively workable?	Average	2
P: Is it Politically acceptable?	Average	2
L: Is there Legal authority to implement?	Good	3
E: Is it Economically beneficial?	Average	2
E: Are other Environmental approvals required?	Good	3
	Score	**33**

Table 13d: Mitigation Action: Trailer Mounted Electronic Sign for Traffic Control

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Good	3
Does it contribute to other goals?	Good	3
Does it benefit the environment?	Average	2
Does it meet regulations?	Average	3
Will historic structures be saved or protected?	Poor	1
Does it help achieve other community goals?	Good	3
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Good	3
T: Is it Technically feasible and potentially successful?	Average	3
A: Is it Administratively workable?	Good	3
P: Is it Politically acceptable?	Good	3
L: Is there Legal authority to implement?	Good	3
E: Is it Economically beneficial?	Average	3
E: Are other Environmental approvals required?	Good	3
	Score	**38**

Table 13e: Mitigation Action: SPOTS – State Police Telecommunications System Terminal

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Good	3
Does it contribute to other goals?	Average	2
Does it benefit the environment?	Good	3
Does it meet regulations?	Average	2
Will historic structures be saved or protected?	Average	2
Does it help achieve other community goals?	Good	3
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Good	3
T: Is it Technically feasible and potentially successful?	Good	3
A: Is it Administratively workable?	Good	3
P: Is it Politically acceptable?	Good	3
L: Is there Legal authority to implement?	Good	3
E: Is it Economically beneficial?	Average	2
E: Are other Environmental approvals required?	Good	3
	Score	**37**

Table 13f Mitigation Action: Local Cable Television Channel for Public Outreach

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Good	3
Does it contribute to other goals?	Good	3
Does it benefit the environment?	Good	3
Does it meet regulations?	Good	3
Will historic structures be saved or protected?	Average	2
Does it help achieve other community goals?	Good	3
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Good	3
T: Is it Technically feasible and potentially successful?	Good	3
A: Is it Administratively workable?	Good	3
P: Is it Politically acceptable?	Good	3
L: Is there Legal authority to implement?	Good	3
E: Is it Economically beneficial?	Average	2
E: Are other Environmental approvals required?	Good	3
	Score	**39**

Table 13g Mitigation Action: Investigate moving or elevating the repetitive loss structures.

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	2
Does it contribute to other goals?	Average	2
Does it benefit the environment?	Average	2
Does it meet regulations?	Average	2
Will historic structures be saved or protected?	Average	2
Does it help achieve other community goals?	Average	2
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Average	2
T: Is it Technically feasible and potentially successful?	Average	2
A: Is it Administratively workable?	Average	2
P: Is it Politically acceptable?	Average	1
L: Is there Legal authority to implement?	Average	2
E: Is it Economically beneficial?	Average	2
E: Are other Environmental approvals required?	Average	2
	Score	**27**

Table 13h Mitigation Action: Increase participation in the CRS

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	2
Does it contribute to other goals?	Average	2
Does it benefit the environment?	Average	2
Does it meet regulations?	Average	2
Will historic structures be saved or protected?	Average	2
Does it help achieve other community goals?	Average	2
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Average	2
T: Is it Technically feasible and potentially successful?	Average	2
A: Is it Administratively workable?	Average	2
P: Is it Politically acceptable?	Average	2
L: Is there Legal authority to implement?	Average	2
E: Is it Economically beneficial?	Average	2
E: Are other Environmental approvals required?	Average	2
	Score	**28**

Table 13i Mitigation Action: Review building codes for adequate compliance for wind speed

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	2
Does it contribute to other goals?	Average	2
Does it benefit the environment?	Average	2
Does it meet regulations?	Average	2
Will historic structures be saved or protected?	Average	2
Does it help achieve other community goals?	Average	2
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Average	2
T: Is it Technically feasible and potentially successful?	Average	2
A: Is it Administratively workable?	Average	2
P: Is it Politically acceptable?	Average	2
L: Is there Legal authority to implement?	Average	2
E: Is it Economically beneficial?	Average	2
E: Are other Environmental approvals required?	Average	2
	Score	**28**

Table 13j Mitigation Action: Review Town Regulations for Vegetation Setbacks and Fire Protection requirements

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	2
Does it contribute to other goals?	Average	2
Does it benefit the environment?	Average	2
Does it meet regulations?	Average	2
Will historic structures be saved or protected?	Average	2
Does it help achieve other community goals?	Average	2
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Average	2
T: Is it Technically feasible and potentially successful?	Average	2
A: Is it Administratively workable?	Average	2
P: Is it Politically acceptable?	Average	2
L: Is there Legal authority to implement?	Average	2
E: Is it Economically beneficial?	Average	2
E: Are other Environmental approvals required?	Average	2
	Score	**28**

Table 13k Mitigation Action: Update the 1998 Drainage Analysis Plan

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	3
Does it contribute to other goals?	Average	3
Does it benefit the environment?	Average	3
Does it meet regulations?	Average	2
Will historic structures be saved or protected?	Average	3
Does it help achieve other community goals?	Average	3
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Average	3
T: Is it Technically feasible and potentially successful?	Average	2
A: Is it Administratively workable?	Average	2
P: Is it Politically acceptable?	Average	2
L: Is there Legal authority to implement?	Average	2
E: Is it Economically beneficial?	Average	3
E: Are other Environmental approvals required?	Average	2
	Score	**37**

Table 13l Mitigation Action: Mapping Station – Town of Rye plot roads that are open/closed instantaneously

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	1
Does it contribute to other goals?	Average	2
Does it benefit the environment?	Average	1
Does it meet regulations?	Average	1
Will historic structures be saved or protected?	Average	1
Does it help achieve other community goals?	Average	2
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Average	2
T: Is it Technically feasible and potentially successful?	Average	3
A: Is it Administratively workable?	Average	3
P: Is it Politically acceptable?	Average	3
L: Is there Legal authority to implement?	Average	3
E: Is it Economically beneficial?	Average	3
E: Are other Environmental approvals required?	Average	2
	Score	**29**

Table 13m Mitigation Action: Control Release of Water Control for Burke's Pond

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	3
Does it contribute to other goals?	Average	3
Does it benefit the environment?	Average	3
Does it meet regulations?	Average	2
Will historic structures be saved or protected?	Average	1
Does it help achieve other community goals?	Average	2
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Average	2
T: Is it Technically feasible and potentially successful?	Average	2
A: Is it Administratively workable?	Average	2
P: Is it Politically acceptable?	Average	2
L: Is there Legal authority to implement?	Average	3
E: Is it Economically beneficial?	Average	2
E: Are other Environmental approvals required?	Average	2
	Score	**31**

Table 13n Mitigation Action: Control Release of Water Control for Eel Pond by Town and State

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	3
Does it contribute to other goals?	Average	3
Does it benefit the environment?	Average	3
Does it meet regulations?	Average	3
Will historic structures be saved or protected?	Average	2
Does it help achieve other community goals?	Average	3
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Average	3
T: Is it Technically feasible and potentially successful?	Average	3
A: Is it Administratively workable?	Average	3
P: Is it Politically acceptable?	Average	3
L: Is there Legal authority to implement?	Average	3
E: Is it Economically beneficial?	Average	3
E: Are other Environmental approvals required?	Average	1
	Score	**38**

Table 13o Mitigation Action: Improve Drainage to Huntervale Avenue, Red Mill and Love Lane

Criteria	Evaluation Rating	Score
Does it reduce disaster damage?	Average	3
Does it contribute to other goals?	Average	3
Does it benefit the environment?	Average	3
Does it meet regulations?	Average	2
Will historic structures be saved or protected?	Average	2
Does it help achieve other community goals?	Average	2
Could it be implemented quickly?	Average	2
S: Is it Socially acceptable?	Average	2
T: Is it Technically feasible and potentially successful?	Average	2
A: Is it Administratively workable?	Average	2
P: Is it Politically acceptable?	Average	2
L: Is there Legal authority to implement?	Average	2
E: Is it Economically beneficial?	Average	3
E: Are other Environmental approvals required?	Average	2
	Score	**32**

After each strategy was evaluated and prioritized according to the final score. The highest scoring strategies were determined to be of more importance, economically, socially, environmentally, and politically feasible and, hence, prioritized over those that were lower scoring.

CHAPTER IX. IMPLEMENTATION SCHEDULE FOR PRIORITY MITIGATION STRATEGIES

This step involves developing an action plan that outlines who is responsible for implementing each of the prioritized strategies determined in the previous step, as well as when and how the actions will be implemented. The following questions were asked to develop an implementation schedule for the identified priority mitigation strategies:

WHO? Who will lead the implementation efforts? Who will put together funding requests and applications?

HOW? How will the community fund these projects? How will the community implement these projects? What resources will be needed to implement these projects?

WHEN? When will these actions be implemented, and in what order?

Table 14 is the Action Plan. In addition to the prioritized mitigation projects, Table 13 includes the responsible party (WHO), how the project will be supported (HOW), and what the timeframe is for implementation of the project (WHEN). Also included is a cost estimate, if available. The process and review used in the Action Plan Below are in the Methodology of this Plan on page 3.

Table 14: Action Plan for proposed mitigation actions

STAPLEE Rank (Priority)	Project	Hazard Mitigated	Responsibility/ Oversight	Funding/ Support	Estimated Cost	Time-frame	Change in Action
1	New Base Unit/Police Communications	All Hazard	Police Chief	Local/Grants	$7,500	2010	Need only for Police
2	Cable Channel	All Hazards	Town Administrator and Board of Selectmen	Local/Grants	$10,000	2009	Reviewing contract
3	Trailer Mounted Electric Sign	All Hazards	Emergency Mgmt. Director	Local/Grants	$2,200	2010	Applying for SRTS grant
4	Control Release of Water from Eel Pond by Town and State	Flooding	Emergency Management Director	Local	none	On-going	New policy - ongoing
5	SPOTS Base Terminal for Police Station	All Hazards	Police Chief	Local/Grants	$7,500	2010	Need only for Police
6	Update the 1998 Drainage Analysis Plan	Flooding	Director of Department of Public Works and Town Planner	Local/Grants	$4,560	2010	In process of applying for funding
7	4 x 4 for Evacuation/Hazmat Situations for Police	All Hazards	Police Chief	Local/Grants	$28,000	2012	Need only for Police
8	Generator for Junior High	All Hazards					No change working on it
9	Improve Drainage to Huntervale Avenue, Red Mill and Love Lane	Flooding	Emergency Management Director, Director of Public Works	Local/Grants	none	2010	Identified hazard
10	Control Release of Water from Burke Pond by Town	Flooding	Emergency Management Director	Local	none	On-going	Identified hazard

STAPLEE Rank (Priority)	Project	Hazard Mitigated	Responsibility/ Oversight	Funding/ Support	Estimated Cost	Time-frame	Change in Action
11	Mapping Station – Town of Rye plot roads that are open/closed instantaneously	All Hazards	Emergency Management Director	Local/Grants	none	2010	Identified strategies to mitigate hazards
12	Review Zoning, Subdivision and Site Plan Regulations for vegetation setback and fire protection requirements and determine if more is required	Wildfire	Town Planner, Planning Board	Local	none	On-going	Always on going when reviewing zoning
13	Improve participation in the CRS program to reduce Flood insurance and potential for future flood losses.	Flooding	Building Inspector	Local	minimal	On-going	Recently submitted CRS Cycle Visit to improve status
14	Review Building Codes to insure adequate compliance for wind speed.	Hurricanes, Coastal Storms and High Wind Events	Building Inspector	Local	none	On-going	2009 approved Zoning for Wind Turbines
15	Investigate using Flood grant money to Purchase or Elevate the repetitive loss structures in Rye	Flooding	Building Inspector	FMA Program	unknown	2010	Building Inspector looking into Grants

CHAPTER X. INCORPORATING, MONITORING, EVALUATING AND UPDATING THE PLAN

Incorporating the Plan into Existing Planning Mechanisms

Upon completion and approval by FEMA and the State of New Hampshire, the *Plan* will be adopted as a stand alone document of the Town and as an appendix of the Town's Master Plan. Future updates of the land-use, future land-use, and natural resources chapters of the Master Plan will reference the *Plan* and reflect the information and strategies that were developed herein

The *Plan* will also be consulted when the Town updates its Capitol Improvement Program (CIP). The Planning Board is responsible for updating the CIP annually, and will review the Action Plan during each update. The Planning Board in conjunction with Board of Selectmen will determine what items can and should be added to the CIP based on the Town's annual budget and possible sources of other funding.

It will also be the responsibility of the Planning Board to incorporate current and future strategies identified in the *Plan* into proposed zoning ordinances and updates to Town Subdivision and Site Plan Review Regulations.

Monitoring, Evaluating and Updating the Plan

Recognizing that many mitigation projects are ongoing, and that while in the implementation stage communities may suffer budget cuts, experience staff turnover, or projects may fail altogether, a good plan needs to provide for periodic monitoring and evaluation of its successes and failures and allow for updates of the *Plan* where necessary.

In order to track progress and update the Mitigation Strategies identified in the Action Plan (Table 11), it is recommended that the Town revisit the *Rye Hazard Mitigation Plan* annually, or after a hazard event. If it is not realistic or appropriate to revise the *Plan* every year, then the *Plan* will be updated and submitted for FEMA approval no less than every five years. At each review of the *Plan* the need for new mitigation actions should be reviewed. A list of general mitigation strategies has been included in the *Plan* as a starting point by which to establish new additions to the Action Plan (Appendix A).

The Emergency Management Director is responsible for initiating the review of the *Plan* with members of the Town that are appropriate including members of the public. In keeping with the process of adopting the 2005 *Rye Hazard Mitigation Plan*, a public hearing to receive public comment on *Plan* maintenance and updating will be held during the any review of the *Plan*. This publicly noticed meeting will allow for members of the community not involved in developing the *Plan* to provide input and comments each time the *Plan* is revised. The final revised *Plan* will be adopted by the Board of Selectmen appropriately, at a second publicly noticed meeting.

Changes should be made to the *Plan* to accommodate for projects that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, should be reviewed as well during the monitoring and update of the *Plan* to determine feasibility of future implementation.