TOWN OF GREENLAND, NH

HAZARD MITIGATION PLAN UPDATE 2015

Approved by the

GREENLAND BOARD OF SELECTMEN

And adopted as an official annex to the Greenland Emergency Operations Plan

23 MARCH 2015

This project was funded in part by

NEW HAMPSHIRE

HOMELAND SECURITY EMERGENCY MANAGEMENT

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Town of Greenland, New Hampshire
Board of Selectmen
A Resolution Adopting the Greenland Hazard Mitigation Plan Update 2015
23 March 2015

WHEREAS, the Town of Greenland received funding from the NH Division of Homeland Security and Emergency Management under a Pre-Disaster Mitigation Project Grant and assistance from Rockingham Planning Commission in the preparation of the Greenland Hazard Mitigation Plan; and

WHEREAS, several public planning meetings were held between April 2011 and August 2014 regarding the development and review of the Greenland Hazard Mitigation Plan Update 2015; and

WHEREAS, the Greenland Hazard Mitigation Plan Update 2015 contains several potential future projects to mitigate hazard damage in the Town of Greenland; and

WHEREAS, a duly-noticed public hearing was held by the Greenland Board of Selectmen on 23 March 2015, to formally approve and adopt the Greenland Hazard Mitigation Plan Update 2015.

NOW, THEREFORE BE IT RESOLVED that the Greenland Board of Selectmen adopts the Greenland Hazard Mitigation Plan Update 2015.

ADOPTED AND SIGNED this 23 day of March 2015.

John Penacho
Greenland Board of Selectmen, Chair

Vaughn Morgan, Selectman

Kevin Forrest, Selectman

John McDevitt, Selectman

James Ralston, Selectman

County of Rockingham, ss.
State of New Hampshire
On this 23rd day of March, 2015
John Penacho,
known to me or proven to be the instrument subscriber, personally appeared before me and acknowledged that he/she executed the foregoing instrument.
Amy K. Leonard, Notary Public

ATTEST

Public Notary

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Executive Summary

The Greenland Hazard Mitigation Plan (herein after, the *Plan*) was compiled in 2006 to assist the Town of Greenland in reducing and mitigating future losses from natural hazard events. The 2015 update of the *Plan* was developed by the Greenland Emergency Management Director and a *Planning Team* composed of participants from the Town of Greenland and contains the tools necessary to identify specific hazards and aspects of existing and future mitigation efforts.

The following natural hazards are addressed:

- Flooding (inland and coastal on the Bay)
- Hurricane – High Wind Event
- Severe Winter Weather
- Wildfire
- Earthquake
- Radon

The following human caused hazards are addressed:

- Bomb Threat
- Biological Terrorism
- Hazardous Materials (Fixed Site)
- Hazardous Material (Transport)
- Mass Causality (Trauma/Medical)
- Radiological Release
- Terrorist Attack
- Transportation Incident (Plane, Train, etc.)
- Utility Interruption

The Critical Facilities include:

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

The *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 appropriate Town of Greenland officials, and a copy has been placed on the Town of Greenland web site. A copy of this Plan is also on file at the New Hampshire Homeland Security and Emergency Management (NH HSEM) and the Federal Emergency Management Agency (FEMA). This *Plan* was approved by both agencies prior its adoption at the local level.

The Town of Greenland became a participating member of the National Flood Insurance Program (NFIP) by a vote at a Town Meeting on March 6th, 1976. The DFIRMs and FIS used in the plan are dated May 17th, 2005.

The Greenland Hazard Mitigation Plan (HMP) is a stand-a-lone document. However, it has been included as part of the Greenland Local Emergency Operations Plan, 2007, and is identified as Annex B. The Town of Greenland has incorporate NFIP into Article VIII, Floodplain Management District of its Zoning Regulations, (adopted 1988 and amended 1989, 2002, and 2005. The Town utilizes the Flood Insurance Rate Maps in Site Plan approvals.

The Greenland HMP is also a reference document for the Greenland Capital Improvement Program (CIP) and when the Master Plan or the Greenland Capital Improvement Plan (CIP) is updated the *Greenland Hazard Mitigation Plan Update 2015,* shall be consulted to determine if strategies or actions suggested in the *Plan* can be incorporated into the Town's Future Land use recommendations and or capital expenditures.

INTRODUCTION

BACKGROUND

The New Hampshire Homeland Security and Emergency Management (NH HSEM) has a goal for all communities within the State 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 Guide To Hazard Mitigation Plan Updates for New Hampshire Communities (July 2011) was created by NH HSEM to assist communities in developing and updating local plans.

HAZARD MITIGATION GOALS AND OBJECTIVES OF THE STATE OF NEW HAMPSHIRE

The *State of New Hampshire Multi-Hazard Mitigation Plan Update 2013*, which was prepared and is maintained by the New Hampshire Homeland Security and 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 Greenland concurs and adopts these goals and objectives.

METHODOLOGY

The *Planning Team* updated the content of the *Plan* using the process set forth in the *Guide* to *Hazard Mitigation Plan Updates for New Hampshire Communities, July 2011*. The Guide emphases' using a 4 phase approach.

The four phases are: Phase I – Planning Process

Phase II – Risk Assessment

Phase III – Mitigation Strategy

Phase IV – Plant Maintenance Process

The *Planning Team* also reviewed the following:

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

FEMA Publication FEMA 385:1, FFEMA 386:2, FEMA 386:3, FEMA 386:4

Acknowledgements

The Rockingham Planning Commission (RPC) provide assistance to the *Planning Team*.

The *Plan* update was funded by a Grant from NH Homeland Security Emergency Management

Phase I: Planning Process

In June 2011, the Greenland Emergency Management Director (EMD) organized the first *Planning Team* meeting with officials and citizens from the Town of Greenland to begin the initial planning stages of updating the *Plan.* (See Meeting Information, page 74)

The *Planning Team* was composed of participants from the Town of Greenland, under contract with the New Hampshire Homeland Security Emergency Management (HSEM) operating under the guidance of Section 206.405 of 44 CFR Chapter 1 (10-1-97 Edition). The *Plan* serves as a strategic planning tool for use by the Town of Greenland in its efforts to identify and mitigate the future impacts of natural and/or man-made hazard events. Upon adoption of this *Plan* by the Greenland Board of Selectmen, it will become an official appendix to the Greenland Emergency Operations Plan.

The initial *Planning Team* members consisted of:

Ken Fernald, Greenland Emergency Management Director
David Moore, Greenland Planning Board Member
Donald Miller, Greenland Resident
Ralph Cresta, Greenland Fire Chief
Ann Mayer, Greenland School Board Member
Michael Maloney, Greenland Police Chief
Bob Cushman, Greenland Building Inspector/Code Enforcement Officer
Ken Bellevue, Greenland Board of Selectmen

Note: The Planning Team suffered two major setbacks in 2012 when in April our Police Chief was shot and killed in a tragic event that shocked the community and a few months later the building inspector passed away from injuries suffered in an accident. No further committee meetings were held in 2012.
In 2013 the Selectmen's representative to the Planning Team left office and the Planning Team was reorganized.

Current *Planning Team* members:

Ken Fernald, Greenland Emergency Management Director
David Moore, Greenland Planning Board Member
Donald Miller, Greenland Resident
Ralph Cresta, Greenland Fire Chief
Ann Mayer, Greenland School Board Member
Tara Laurent, Greenland Police Chief
Myrick Bunker, Greenland Inspector/Code Enforcement Officer
Vaughn Morgan, Greenland Board of Selectmen

To keep the community informed, a notice of the Hazard Mitigation process and *Planning Team* members was posted on the Town of Greenland Web Site and the Greenland Newsletter. The complete updated *Plan* will be posted upon its approval.

The *Planning Team* first reviewed the hazard mitigation actions and strategies that were proposed in the 2006 *Plan* to determine which had been completed, if not why, and were they still valid concerns for inclusion in the updated *Plan*. (See Table 12)
The *Planning Team* then reviewed each section of the 2006 *Plan* and updated as necessary as indicated below:

Step 1 – Map the Hazards: UPDATED

Participants on the *Planning Team* reviewed the 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 an updated 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: UPDATED

Participants on the *Planning Team* then reviewed the 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: UPDATED

After collecting detailed information on each critical facility in Greenland, the *Planning Team* identified existing Town mitigation strategies relative to flooding, wind, fire, ice and snow events and earthquakes. This process involved reviewing the Town's Master plan, Capital Improvements Program (CIP), Zoning Ordinance, Subdivision Regulations, Site Plan Review Regulations, Greenland Central School Emergency/Crisis Response Plan and participation in the (National Flood Insurance Program) NFIP. This allowed to *Planning Team* to identify portions of the Town's existing mitigation strategies. This also allowed the *Planning Team* to 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 Gaps in Existing Mitigation Actions or Strategies UPDATED

The existing strategies were then reviewed by the *Planning Team* for coverage and effectiveness, as well as the need for improvement.

Step 5 – Identify Potential Mitigation Actions or Strategies: UPDATED

A list was developed of additional hazard mitigation actions and strategies for the Town of Greenland. Potential actions include the continued updating the Local Emergency Operations Plan, including an updated sheltering and evacuation plan.

Step 6 – Prioritize and Develop Action Plan: UPDATED

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: UPDATED

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.

Step 8 – Develop Implementation Strategy: UPDATED

An implementation strategy was developed for the Action Plan 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: UPDATED

A draft of the *Plan* was reviewed by members of the *Planning Team*. The draft *Plan* was also placed on the Greenland website for review by the public, neighboring communities, agencies, businesses, and other interested parties to review and make comments via email. An e-mail was sent to the Emergency Management Directors of the abutting New Hampshire communities of Stratham, North Hampton, Rye, Portsmouth and Newington to insure their opportunity to review the *Plan* prior to finalization. A public hearing was held by the *Planning Team* on 27 August 2014. This meeting allowed the community to provide comments and suggestions for the *Plan* in person, prior to the document being finalized. The draft was revised to incorporate comment from the Board of Selectmen and general public; then submitted to the NH HSEM and FEMA Region I for their review and comments on 29 August, 2014. Any changes required by NH HSEM and FEMA were made and a revised draft document was then submitted to the Greenland Board of Selectmen for their final review on _____, 2015. A second public hearing was then held by the Greenland Board of Selectmen on _____, 2015. At this public hearing the *Plan* was approved by the Board of Selectmen, and adopted as an appendix to the Greenland Local Emergency Operations Plan.

There was no feedback concerning the plan update received from the public or the neighboring communities.

Phase II: Risk Assessment

COMMUNITY PROFILE

NATURAL FEATURES

The Town of Greenland is located in the Seacoast of New Hampshire, on the southern side of Great Bay. Greenland is part of two regional watersheds, the Great Bay watershed (6,925 square acres) and the Coastal watershed (435 square acres)[1]. Waterways within the Town that lead to Great Bay include: the Winnicut River, Foss Brook, Shaw Brook, Pickering Brook, and Packer's Brook. Berry's Brook is the most significant waterway in Greenland that is part of the Coastal watershed. Another dominate feature of Greenland's Natural Features is Packer Bog, identified in Figure 1 below.

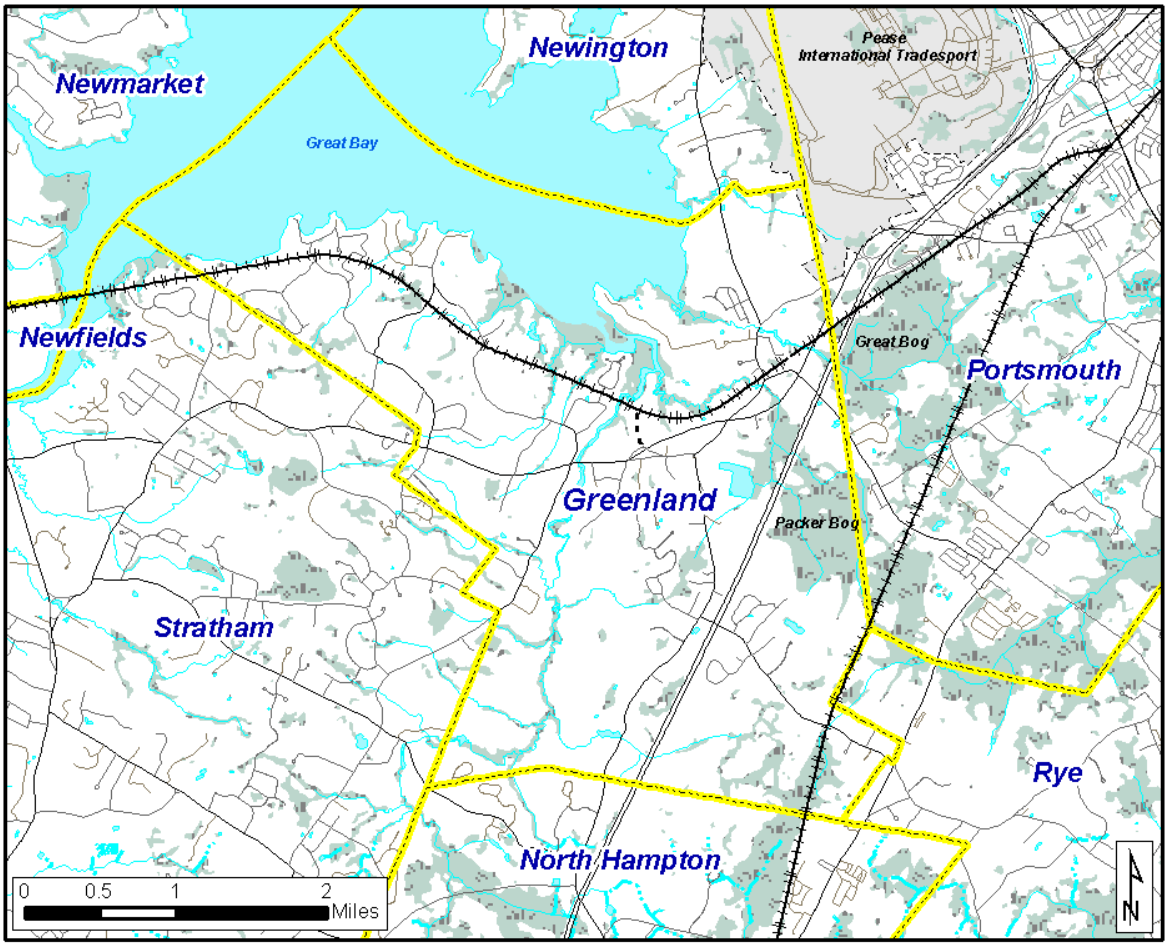


Figure 1: Location Map of Greenland, New Hampshire

[1] Town of Greenland, Water Resource Management and Protection Plan. 1991

LAND USE AND DEVELOPMENT

A land use map was prepared for this *Plan* by the Rockingham Planning Commission reflecting the zoning districts as of 2014. This data is presented in Map 1: Greenland Land Use.
Greenland is a predominately residential community. It has a small commercial zoning district that covers approximately 60% of Route 33, and also extends south along Bramber Lane. Greenland also has a small industrial district in the northeast portion of Town, along both sides of Interstate 95. The majority of Greenland is zoned for residential. The potential for future development is Greenland is limited by several factors. Greenland has no municipal sewer and limited municipal water. Because of this Greenland's minimum lot size is 60,000 square feet, due to the need of on-site septic and wells. Greenland is also inundated with wetlands which decrease the land available for development. Due to these constraints, and the lack of available large parcels most of the future residential development will be small subdivisions. A large amount of shoreline on Great Bay has been put into conservation land.

Changes in the population of Greenland are listed below:

Population, Year of the First Census Taken: 634 residents in 1790
Population Trends: Population change for Greenland totaled 2,457 over 52 years, from 1,196 in 1960 to 3,653 in 2012. The largest decennial percent change was a 49 percent increase between 1960 and 1970. The 2000 census was 3,210 and the 2010 census was 3,549 and the 2012 Census estimate for Greenland was 3,653 residents, which ranked 101st among New Hampshire's incorporated cities and towns.
(Economic & Labor Market Information Bureau, NH Employment Security, February 2014.)

Building permits issued since 2006 are as follows:

Year	New Homes	Commercial
2007	16	7
2008	17	6
2009	16	8
2010	16	1
2011	20	3
2012	32	0
2013	31	0

Because the Town of Greenland has been proactive in insuring its zoning, sub-division and site review plans address identified mitigation issues, none of the building development has created the requirements for any new mitigation strategies. All plans, including roads, are reviewed by an engineering firm under contract to the Town. Contractors are required to install 30,000 gallon water cisterns, underground, in developments in areas of the Town not covered by the municipal water supply. This helps mitigate the threat of wildfires, which is very low.

Most all commercial development has been small in nature but, a major commercial development of a shopping center on Route 33, was connected to the City of Portsmouth sewer system through a private agreement. This development was added to the Critical Facilities list. There are no special natural hazard mitigation strategies required for this facility. The Local Emergency Operations Plan is being updated to reflect evacuation plans in the event of a human caused event.

NATURAL HAZARDS IN THE TOWN OF GREENLAND

The *Planning Team* reviewed the natural hazards identify in the 2006 plan 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 Greenland is prone to several types of natural hazards. These hazards include: flooding, hurricanes or other high-wind events, severe winter weather, wildfires, radon and earthquakes. Other natural hazards can and do affect the Town of Greenland, but these were the hazards prioritized by the *Planning Team* 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 not included in the *Plan* include: drought, extreme heat, landslide, subsidence, 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*. Greenland 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 Multi-Hazard Mitigation Plan Update 2013, indicates that Rockingham County is at Moderate risk to drought, and heat; 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 use of the *Planning Team* time to include drought or extreme heat, in the *Plan* at this time. Ice jams were not included in the plan because of their infrequency and low potential for damage in Greenland, NH. Greenland is coastal and completely contained in the Coastal Watershed. Due to this streams and rivers in Greenland 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.

Hazard Definitions

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 storm surge associated with high wind events hurricanes or from 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 Greenland, A and

AE are defined as follows (according to FEMA's website: http://www.fema.gov/fhm/fq_term.sht.)

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.

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.

River Ice Jams

Rising waters in early spring often breaks ice into chunks, which float downstream and often pile up, causing flooding. Small rivers and streams pose special flooding risks because they are easily blocked by jams. Ice collecting in river bends and against structures presents significant flooding threats to bridges, roads, and the surrounding lands.

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. It is generally accepted by the international scientific community to describe a series of traveling waves in water produced by the displacement of the sea floor associated with submarine earthquakes, volcanic eruptions, or landslides.

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 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 (see Appendix C). The eye of the storm is 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. The Saffir/Simpson scale is used by the Natural Hurricane Center to assign categories to hurricane based on wing strength. (See Appendix C)

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 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. (See Appendix D)

Severe Thunderstorms/Downburst

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. Thunderstorms may cause downbursts. (See Appendix E)

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.

(See Appendix F)

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. (See Appendix G)

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 often produce widespread power outages. (See Appendix H)

Nor'easter

A Nor'easter is large weather system traveling from South to North passing along or near the seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds impact the coast and inland areas form a Northeasterly direction. The sustained winds may meet or exceed hurricane force, with larger bursts, and may exceed hurricane events by many hours (or days) in terms of duration[2].

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. (See Appendix I)

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

[2] Definition of Nor'easter taken from NH State Multi-Hazard Mitigation Plan 2013

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[3] and Mercalli scale. (See Appendix J)

Radon

Radon is naturally occurring radioactive gas that can lead to lung cancer after prolonged exposure. In New Hampshire radon is associated with certain types of granite, depending on the geochemistry of the particular granite outcrop. The radon gas can build up in the lowest level of a dwelling and be a hazard to residents over a prolonged period of time.

PROFILE OF PAST AND FUTURE POTENTIAL HAZARDS

As discussed above the natural hazards that were identified for mitigation in this *Plan* include: flooding, hurricanes-high wind events, severe winter weather, wildfire, earthquakes and radon. Some of the natural hazards could be included under more than one type of hazard. For example a hurricane could be considered a high wind event or a flooding event depending on the storm's consequences.

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 impacts of the natural hazard (e.g. magnitude or severity), future 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 Greenland (within written memory), for these hazards the plan 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 Greenland to each natural hazard. The Future Potential Risk Severity Probabilities were derived from the tables on page 8 & 9 of the *Guide* to *Hazard Mitigation Plan Updates for New Hampshire Communities, July 2011*.

Probability of Occurrence

High – There is near 100% likelihood that the hazard event will occur within the next 25 years.
Moderate – There is a 50% likelihood that the hazard event will occur within the next 25 years.
Low – There is a 25% or less likelihood that the hazard event will occur within the next 25 years.

Flooding

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

Location: Greenland 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). Greenland has two major flood zones: A and AE.

[3] A copy of the Richter scale is displayed in Appendix J.

Impacts: The extent of the Special Flood Hazard Zone and the 500-year flood zone can be seen in Map 2: Past and Future Hazards. The two locally identified areas of potential flood problems shown in the 2006 plan have been mitigated. First a portion of Alden Ave. near Packer's Brook that had been affected by local flooding was mitigated by the replacement and enlargement of the culvert under Portsmouth Avenue near Ocean Road. The dam identified in the 2006 plan has been removed mitigating the threat of a dam breach to homes located on Caswell Drive along the banks of the Winnicut River.

Future Probability: **MODERATE**

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: The most common flooding hazard for the Town of Greenland, is basement flooding in the spring, dependent on snow melt and rain, or in unusually heavy rain events. These occur primarily in homes that are over 50 years old. New construction requires drainage installed around the foundation and proper grading to carry water away from the property. A basement sump pump is also required in areas where this type of flooding may occur. When a property is identified as having a repetitive problem, the property owner is instructed on methods to eliminate the problem. None of this flooding is caused by infrastructure and elevation of these properties is not possible.

The several locations that were identified as areas of chronic reoccurring flooding or moderate potential for future flooding in the 2006 plan have been mitigated through the replacement of culverts. Larger flood events of the past are listed in Table 4.

Community Vulnerability:

- Structures located in the flood zone
- Culverts
- Basements
- Erodible soils
- Closed roads
- Locally-identified flood areas (Map 2: Past and Future Hazards)

NOTE: Updated NFIP 2014 Flood Maps were unavailable for inclusion in the *Plan*. It is anticipated that they will be available sometime in October 2014. At that time potential flood loss will be recalculated for Flood zones A and AZ. Losses shown are based on the same number of structures with updated evaluation.

Table 2: Greenland NFIP Policy and Loss Statistics

Policies in force = 16

Insurance in Force = $3,081,100.00

Number of Paid Losses (since 1978) = 12

Total Losses Paid (Since 1978) = $272,095.28

2 Repetitive losses have been identified. One residential and one non-residential

Source: FEMA Policy and claims database, as of 2/28/12

Hurricane/High Wind Event

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

Location: Hurricane events are more potentially damaging with increasing proximity to the coast. For this *Plan*, high-wind events were considered to have an equal chance of affecting any part of the Town of Greenland.

Impacts: Greenland is located within a Zone II hurricane-susceptible region (indicating a design wind speed of 160 mph)[4]. 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 Greenland is a high risk to a hurricane event, with variable wind speeds between 74 – 130 mph (category 1-3).

Future Probability: **HIGH**. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with high likelihood of hurricane, and "Nor'-Easters" events. Also, it rates the risk of downbursts, lightning and hail events as moderate. Our calculations concur.

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.

Community Vulnerability:

- Power lines,
- Shingled roofs,
- Chimneys, and
- Trees
- Closed roads

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

Tornado

Description: From 1950 to 2008 Rockingham County was subject to 10 recorded tornado events, these included 2 type F0 (Gale Tornado, 40-72 mph), 2 type F1 (Moderate Tornado, 73-112 mph), 5 type F2 (Significant Tornado, 113-157 mph) and 1 type F3 (Severe Tornado, 158-206 mph)[5]. Type 3 tornados can cause severe damage including tearing the roofs and walls from well-constructed homes, trees can be uprooted, trains over-turned, and cars lifted off the ground and thrown[6].

Location: Any part of Greenland has an equal chance of being affected by a Tornado.

Future Probability: **HIGH**. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with high likelihood of a tornado and if one occurs damage could be catastrophic. Damaging hail can also occur with tornadic activity. Our calculations concur.

Past Occurrence: Rockingham County 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, June 09, 1963, and July 24 2008. The category F3 tornado occurred on June 09, 1953. The category EF2 tornado that occurred on July 24, 2008 traveling 50 miles across the state from Deerfield to Freedom, killing one person.

Community Vulnerability:

- Power lines,
- Roofs,
- Entire buildings
- Chimneys
- Trees
- Closed roads

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 have been known to collapse buildings. Ice storms disrupt power and communication services. Extreme cold affects the elderly.

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

Impacts: Large snow events in Southeastern New Hampshire can produce 30 inches of snow, or more. Portions of central New Hampshire recorded snowfalls of 98" during one slow moving storm in 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.

[5] The tornado project .com
[6] "Understanding Your Risks, Identifying Hazards and Estimating Losses", FEMA, page

Future Probability: **HIGH**. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with high likelihood of heavy snows and ice storms. Our calculations concur.

Past Occurrence: The ice storm of December 2008 and the Halloween snow storm of October 2011, had a major impact on trees and power lines in the community list of past winter storm events is displayed below, in Table 4.

Community Vulnerability:

- Power lines
- Trees
- Closed roads
- Elderly Populations

Wildfire

Description: Wildfires include grass fires and forest fires.

Location: The Committee identified that other than the Industrial areas of the rest of the community is at-risk to wildfires. (See Map 2: Past and Future Hazards).

Impacts: A wildfire in the Town of Greenland is unlikely, but if a crown fire were to occur it could be very damaging to structures abutting large wooded areas of Town.

Future Probability: **LOW.** The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with moderate risk to wildfires. Our calculation indicate that the risk for Greenland is low. 30,000 gallon, underground cisterns are required to be installed by the developer in new developments not covered by fire hydrants. Dry hydrants have been installed on ponds where appropriate. Fire Department carries over 4,000 gallons of water on vehicles.

Past Occurrence: Large wildfires have not occurred in Greenland. An area had been identified by the Committee along the railroad tracks in 2006; where, in the past, passing trains have sparked small brush fires. There have been no fires along these tracks in the past 7 years.

Community Vulnerability:

- Most residential structures border on woods or large open vegetated areas that maybe prone to lightning strikes.
- Vulnerability increases during drought events.

Earthquake

Description: Seismic activity including landslides and other geologic hazards.

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

Impacts: 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).

Future Probability: **MODERATE**. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 ranks all of the Counties in the State with at moderate risk to earthquakes. The Town of Greenland's Peak Ground Acceleration (PGA) values range between 6.1 and 21.0[7]. 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 Greenland (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 Greenland within recent memory. A list of earthquakes that have affected the region is displayed in Table 4.

Community Vulnerability:

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

Radon

Description: Radon is a naturally occurring radioactive gas. Exposure to radon has been found to be carcinogenic (cancer causing). Radon is released from some types of granite found in New Hampshire. The gas can build up in unventilated basements and have harmful effects on residents over time.

Location: Because some granite may emit radon and some won't, it is difficult to determine a location that radon is more or less likely to occur. Because of this all areas of Greenland are considered at equal risk.

Impacts: Exposure to radon is estimated by the EPA (Environmental Protection Agency) to cause 13,600 deaths in the United States each year. The State of New Hampshire's Hazard Mitigation Plan states that 1 in 3 New Hampshire households have radon levels that exceed the EPA level of safety.

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

Future Probability: **MODERATE**. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 ranks all of the Counties in the State with at moderate risk to Radon.

Past Occurrence: No individual homes were identified as at risk to radon. It is certain that radon does affect some of the homes in Greenland to some extent, but no known cases of cases of cancer have been linked to radon exposure in Greenland.

Community Vulnerability:

- Unventilated living spaces in basements or in the lowest level of a home.
- New subdivisions where granite ledge was excavated to create new house lots

Table 4: Past Natural Hazard Events in Greenland and Rockingham County

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 28, 1996	Rockingham County	Unknown - Typically structures and infrastructure in the floodplain	North and west regions; severe storms.
Flood	October 20-21 1996	Portions of State	Heavy damage to roads and flooded buildings	**FEMA DR-1144-NH**
Flood	June – July 1998	Rockingham County	Heavy damage to secondary roads occurred	**FEMA DR-1231-NH:** A series of rainfall events
Flood	Jul 21 – Aug `8, 2003	SW parts of NH	Heavy damage to roads and flooded buildings	**FEMA -1489-DR**
Flood	October 8-9 2005	SW parts of NH	Heavy damage to roads and flooded buildings	**FEMA -1610-DR**
Flood	May 12, 2006	Central and Southern Regions	Heavy damage to roads and flooded buildings	**FEMA 1643-DR**
Flood	April 15-23,	Statewide	Heavy damage to roads	**FEMA 1695-DR**

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description
	2007		and flooded buildings	
Flood	Jul 24, 2008	Central and Southern Regions	Heavy damage to roads and flooded buildings	**FEMA 1782-DR**
Flood	Jul 24 – Aug 14, 2008	Central and Northern Regions	Heavy damage to roads and flooded buildings	**FEMA 1782-DR**
Flood	Sep 6 & 7, 2008	Southern part of State	Heavy damage to roads and flooded buildings	**FEMA 1799-DR**
Flood	May 14-31, 2010	SE Region	Heavy damage to secondary roads occurred	**FEMA 1913-DR**
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.
Hurricane Carol	August 31, 1954	Southern New England	Extensive tree and crop damage in state.	SAFFIR/SIMPSON HURRICANE SCALE[8] - 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 Irene	August 28, 2011	Central & Western NH	Extensive flooding	
Super Storm Sandy	October 29 2012	Mid-Atlantic to New England	Most NH damage in western part of state and	Minor tree damage in Greenland. No flooding

[8] For a complete description of the Saffir/Simpson Hurricane Scale see Appendix C.

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description
			shore roads	
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[9]
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
Tornado	July 24, 2008	Deerfield to Freedom	Homes destroyed 1 Fatality.	F2
Downburst	July 6, 1999	Stratham, NH	Five fatalities and eleven injuries. Major tree damage, power outages	Microburst $2,498,974 in damages
Wind Storm	February 25-26 2010	Seacoast, NH	Major tree damage, power outages	Wind gust to 91 mph at Hampton Beach. Business block destroyed by fire.
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	Southern NH	Numerous power outages	Numerous in Southern

[9] For a complete description of the Fujita Tornado Damage Scale see Appendix D

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description
	1991		in southern NH	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 11-12 2008	State Wide	Major disruption of Power and transportation	Over $150 million in property damage state wide
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
Snowstorm	April 5-7 1982	Southern NH	Unknown	Late season with thunderstorms and 18-22" of snow
Snowstorm	October 30, 2011	Statewide	Trees down and power outages	Extensive damage to utilities
Severe "NorEast" Snowstorm	Feb 8-9 2013	New York, New England, Canada	All New England Governors declare State of Emergency	All forms of traffic disrupted. 15' to 30" of snow
Earthquake	November 18, 1929	Grand Banks Newfoundland	No damage	Richter Magnitude Scale: 7.2[10]
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

[10] For a complete description of the Richter Magnitude Scale see Appendix J.

Hazard	Date	Location	Critical Facility or Area Impacted	Remarks/Description
Earthquake	June 19, 1982	West of Laconia	Little damage	Richter Magnitude Scale: 4.5
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.
Drought	1960-69	Statewide	Unknown	Longest recorded continuous period of below normal precipitation
Drought	2001-02	Statewide	Unknown	Third worst drought on record

HUMAN CAUSED HAZARDS IN THE TOWN OF GREENLAND

The 2006 Hazard Mitigation Plan did not contained data on Human Caused Hazards. Therefore, the Human Caused Hazards outlined on page 9 of the *Guide* to *Hazard Mitigation Plan Updates for New Hampshire Communities, July 2011,* were reviewed and scored as to the Risk Severity Probability.

Human Caused Hazards that are included on page 9, of the *Guide*, but that are not included in the *Plan* include: armed attack, bomb threat, civil disorder, urban fire and utility interruption. The *Planning Team* reviewed those Human Caused Hazards that most likely would impact the Town.

Biological Terrorism

Description: A bioterrorism attack is the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants.

Location: A release could impact anywhere in the community.

Impacts: All residents could be in jeopardy.

Future Probability: **MODERATE.** Rockingham County is in the Boston Metropolitan Statistical Area (MSA) related to a bioterrorism attack.

Past Occurrence: There have been no past occurrences.

Community Vulnerability: All of the population is at risk.

Hazardous Materials (Fixed)

Description: Any material which is explosive, flammable, poisonous, corrosive, reactive, or radioactive (or any combination), and requires special care in handling because of the hazards posed to public health, safety, and/or the environment.

Material is located at a fixed location at a building or facility.

Location: Within 2500' of the Amerigas LPG storage facility on Rt. 33, on the Greenland/Portsmouth town line. Also, the truck stop at the corner of Ocean Road and Rt. 33, may have a significant amount of various hazardous material parked there at any time.

Impacts: All population and facilities within 2500" of either location.

Future Probability: **MODERATE.** Either location may be susceptible to human error causing a major incident.

Past Occurrence: There have been no past occurrences.

Community Vulnerability:

- Damage to entire buildings
- Closed roads
- Power lines

Hazardous Materials (Transportation)

Description: Any material which is explosive, flammable, poisonous, corrosive, reactive, or radioactive (or any combination), and requires special care in handling because of the hazards posed to public health, safety, and/or the environment.

Material is located at a fixed location at a building or facility.

Location: There is traveling through the community each day by road and rail many types of hazardous material as described above. Any area of the community may be at risk if an accident occurs.

Impacts: All population and facilities.

Future Probability: **HIGH.** The risk of a transportation accident, given the volume of traffic passing through Greenland, is high. With the increase in rail traffic carrying a significant increase in LPG, an accident on the rail line will expose a larger portion of the population may be at risk.

Past Occurrence: There have been no past occurrences.

Community Vulnerability:

- Damage to entire buildings
- Closed roads
- Power lines
- Schools
- Infrastructure
- Populations

Mass Casualty (Trauma/Medical)

Description: Any large number of casualties produced in a relatively short period of time, usually as the result of a single incident such as a military aircraft accident, hurricane, flood, earthquake, or armed attack that exceeds local logistic support capabilities.

Location: A mass casualty event can occur anywhere in the community.

Extent: All population and facilities.

Future Probability: **LOW.** The greatest risk of mass casualties in the community would likely be from a hazardous materials incident or an aircraft accident, either military or civilian, from the Portsmouth airport at Pease.

Past Occurrence: There have been no past occurrences.

Community Vulnerability:

- Damage to buildings
- Closed roads
- Power lines

- Schools
- Infrastructure
- Populations

Radiological Release

Description: A loss of control over radiation or radioactive material that presents a hazard to life, health, or property or that may result in any member of the general population exceeding exposure limits for ionizing radiation.

Location: A radiological release could impact any area of the community.

Impacts: All population and facilities.

Future Probability: **LOW.** Although Greenland is located within the EPZ for the Seabrook Nuclear power plant, there is an extremely low probability of a release. There are small quantities of radioactive material that pass through the community by road and rail.

Past Occurrence: There have been no past occurrences.

Community Vulnerability:

- Schools
- Population

Terrorist Attack (WMD)

Description: The calculated use of unlawful violence or threat of unlawful violence to inculcate fear; intended to coerce or to intimidate governments or societies in the pursuit of goals that are generally political, religious, or ideological

Location: A terrorist attack can occur anywhere in the community.

Impacts: All population and facilities.

Future Probability: **LOW.** The greatest risk of a terrorist attack would probably occur in a bioterrorism attack.

Past Occurrence: There have been no past occurrences.

Community Vulnerability:

- Damage to buildings
- Closed roads
- Power lines
- Schools
- Infrastructure
- Populations

Transportation Incident (Plane, Train, etc.)

See Hazardous Material (Transportation) and Mass Casualty (Trauma/Medical)

CRITICAL FACILITIES

The Critical Facilities List for the Town of Greenland was reviewed and updated by Greenland's Hazard Mitigation *Planning Team*. 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 *Planning Team* as non-essential. These are not required in an emergency response event, but are considered essential for the everyday operation of Greenland. 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. A detailed list of critical facilities can be found in Table 4. Map 3, Critical Facilities is located in the Map Section of the *Plan* identifies the location of the facilities and the major routes that can be used for evacuation.

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

Facilities that may be utilized in to respond to a hazard event

Critical Facility	Comments
Town Office/EOV	Has back-up power
Police Station	Has back-up power
Fire Station	Has back-up power
Greenland Central School	Has back-up power. Short stay shelter for Town
Seabrook Siren (x4)	

Table 5: Category 2- Essential Facilities:

Facilities essential to the day-to-day functioning of Greenland

Critical Facility	Comments
Greenland Community Church	
Greenland Library	
Parish House	Can shelter up to 75 people for short time. No back-up power.
Post Office	

Critical Facility	Comments
Veteran's Hall	Can shelter up to 50 people for short time. No back-up power.
Verizon Service box	
PSNH sub-station	
Bower/ Nike	
Novell Iron	
Boise Cascade	
Seacoast VW	
Drehar Halloway Mercedes	
Portsmouth Country Club	
Warehouse (Trans)	
Portsmouth Well	
Bethany Church	Can shelter up to 250 people for short time. No back-up pwr.
Ocean Rd. Overpass (I-95)	
Breakfast Hill Overpass (I-95)	
Bramber Valley Golf	
Breakfast Hill Golf Club	
Cumberland Farms	
Golf Club of New England	
Methodist United Church	Can shelter up to 75 people for short time. No back-up power
Train Trestle over Winnicut	
Discovery Center	
Cell Tower, Nextel	
Cell Tower, T-mobile	
Transfer Station	
McDonalds	
Alden Pond Park	
Golf and Ski	
Nik & Charlie's Restaurant	

Critical Facility	Comments

Table 5: Category 3 - Facilities/Populations to protect or account for during a hazard event:

Critical Facility	Comments
New Generation Home	Expectant mothers and babies
Central School (K-8)	
Cumberland Farms (Gas)	
Bethany Church	May have large crowds (500+) during special events
TA Truck Stop	100 to 200+ tractor trailer trucks could be on site.
Amerigas	LPG Storage
Biospray	
Weeks House	
YMCA Day camp/day care	
LP Gas Line Valve Rt. 33	
LP Gas Line Valve Post Rd.	
Lowes & Target	
Daycare, Coastal Ave.	
TA Culvert Under 95	
Day Care (Ports Ave)	

Table 5: Category 4 – Potential Resources in the event of a Natural Hazard:

Critical Facility	Comments
Cumberland Farms	Fuel & food
TA Truck Stop	Fuel & food
Suds and Soda	Food
Lowes & Target	Hardware supplies & food

POTENTIAL HAZARD AFFECTS

IDENTIFYING VULNERABLE FACILITIES

It is important to determine what the most vulnerable areas of the Town of Greenland are and to estimate their potential loss. The first step is to identify the areas most likely to be damaged in a hazard event. To do this, the locations of buildings and other structures were compared to the location of potential hazard areas identified by the Hazard Mitigation *Planning Team* using GIS (Geographic Information Systems). Vulnerable buildings were identified by comparing their location to possible hazard events. For example, all of the structures within the 100-year floodplain were identified and used in conducting the potential loss analysis for flooding.

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 buildings' assessed value. The assessed value for every parcel in Greenland was provided for the purpose of calculating damage estimates. The damage estimates are divided into two categories based on hazard types: hazards that are location specific (e.g. flooding), and hazards that could affect all areas of Greenland equally. Damage estimates from hazards that could affect all of Greenland equally are much rougher estimates, based on percentages of the total assessed value of structures and utilities in Greenland. Damage estimates from hazard with a specific location are derived from the assessed values of each parcel that had its center in the hazard area in question. Greenland's Parcel database (with assessor's data) was queried using the GIS to determine the assessed value of all of the parcels within a hazard area.

After identifying the parcels and buildings that are at risk, the next step was to calculate a damage estimate for each potential hazard area. FEMA provides a model for estimating damage for various flooding events, so the flood damage estimates provide information including: damage estimates for structures, contents of buildings, functional downtime and replacement time. For wildfire and urban conflagration, damage estimates were determined for the buildings in the potential hazard areas as well as estimates of the building content value, based on the same estimates from the flood model. The following discussion summarizes the potential loss estimates 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 digital versions of FEMA's FIRM maps on digital aerial photography of the town of Greenland. 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 floodplain (A-zone and AE-zone). 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 6, 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).

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):

Potential Structure Damage: 49%

Approximately 49 structures in the AE Zone assessed at $15,586,080 = $7,637,179 potential damage

Approximately 25 structures in the A Zone assessed at $5,285,040 = $2,589,669 potential damage

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 49 structures in the AE Zone assessed at $15,586,080 = $4,364,102 potential damage

Approximately 25 structures in the A Zone assessed at $5,285,040 = $1,479,811 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 49 structures in the AE Zone assessed at $15,586,080 = $3,117,216 potential damage

Approximately 25 structures in the A Zone assessed at $5,285,040 = $1,056,408 potential damage

Table 6: 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 is no longer a hazard in Greenland. The dam on the Winnicut River was removed and the homes identified in 2006 at risk in the dam breech flood area are no longer at risk.

~Storm Surge

Storm Surge could affect approximately 62 structures with a total value of $23,183,382. Using the same flood damage assumptions are made for this type of the flooding as were made above the damage estimates would be as follows:

8-foot flood (49% damage to structures) = $11,359,857 potential damage

4-foot flood (28% damage to structures) = $6,491,346 potential damage

2-foot flood (20% damage to structures) = $4,636,676 potential damage

Hurricane/ High Wind Events

~Hurricane

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 Greenland, 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 Greenland. The assessed value of all residential and commercial structures in the Town of Greenland, including exempt structures such as schools and churches, and utilities is $421,904,350. (Assuming 1% to 5% damage, a hurricane could result in $4,219,043 to $21,095,217 of structure damage.

~Tornado

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. The assessed value of all residential and commercial structures in the Town of Greenland including exempt structures such as schools and churches, and utilities is $421,904,350. (Assuming 1% to 5% damage, a hurricane could result in $4,219,043 to $21,095,217 of structure damage.

~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 no record of monetary damages inflicted in the Town of Greenland from lightning strikes. The Town requires that all new construction have re-bar installed through the cement foundation and the electrical service and panel be grounded to the foundation, thereby grounding the entire structure.

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 Greenland 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 Greenland 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 Greenland. They can also cause severe damage to trees. In 2008, an ice storm inflicted over $150,000,000 worth of damage to New Hampshire as a whole. Ice storms in Greenland could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm.

Wildfire

Wildfires have not damaged homes in Greenland in recent memory. Due to the ability and coordination of the emergency response services in Greenland 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, of the residential structures which is $237,717.

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 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 Greenland, 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 Greenland, including exempt structures such as schools and churches, and utilities is $421,904,350 Based on Table 6, 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 Greenland are single family homes built Pre-code, and wood frame construction, an earthquake could result in $16,876,174 of damage for a 0.07 PGA earthquake to $139,228,435 of damage for a 0.20 PGA earthquake.

Table 7: 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 Greenland, 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

Phase III: Mitigation Strategy

EXISTING HAZARD MITIGATION ACTIONS

This section identifies those programs that are currently in place as hazard mitigation actions or strategies for the Town of Greenland, NH. The table below (Table 8), displays existing ordinance, regulations, plans and Town departments that plan for, react to, natural hazards to mitigate possible damage.

KEY TO EFFECTIVENESS:
Excellent ..... The existing program works as intended and is exceeding its goals.
Good ..... The existing program works as intended and meets its goals.
Average ..... The existing program does not work as intended and/or does not meet its goals.
Poor ..... The existing program does not work as intended, often falls short of its goals, and/or may present unintended consequences.
Untested……. The policy, plan or mutual aid system has not yet been tried or put to the test.

Table 8: Existing Hazard Mitigation Actions

Current Program or Activity	Protection Provided	Area of Town Covered	Enforcing Department	Effectiveness	Improvements or Changes Needed
Building Codes	Town regulations to ensure that all construction meets buildings codes	Town-wide	Building Inspector and Planning Board	Excellent	**No Improvements Needed:** Building Inspector reviews all plans and does on site visit during construction. For major projects the Town hires a qualified engineer to provide oversight..
Zoning Ordinance	Wetland setbacks, Floodplain building requirements and aquifer protection district.	Town-wide	Planning Board	Excellent	**No Improvements Needed:** Planning Board reviews zoning ordinances each year to insure objectives are being met.
Subdivision and Site Plan Regulations	Storm drainage and erosion control plans are required	Town-wide	Planning Board	Excellent	**No Improvements Needed:** Planning Board reviews Subdivision and site plans regulation's each year to insure objectives are being met.
Seabrook Radiological Plan	Frequent training and drills occur in a coordinated effort with the State including evacuation planning for schools and residents.	Town-wide	EMD and Select Board	Excellent	**No Improvements Needed:** FEMA and NRC grade communities in the EPZ every two years.

Tree Maintenance	Trees in the Town's right of way are maintained to prevent hazardous situations from falling limbs or trees.	Town-wide	Town Administrator	Good	**No Improvements Needed:** Program works well**.** Has reduced power outages from wind events.
Back-up Power	Back-up power is in place for the Central School, Town Offices, EOC, Fire and Police Station.	Critical Town facilities	School Principle, EMD, Fire & Police Chiefs	Excellent	**No Improvements Needed:** All equipment is tested weekly**.**
School Emergency Plan	Disaster evacuation plans are in place for the local school.	Central School K-12	School Principle and EMD	Un-tested	**Unknown if Improvements Needed:** Evacuation routes and traffic control point have been established.
Hazardous Materials Team	A team trained to deal with hazardous materials. Response equipment is located in Exeter and Hampton, New Hampshire.	Town-wide	Fire Chief and EMD	Good	**No Improvements Needed:** Team has responded to a number of Haz Mat issues in the Seacoast area with good results.
Mutual Aid Agreements	Police and fire departments have mutual aid agreements with surrounding Towns.	Town-wide	Police and Fire Chiefs, EMD	Excellent	**No Improvements Needed:** Program works well.
Shore land Protection Act	Various levels of Protection provided when development occurs near the Great Bay of other large waterways.	Town-wide	Planning Board Select-Board	Good	**No Improvements Needed:** Boards continually monitor shore conditions.
Wellhead Protection	Wellhead protection districts exist around municipal well in the Town of Greenland that is owned by the City of Portsmouth.	Portsmouth well head area	Planning Board and Town Administrator	Excellent	**No Improvements Needed:** Town regulations prohibit encroachment in the area.
Best Management Practices	Best Management practices are employed to reduce erosion and siltation during development.	Town-wide	Building Inspector	Excellent	**No Improvements Needed: On-site inspections conducted to insure required protections are in place.**

Hazardous Material Survey	Trucks carrying hazardous materials were identified and logged to determine what materials were generally traveling through the Town of Greenland, during a two month period.	Town-wide	EMD	Good	**No Improvements Needed:** Truck traffic is continually monitored. Data is being updated. Rail traffic will be-come a greater issue in 2015.
Interstate Emergency Response	40+ town with mutual aid agreement to provide response to any community dealing with any type fire emergency or disaster situation.	Town-wide	Fire Chief and EMD	Excellent	**No Improvements Needed:** The Mutual Aid Response has been performed under actual emergency conditions many times.
Local Emergency Operations Plan	Town LEOP covers all hazards out-lined in this plan. Detailed Emergency Support Functions (ESF's) spell out primary and secondary responsibilities of all members of the Emergency Response Organization (ERO).	Town-wide	EMD and Select Board	Good	**No Improvements Needed:** Program works well. Has been utilized in a number of emergency situations.
Emergency Response Organization (ERO)	The Town has a well-trained ERO. The ERO trains together throughout the year to be able to respond and manage any incident that may occur.	Town-wide	EMD	Excellent	**No Improvements Needed:** The Greenland ERO has manage a number of incidents requiring activation of the EOC.
Become Involved in Fire Prevention Week	Stress fire safety to Central School students including Wild Fires	Town-wide	Fire Chief	Good	**No Improvements Needed:** Program works well.

Table 9: Status of 2006 Mitigation Actions

Mitigation Strategies or Action	Hazard(s) Mitigated
Generators for the school and the police station	All Hazards - COMPLETE.
Update the Emergency Action Plan	All Hazards requiring emergency response – COMPLETED 2007.
Become involved in fire prevention week	Wildfire - COMPLETE.
Radon education (hand-outs and/or the website)	Radon – COMPLETE.
New Fire House	Wild Fire, All Hazards – DEFERRED. STUDY UNDERWAY TO ACCESS ALL TOWN BUILDING NEEDS.
Move EOC to the Police Station (2nd floor)	All Hazards requiring use of Emergency Operations Center – DELETED. EOC WILL BE LOCATED IN NEW FIRE STATION WHEN BUILT.
Radio tower update (currently not fully covered)	All Hazards – DEFERRED. WILL BE PART OF NEW FIRE STATION WHEN BUILT.
Cots for the Shelter	All Hazards requiring use of a shelter – DELETED. LOCAL SHELETER WILL BE USED AS WARMING SHELTER ONLY. OVERNIGHT NEEDS WILL BE HANDLE THROUGH SEACOAST PUBLIC HEALTH SHELTER PLAN.
Culvert on Packard Brook (by old train station)	Flooding – COMPLETE
Review Building Codes to insure adequate compliance for wind speed.	High Wind Events – COMPLETE
Review Zoning, Subdivision and Site Plan Regulations for vegetation setback and fire protection requirements and determine if more is required	Wildfire – COMPLETE. NOT INCORPORATED INTO REGULATIONS. CURRENT REGULATIONS DETERMINED ADEQUATE.
Earthquake proof Primary Shelter	Earthquake – DEFERRED. FUNDING NOT AVAILABLE.
Establish a tree warden for the Town	High Wind events, Ice Storms, Wildfire – DELETED POSITION NOT ESTABLISHED. DUTIES ASSUMED BY TOWN ADMINISTRATOR
Inspect Railroad tracks near Discovery Center	Possible train accident - COMPLETE
Training for Radio Dispatch personal to use Sirens	All Hazards – COMPLETE.
Public Education for supplies to have on hand for emergency preparedness	All Hazards – COMPLETE.
Survey Town residents to obtain voluntary special needs information	All Hazards that could affect vulnerable populations COMPLETE.
Investigate extending mutual aid for Coastal Storms	High wind events, Flooding – COMPLETE
Identify HAM radio operators in Town	Winter Storms, All Hazards - COMPLETE

POTENTIAL MITIGATION ACTIONS

POTENTIAL MITIGATION STRATEGIES

The Action Plan was developed by analyzing the existing Town programs, the proposed improvements and changes to these programs. The *Planning Team* brainstormed a list of strategies and actions that could be taken to mitigation future hazards. These are compiled in Table 10. Following the table is a summary of each proposed strategy or action.

The *Planning Team* looked at how successful previously identified mitigation strategies had been in accomplishing there goals. The *Planning Team* determined that the Town has been proactive in its building codes, zoning and site plan review process and eliminating specific potential flood hazard. Based on those findings that, along with the continuation of the deferred items, the overriding mitigation strategy for 2014 -2019, should be a comprehensive Public Information and Outreach Projects for all of the identified hazards for the community in the Risk Assessment section of this document.

These potential mitigation strategies were ranked in five categories according to how they accomplished each item:

- Prevention……...= 1
- Property Protection……= 2
- Structural Protection…….= 3
- Emergency Services……..= 4
- Public Information and Involvement = 5

Table 10: Potential Mitigation Actions

Mitigation Strategies	Hazard(s) Mitigated	Area of Town Covered	Responsible Department	Description and Actions
Install "Code Red" System 1, 2, 3	Possible loss of life and property	Town-wide	Town Administrator	Provide a system using electronic media to alert residents and business of an impending weather event or some other hazardous situation requiring them to take protective action.
Update Local Emergency Operations Plan 2, 3, 4, 5	Provides a plan of operation for Town officials to respond and mitigate and hazardous situation.	Town-wide	EMD	Last complete LEOP update was 2007. 2015update will consolidate minor revisions, incorporate changes in demographics and update responsibilities of the ERO.
Develop Ongoing Fire Safety and Prevention Program 1, 2, 3, 5	Structured fires and Wild land fires.	Town-wide	Fire Chief	Develop ongoing program that encompasses general public along with the Central School, Day Care Centers and Businesses throughout year.

Update Seabrook Radiological Plan (RERP) 1, 5	Potential Radiological release from Seabrook Station.	Town-wide	EMD and Select Board	RERP requires yearly update and frequent training and drills in coordination with the State, including sheltering in-place and evacuation planning for schools and residents
Establish Tree Maintenance Program 2	Prevent hazardous situations from falling limbs or trees and power outage	Town-wide	Town Administrator	Establish standards in conjunction with Utility companies to keep trees trimmed and/or removed as necessary from right-of-ways to prevent hazardous situations and power outages.
Radon Education 1, 5	Radon in homes	Town-wide	EMD, Building Inspector	Establish Public education program on Radon Hazards and Detection in conjunction with Fire Prevention week and public information display at Town Office
New Fire Station 2, 3, 4	All Hazards	Town-wide	Select Board, Fire Chief, Budget Committee	Current facility is 35 years old. Current station has no sleeping quarters and when Fire/EMS volunteers are required to man station in storms they must sleep in chairs or on floor.
Emergency Radio Tower 3	All Hazards	Town-wide	Fire Chief, EMD	New tower will provide better emergency communications throughout community in all hazard situations.
Enforce Adopted Building Codes 1, 2, 3, 5	All Hazards	Town-wide	Planning Board, Building Inspector	Review of all building and site plans and before issuance of permits to insure compliance with mitigate strategies of identified hazards.
Update Zoning, Sub-division, and Site plan regulations 1, 2, 3, 5	All Hazards	Town-wide	Planning Board	Update Zoning, Subdivision and Site Plan Regulations yearly to insure compliance with mitigation strategies for identified hazards and determine if new regulations maybe required.
Earthquake Proof Identified Primary Shelter 3	Property Protection	Central School	School Board, Select Board, Budget Committee	Incorporate funding for study to determine cost to Earthquake proof Primary Shelter into Capital Improvement Program (CIP).
Training for Radio Dispatchers to use Seabrook Sirens 2, 3	All Hazards	Town-wide	EMD	Training for Radio Dispatch personal to use Sirens
Public Education for Supplies to have on hand for Emergencies 1, 5	All Hazards	Town-wide	EMD, Police Chief, Fire Chief	Public Education for supplies to have on hand for emergency preparedness
Incorporate EOC into New Fire Station 2, 3, 4	All Hazards	Town-wide	EMD	Incorporate EOC into the new fire Station

Survey Town Residents to Residents to Voluntarily provide Special Needs Information 1, 3	All Hazards that could affect vulnerable populations	Town-wide	EMD, Police Chief, Fire Chief	Survey Town residents to obtain voluntary special needs information
Identify HAM Radio Operators in Town 4	All Hazards	Town-wide	EMD, Fire Chief	Identify HAM radio operators in Town
Develop a Comprehensive Public Information Outreach Programs for Identified Hazards 1,2,3,4,5	All Hazards	Town-wide	EMD, Police Chief, Fire Chief	Develop a Comprehensive Public Information Outreach Programs for Identified Hazards to enable residents and business to be better prepared to mitigate the threat to life and property associated with the identifies risks to the community. Strategies will include mailings, use of all types of media, presentations at neighborhood and public meetings, newspapers, radio/TV and public displays.

PRIORITIZATION OF MITIGATION ACTIONS

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 11:

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 11.

Table 11.1: Install Code Red System

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	Need to rapidly communicate
T: Is it Technically feasible and potentially successful?	3	accurate information to all
A: Is it Administratively workable?	3	residents in an emergency
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	3	
E: Are other Environmental approvals required?	3	
Score	21	

Table 11.2: Update the Local Emergency Operation Plan

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	3	
E: Are other Environmental approvals required?	3	
Score	21	

Table 11.3: Become involved in fire prevention week

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	2.5	
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	1	
E: Are other Environmental approvals required?	3	
Score	18.5	

Table 11.4: Radon education (hand-outs and/or the website)

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	
T: Is it Technically feasible and potentially successful?	2.5	
A: Is it Administratively workable?	2	
P: Is it Politically acceptable?	2	
L: Is there Legal authority to implement?	1	
E: Is it Economically beneficial?	1	
E: Are other Environmental approvals required?	2	
Score	13.5	

Table 11.5: New Fire Station

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	2	
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	1.5	
L: Is there Legal authority to implement?	1.5	
E: Is it Economically beneficial?	1	
E: Are other Environmental approvals required?	1	
Score	13	

Table 11.6: Incorporate EOC into new Fire Station

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	Implementation of this strategy is dependent on the construction of a new fire station
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	3	
E: Are other Environmental approvals required?	3	
Score	21	

Table 11.7: New Emergency Radio Tower (Incorporate into new Fire Station)

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	Implementation of this strategy is dependent on the construction of a new fire station
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	3	
E: Are other Environmental approvals required?	2	
Score	20	

Table 11.8: Update Radiological Emergency Response Plan (Seabrook Station)

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	3	
E: Are other Environmental approvals required?	3	
Score	21	

Table 11.9: Review Building Codes to insure adequate compliance to mitigate identified hazards.

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	2.5	
T: Is it Technically feasible and potentially successful?	2.5	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	2.75	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	3	
E: Are other Environmental approvals required?	2	
Score	18.75	

Table 11.10: Review Zoning, Subdivision and Site Plan Regulations to insure mitigation of identified hazards and determine if further regulations maybe required

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	2.5	
T: Is it Technically feasible and potentially successful?	2.5	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	2.75	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	3	
E: Are other Environmental approvals required?	2	
Score	18.75	

Table 11.11: Earthquake proof Primary Shelter

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	1	
T: Is it Technically feasible and potentially successful?	2	
A: Is it Administratively workable?	1	
P: Is it Politically acceptable?	1	
L: Is there Legal authority to implement?	1	
E: Is it Economically beneficial?	1	
E: Are other Environmental approvals required?	1	
Score	8	

Table 11.12: Training for Fire Dispatch personnel to use Sirens

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	1	
E: Are other Environmental approvals required?	3	
Score	19	

Table 11.13: Public Education for supplies to have on hand for emergency preparedness

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	2	
E: Are other Environmental approvals required?	3	
Score	20	

Table 11.14: Survey Town residents to obtain voluntary special needs information

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	2.5	
T: Is it Technically feasible and potentially successful?	1.75	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	2.5	
L: Is there Legal authority to implement?	2	
E: Is it Economically beneficial?	3	
E: Are other Environmental approvals required?	3	
Score	17.75	

Table 11.15: Identify HAM radio operators available in Town

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	2	
E: Is it Economically beneficial?	2	
E: Are other Environmental approvals required?	3	
Score	19	

Table 11.16: Public Information Outreach Programs

Criteria	Evaluation Rating (1-3)	Comments
S: Is it Socially acceptable?	3	Public Education will have a significant impact on all the communities mitigation activities.
T: Is it Technically feasible and potentially successful?	3	
A: Is it Administratively workable?	3	
P: Is it Politically acceptable?	3	
L: Is there Legal authority to implement?	3	
E: Is it Economically beneficial?	3	
E: Are other Environmental approvals required?	3	
Score	21	

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.

ACTION PLAN

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 12 is the Action Plan. In addition to the prioritized mitigation projects, Table 12 includes the responsible party (WHO), how the project will be supported (HOW), and what the timeframe is for implementation of the project (WHEN). The beginning of the timeframe of completion for the following items is when the plan is approved and the community is eligible for receiving mitigation funding; the timeframe column in Table 12 lists the amount of time needed or the target date to implement and/or complete the action/project.

Table 12: Action Plan for proposed mitigation actions

Score	Project	Responsibility/ Oversight	Funding/ Support	Estimated Cost	Timeframe
21.0	Install Code Red System	TA, EMD, Police Chief, Fire Chief Selectmen	Local	$4,000	Winter 2015
21.0	Develop a Comprehensive Public Information Outreach Programs for Identified Hazards	EMD, Fire Chief, Police Chief	Local	$3,000	Spring 2017
21.0	Update Local Emergency Operations Plan	EMD, Police Chief, Fire Chief	Local / Grants	$5,000	Winter 2015
21.0	Update Radiological Emergency Response Plan	EMD, Police Chief, Fire Chief	Local / RERP Budget	$1,000	Winter 2015
20.0	Public Education for supplies to have on hand for emergency preparedness	EMD, Webmaster	Local	$80,000	Fall 2016
19.0	Identify HAM radio operators in Town	EMD, Fire Chief	Local	Staff time	Annually 2015-2020
19.0	Training for Fire Dispatch personnel to use Sirens	EMD, Fire Chief	Local	Staff time	Annually 2015-2020
18.75	Review Building Codes to insure adequate compliance to mitigate identified hazards	Building Inspector, Planning Board	Local	Staff time	Annually 2015-2020
18.75	Review Zoning, Subdivision and Site Plan Regulations to insure mitigation of identified hazards and determine if further regulations may be required	Building Inspector, Planning Boar	Local	Staff time	Annually 2015-2020

18.5	Become involved in fire prevention week	Fire Chief	Local	$500	Annually 2014-2019
17.75	Survey Town residents to obtain voluntary special needs information	EMD, Fire Chief, Police Chief	Local	$1,000	Annually 2015-2020
13.5	Radon education (hand-outs and/or the website)	Health Officer, Webmaster	Local	$500-	Spring 2016
13.0	New Fire Station	Fire Chief, Selectmen, Budget Committee	Local / Grants	$4,000,000	Fall 2019
21*	Incorporate new EOC into new Fire Station	EMD, Selectmen, Budget Committee	Grants	$500,00-	Fall 2019
21*	New Emergency Radio Tower – incorporate into new Fire Sta.	EMD, Fire Chief, Selectmen, Budget Committee	Local	$100,00	Fall 2019
8.0	Earthquake proof Primary Shelter	EMD, School Board	Grants	$500,000	Winter 2019

***Note: New EOC and Emergency Radio Tower are scored at 21 but are not possible to implement until a new fire station is constructed.**

Phase IV: Plan Maintenance Process

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 10), it is recommended that the Town revisit the *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 revisited no less then every five years. The Emergency Management Director is responsible for initiating this review with members of the Town that are appropriate, including members of the public.

If there any proposed updates to the *Plan* over the next 5 years, notification of public meetings and hearings will be published to receive public comment on *Plan* maintenance and updating. These hearings will be held during the review of the *Plan*. The date and time of these hearings will be posted on the Town Web Site, Town bulletin board and in local media. This will allow for members of the community not involved in developing the *Plan* to provide input and comments each time the *Plan* is revised. If necessary, comment will be sought from neighboring communities by notifying them of the public hearings. 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 this *Plan* to determine feasibility of future implementation.

APPENDIX A:
SUMMARY OF HAZARD MITIGATION STRATEGIES

I. RIVERINE MITIGATION

A. PREVENTION

Prevention measures are intended to keep the problem from occurring in the first place, and/or keep it from getting worse. Future development should not increase flood damage. Building, zoning, planning, and/or code enforcement offices usually administer preventative measures.

1. Planning and Zoning

Land use plans are put in place to guide future development, recommending where - and where not - development should occur. Sensitive and vulnerable lands can be designated for uses that would not be incompatible with occasional flood events - such as parks or wildlife refugees.

A Capital Improvements Program can recommend the setting aside of funds for public acquisition of these designated lands.

The zoning ordinance can regulate development in these sensitive areas by limiting or preventing some or all development - for example, by designating floodplain overlay, conservation, or agricultural districts.

2. Open Space Preservation

Preserving open space is the best way to prevent flooding and flood damage. Open space preservation should not, however, be limited to the flood plain, since other areas within the watershed may contribute to controlling the runoff that exacerbates flooding.

Land Use and Capital Improvement Plans should identify areas to be preserved by acquisition and other means, such as purchasing easements. Aside from outright purchase, open space can also be protected through maintenance agreements with the landowners, or b

requiring developers to dedicate land for flood flow, drainage and storage.

3. Floodplain Development Regulations

Floodplain development regulations typically do not prohibit development in the special flood hazard area, but they do impose construction standards on what is built there. The intent is to protect roads and structures from flood damage and to prevent the development from aggravating the flood potential.

Floodplain development regulations are generally incorporated into subdivision regulations, building codes, and floodplain ordinances, which either stand-alone or are contained within a zoning ordinance.

Subdivision Regulations: These regulations govern how land will be divided into separate lots or sites. They should require that any flood hazard areas be shown on the plat, and that every lot has a buildable area that is above the base flood elevation.

Building Codes: Standards can be incorporated into building codes that address flood proofing for all new and improved or repaired buildings.

Floodplain Ordinances: Communities that participate in the National Flood Insurance Program are required to adopt the minimum floodplain management regulations, as developed by FEMA. The regulations set minimum standards for subdivision regulations and building codes. Communities may adopt more stringent standards than those set forth by FEMA.

4. Storm water Management

Development outside of a floodplain can contribute significantly to flooding by covering impervious surfaces, which increases storm water runoff. Storm water management is usually addressed in subdivision regulations. Developers are typically required to build retention or detention basins to minimize any increase in runoff caused by new or expanded impervious surfaces, or new drainage systems. Generally, there is a prohibition against storm water leaving the site at a rate higher than it did before the development.

One technique is to use wet basins as part of the landscaping plan of a development. It might even be possible to site these basins based on a watershed analysis. Since detention only controls the runoff rates and not volumes, other measures must be employed for storm water infiltration - for example, swales, infiltration trenches, vegetative filter strips, and permeable paving blocks.

5. Drainage System Maintenance

Ongoing maintenance of channel and detention basins is necessary if these facilities are to function effectively and efficiently over time. A maintenance program should include regulations that prevent dumping in or altering watercourses or storage basins; regrading and filling should also be regulated.

Any maintenance program should include a public education component, so that the public becomes aware of the reasons for the regulations. Many people do not realize the consequences of filling in a ditch or wetland, or regrading their yard without concern for runoff patterns.

B. PROPERTY PROTECTION

Property protection measures are used to modify buildings subject to flood damage, rather than to keep floodwaters away. These may be less expensive to implement, as they are often carried out on a cost-sharing basis. In addition, many of these measures do not affect a building's appearance or use, which makes them particularly suitable for historical sites and landmarks.

1. Relocation

Moving structures out of the floodplain is the surest and safest way to protect against damage. Relocation is expensive, however, so this approach will probably not be used except in extreme circumstances. Communities that have areas subject to severe storm surges, ice jams, etc. might want to consider establishing a relocation program, incorporating available assistance.

2. Acquisition

Acquisition by a governmental entity of land in a floodplain serves two main purposes: (1) it ensures that the problem of structures in the floodplain will be addressed; and (2) it has the potential to convert problem areas into community assets, with accompanying environmental benefits.

Acquisition is more cost effective than relocation in those areas that are subject to storm surges, ice jams, or flash flooding. Acquisition, followed by demolition, is the most appropriate strategy for those buildings that are simply too expensive to move, as well as for dilapidated structures that are not worth saving or protecting. Relocation can be expensive, however, there are government grants and loans that can be applied toward such efforts.

3. Building Elevation

Elevating a building above the base flood elevation is the best on-site protection strategy. The building could be raised to allow water to run underneath it, or fill could be brought in to elevate the site on which the building sits.

This approach is cheaper than relocation, and tends to be less disruptive to a neighborhood. Elevation is required by law for new and substantially improved residences in a floodplain, and is commonly practiced in flood hazard areas nationwide.

4. Flood proofing

If a building cannot be relocated or elevated, it may be flood proofed. This approach works well in areas of low flood threat. Flood proofing can be accomplished through barriers to flooding, or by treatment to the structure itself.

Barriers: Levees, floodwalls and berms can keep floodwaters from reaching a building. These are useful, however, only in areas subject to shallow flooding.

Dry Flood proofing: This method seals a building against the water by coating the walls with waterproofing compounds or plastic sheeting. Openings, such doors, windows, etc. are closed either permanently with removable shields or with sandbags.

Wet Flood proofing: This technique is usually considered a last resort measure, since water is intentionally allowed into the building in order to minimize pressure on the structure. Approaches range from moving valuable items to higher floors to rebuilding the floodable area. An advantage over other approaches is that simply by moving household goods out of the range of floodwaters, thousands of dollars can be saved in damages.

5. Sewer Backup Protection

Storm water overloads can cause backup into basements through sanitary sewer lines. Houses that have any kind of connection to a sanitary sewer system - whether it is downspouts, footing drain tile, and/or sump pumps, can be flooded during a heavy rain event. To prevent this, there should be no such connections to the system, and all rain and ground water should be directed onto the ground, away from the building. Other protections include:

- Floor drain plugs and floor drain standpipe, which keep water from flowing out of the lowest opening in the house.
- Overhead sewer - keeps water in the sewer line during a backup.
- Backup valve - allows sewage to flow out while preventing backups from flowing into the house.

6. Insurance

Above and beyond standard homeowner insurance, there is other coverage a homeowner can purchase to protect against flood hazard. Two of the most common are National Flood Insurance and basement backup insurance.

National Flood Insurance: When a community participates in the National Flood Insurance Program, any local insurance agent is able to sell separate flood insurance policies under rules and rates set by FEMA. Rates do not change after claims are paid because they are set on a national basis.

Basement Backup Insurance: National Flood Insurance offers an additional deductible for seepage and sewer backup, provided there is a general condition of flooding in the area that was the proximate cause of the basement getting wet. Most exclude damage from surface flooding that would be covered by the NFIP.

C. NATURAL RESOURCE PROTECTION

Preserving or restoring natural areas or the natural functions of floodplain and watershed areas provide the benefits of eliminating or minimizing losses from floods, as well as improve water quality and wildlife habitats. Parks, recreation, or

conservation agencies usually implement such activities. Protection can also be provided through various zoning measures that are specifically designed to protect natural resources.

1. Wetlands Protection

Wetlands are capable of storing large amounts of floodwaters, slowing and reducing downstream flows, and filtering the water. Any development that is proposed in a wetland is regulated by either federal and/or state agencies. Depending on the location, the project might fall under the jurisdiction of the U.S. Army Corps of Engineers, which in turn, calls upon several other agencies to review the proposal. In New Hampshire, the N.H. Wetlands Board must approve any project that impacts a wetland. And, many communities in New Hampshire also have local wetland ordinances.

Generally, the goal is to protect wetlands by preventing development that would adversely affect them. Mitigation techniques are often employed, which might consist of creating a wetland on another site to replace what would be lost through the development. This is not an ideal practice, however, since it takes many years for a new wetland to achieve the same level of quality as an existing one.

2. Erosion and Sedimentation Control

Controlling erosion and sediment runoff during construction and on farmland is important, since eroding soil will typically end up in downstream waterways. And, because sediment tends to settle where the water flow is slower, it will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters.

Practices to reduce erosion and sedimentation have two principal components: (1) minimize erosion with vegetation and; (2) capture sediment before it leaves the site. Slowing the runoff increases infiltration into the soil, thereby controlling the loss of topsoil from erosion and the resulting sedimentation. Runoff can be slowed by vegetation, terraces, contour strip farming, no-till farm practices, and impoundments (such as sediment basins, farm ponds, and wetlands).

3. Best Management Practices

Best Management Practices (BMPs) are measures that reduce nonpoint source pollutants that enter waterways. Nonpoint source pollutants are carried by storm water to waterways, and include such things as lawn fertilizers, pesticides, farm chemicals, and oils from street surfaces and industrial sites.

BMPs can be incorporated into many aspects of new developments and ongoing land use practices. In New Hampshire, the Department of Environmental Services has developed best management practices for a range of activities, from farming to earth excavations.

D. EMERGENCY SERVICES

Emergency services protect people during and after a flood. Many communities in New Hampshire have emergency management programs in place, administered by an emergency management director (very often the local police or fire chief).

1. Flood Warning

On large rivers, the National Weather Service handles early recognition. Communities on smaller rivers must develop their own warning systems. Warnings may be disseminated in a variety of ways, such as sirens, radio, television, mobile public address systems, or door-to-door contact. It seems that multiple or redundant systems are the most effective, giving people more than one opportunity to be warned.

2. Flood Response

2.Flood response refers to actions that are designed to prevent or reduce damage or injury, once a flood threat is recognized. Such actions and the appropriate parties include:

- activating the emergency operations center (emergency director)
- sandbagging designated areas (public works department)
- closing streets and bridges (police department)
- shutting off power to threatened areas (public service)
- releasing children from school (school district)
- ordering an evacuation (selectmen/city council/emergency director)
- opening evacuation shelters (churches, schools, Red Cross, municipal facilities)

These actions should be part of a flood response plan, which should be developed in coordination with the persons and agencies that share the responsibilities. Drills and exercises should be conducted so that the key participants know what they are supposed to do.

3. Critical Facilities Protection

Protecting critical facilities is vital, since expending efforts on these facilities can draw workers and resources away from protecting other parts of town. Buildings or locations vital to the flood response effort:

- emergency operations centers
- police and fire stations
- hospitals
- highway garages
- selected roads and bridges
- evacuation routes
- Buildings or locations that, if flooded, would create secondary disasters
- hazardous materials facilities
- water/wastewater treatment plants
- schools
- nursing homes

All such facilities should have their own flood response plan that is coordinated with the community's plan. Nursing health facilities, and schools will typically be required by the state to have emergency response plans in place.

4. Health and Safety Maintenance

The flood response plan should identify appropriate measures to prevent danger to health and safety. Such measures include:

- patrolling evacuated areas to prevent looting.
- providing safe drinking water.
- vaccinating residents for tetanus.
- clearing streets.
- cleaning up debris.

The plan should also identify which agencies will be responsible for carrying out the identified measures. A public information program can be helpful to educate residents on the benefits of taking health and safety precautions.

Structural Projects

Structural projects are used to prevent floodwaters from reaching properties. These are all man-made structures, and can be grouped into the six types of discussed below. The shortcomings of structural approaches are that:

- They can be very expensive.
- They disturb the land, disrupt natural water flows, and destroy natural habitats.

- They are built to an anticipated flood event, and may be exceeded by a greater-than-expected flood.
- They can create a false sense of security.

Reservoirs

Reservoirs control flooding by holding water behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate the river downstream can handle.

Reservoirs are suitable for protecting existing development, and they may be the only flood control measure that can protect development close to a watercourse. They are most efficient in deeper valleys or on homes, other public healt smaller rivers where there is less water to store. Reservoirs might consist of man-made holes dug to hold the approximate amount of floodwaters, or even abandoned quarries. As with other structural projects, reservoirs:

- are expensive;
- occupy a lot of land;
- require periodic maintenance;
- may fail to prevent damage from floods that exceed their design levels; and
- may eliminate the natural and beneficial functions of the floodplain.

Reservoirs should only be used after a thorough watershed analysis that identifies the most appropriate location, and ensures that they would not cause flooding somewhere else. Because they are so expensive and usually involve more than one community, they are typically implemented with the help of state or federal agencies, such as the Army Corps of Engineers.

Levees/Floodwalls

Probably the best know structural flood control measure is either a levee (a barrier of earth) or a floodwall made of steel or concrete erected between the watercourse and the land. If space is a consideration, floodwalls are typically used, since levees need more space. Levees and floodwalls should be set back out of the floodway, so that they will not divert floodwater onto other properties.

Diversions

A diversion is simply a new channel that sends floodwater to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During flood flows, the stream spills over the diversion channel or tunnel, which carries the excess water to the receiving lake or river.

Diversions are limited by topography; they won't work everywhere. Unless the receiving water body is relatively close to the flood prone stream and the land in between is low and vacant, the cost of creating a diversion can be prohi not favorable, a more expensive tunnel is needed. In either case, care must be taken to ensure that the diversion does not create a flooding problem somewhere else.

Channel Modifications

Channel modifications include making a channel wider, deeper, smoother, or straighter. These techniques will result in more water being carried away, but, as with other techniques mentioned, it is important to ensure that the modifications do not create or increase a flooding problem downstream.

Dredging: Dredging is often cost-prohibitive because the dredged material must be disposed of somewhere else, and the stream will usually fill back in with sediment. Dredging is usually undertaken only on larger rivers, and then only to maintain a navigation channel.

Drainage modifications: These include man-made ditches and storm sewers that help drain areas where the surface drainage system is inadequate or where underground drainage ways may be safer or more attractive. These approaches are usually designed to carry the runoff from smaller, more frequent storms.

Storm Sewers

Mitigation techniques for storm sewers include installing new sewers, enlarging small pipes, street improvements, and preventing back flow. Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving body of water can absorb the increased flows without increased flooding.

In many developments, streets are used as part of the drainage system, to carry or hold water from larger, less frequent storms. The streets collect runoff and convey it to a receiving sewer, ditch, or stream. Allowing water to stand in the streets and then draining it slowly can be a more effective and less expensive measure than enlarging sewers and ditches.

Public Information

Public information activities are intended to advise property owners, potential property owners, and visitors about the particular hazards associated with a property, ways to protect people and property from these hazards, and the natural and beneficial functions of a floodplain.

Map Information

Flood maps developed by FEMA outline the boundaries of the flood hazard areas. These maps can be used by anyone interested in a particular property to determine if it is flood-prone. These maps are available from FEMA, the NH Office of Emergency Management, the NH Office of State Planning, or your regional planning commission.

Outreach Projects

Outreach projects are proactive; they give the public information even if they have not asked for it. Outreach projects are designed to encourage people to seek out more information and take steps to protect themselves and their properties. Examples of outreach activities include:

- Mass mailings or newsletters to all residents.
- Notices directed to floodplain residents.
- Displays in public buildings, malls, etc.
- Newspaper articles and special sections.
- Radio and TV news releases and interview shows.
- A local flood proofing video for cable TV programs and to loan to organizations.
- A detailed property owner handbook tailored for local conditions.
- Presentations at meetings of neighborhood groups.

Research has shown that outreach programs work, although awareness is not enough. People need to know what they can do about the hazards, so projects should include information on protection measures. Research also shows that locally designed and run programs are much more effective than national advertising.

Real Estate Disclosure

Disclosure of information regarding flood-prone properties is important if potential buyers are to be in a position to mitigate damage. Federally regulated lending institutions are required to advise applicants that a property is in the floodplain. However, this requirement needs to be met only five days prior to closing, and by that time, the applicant is typically committed to the purchase. State laws and local real estate practice can help by making this information available to prospective buyers early in the process.

Library

Your local library can serve as a repository for pertinent information on flooding and flood protection. Some libraries also maintain their own public information campaigns, augmenting the activities of the various governmental agencies involved in flood mitigation.

Technical Assistance

Certain types of technical assistance are available from the NFIP Coordinator, FEMA, and the Natural Resources Conservation District. Community officials can also set up a service delivery program to provide one-on-one sessions with property owners.

An example of technical assistance is the flood audit, in which a specialist visits a property. Following the visit, the owner is provided with a written report, detailing the past and potential flood depths, and recommending alternative protection measures.

Environmental Education

Education can be a great mitigating tool, if people can learn what not to do before damage occurs. And the sooner the education begins, the better. Environmental education programs for children can be taught in the schools, park and recreation departments, conservation associations, or youth organizations. An activity can be as involved as course curriculum development or as simple as an explanatory sign near a river.

Education programs do not have to be limited to children. Adults can benefit from knowledge of flooding and mitigation measures. And decision-makers, armed with this knowledge, can make a difference in their communities.

II. EARTHQUAKES

A. PREVENTIVE

Planning/zoning to keep critical facilities away from fault lines.

Planning, zoning and building codes to avoid areas below steep slopes or soils subject to liquefaction.

Building codes to prohibit loose masonry, overhangs, etc.

B. PROPERTY PROTECTION

Acquire and clear hazard areas.

Retrofitting to add braces, remove overhangs.

Apply mylar to windows and glass surfaces to protect from shattering glass.

Tie down major appliances, provide flexible utility connections.

Earthquake insurance riders.

C. EMERGENCY SERVICES

Earthquake response plans to account for secondary problems, such as fires and hazardous materials spills.

D. EMERGENCY SERVICES

Slope stabilization.

III. DAM FAILURE

A. PREVENTIVE

Dam failure inundation maps.

Planning/zoning/open space preservation to keep area clear.

Building codes with flood elevation based on dam failure.

Dam safety inspections.

Draining the reservoir when conditions appear unsafe.

B. PROPERTY PROTECTION

Acquisition of buildings in the path of a dam breach flood.

Flood insurance.

C. EMERGENCY SERVICES

Dam conditioning monitoring.

Warning and evacuation plans based on dam failure.

D. EMERGENCY SERVICES

Dam conditioning monitoring.
Warning and evacuation plans based on dam failure.

Dam improvements, spillway enlargements.
Remove unsafe dams.

IV. WILDFIRES

A. PREVENTIVE

Zoning districts to reflect fire risk zones.
Planning and zoning to restrict development in areas near fire protection and water resources.
Requiring new subdivisions to space buildings, provide firebreaks, on-site water storage, wide roads multiple accesses.
Building code standards for roof materials, spark arrestors.
Maintenance programs to clear dead and dry bush, trees.
Regulation on open fires.

B. PROPERTY PROTECTION

Retrofitting of roofs and adding spark arrestors.
Landscaping to keep bushes and trees away from structures.
Insurance rates based on distance from fire protection.

C. NATURAL RESOURCE PROTECTION

Prohibit development in high-risk areas.

D. EMERGENCY SERVICES

Fire Fighting

V. WINTER STORMS

A. PREVENTIVE

Building code standards for light frame construction, especially for wind-resistant roofs.

B. PROPERTY PROTECTION

Storm shutters and windows
Hurricane straps on roofs and overhangs
Seal outside and inside of storm windows and check steals in spring and fall.
Family and/or company severe weather action plan & drills include:
include a NOAA weather radio
designate a shelter area or location
keep a disaster supply kit, including stored food and water
keep snow removal equipment in good repair; have extra shovels, sand, rock, salt and gas
know how to turn off water, gas, and electricity at home or work

C. NATURAL RESOURCE PROTECTION

Maintenance program for trimming tree and shrubs

D. EMERGENCY SERVICES

Early warning systems/NOAA Weather Radio
Evacuation Plans

Appendix B:
TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION

Local Municipalities must have a FEMA-approved Hazard Mitigation Plan in order to be eligible for the Hazard Mitigation Grant Program (for a disaster declared after November 1st, 2004) and the Pre-disaster Mitigation Project Grants. Information on these two Grant Programs is listed below. Additional hazard mitigation grant program information follows.

HAZARDS MITIGATION GRANT PROGRAM (HGMP)

Authorized under Section 404 of the Stafford Act, the Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.
Hazard Mitigation Grant Program funding is only available in States following a Presidential disaster declaration. Eligible applicants are:

State and local governments
Indian tribes or other tribal organizations
Certain private non-profit organization

Individual homeowners and businesses may not apply directly to the program; however a community may apply on their behalf. HMGP funds may be used to fund projects that will reduce or eliminate the losses from future disasters. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage.

PRE-DISASTER MITIGATION PROGRAM

The Pre-Disaster Mitigation (PDM) program provides technical and financial assistance to States and local governments for cost-effective pre-disaster hazard mitigation activities that complement a comprehensive mitigation program, and reduce injuries, loss of life, and damage and destruction of property. FEMA provides grants to States and Federally recognized Indian tribal governments that, in turn, provide sub-grants to local governments (to include Indian Tribal governments) for mitigation activities such as planning and the implementation of projects identified through the evaluation of natural hazards.

ADDITIONAL HAZARD MITIGATION GRANT PROGRAMS:

FLOOD MITIGATION ASSISTANCE (FMA) PROGRAM

FMA provides funding to assist States and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). There are three types of grants available under FMA: Planning, Project, and Technical Assistance Grants. FMA Planning Grants are available to States and communities to prepare Flood Mitigation Plans. NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project Grants. FMA Project Grants are available to States and NFIP participating communities to implement measures to reduce flood losses. Ten percent of the Project Grant is made available to States as a Technical

Assistance Grant. These funds may be used by the State to help administer the program. Communities receiving FMA Planning and Project Grants must be participating in the NFIP. A few examples of eligible FMA projects include: the elevation, acquisition, and relocation of NFIP-insured structures. Additional information can be read on the Mitigation Planning pages.

Funding for the program is provided through the National Flood Insurance Fund, and FMA is funded at $20 million nationally.

States are encouraged to prioritize FMA project grant applications that include repetitive loss properties. The FY 2001 FMA emphasis encourages States and communities to address target repetitive loss properties identified in the Agency's Repetitive Loss Strategy. These include structures with four or more losses, and structures with 2 or more losses where cumulative payments have exceeded the property

value. State and communities are also encouraged to develop Plans that address the mitigation of these target repetitive loss properties.

HSEM EMERGENCY MANAGEMENT ASSISTANCE PROGRAM

GUIDELINES:

Emergency Management Assistance (EMA) funding is available to local communities and eligible Agencies for projects that fall in FOUR general areas of Emergency Management: Planning activities; Training activities; Drills and Exercises; and Emergency Management Administration. Contact your New Hampshire Homeland Security & Emergency Management (HSEM) local Field Representative for additional information and an APPLICATION PACKET.

The following list of possible projects and activities is meant to guide you in selecting projects for an EMA Grant Submission. This list of suggested projects is not intended to be all-inclusive. Local communities or agencies may have other specific projects and activities that reflect local needs based on local capability assessments and local hazards.

Planning Activities may include:

Develop a Hazard Mitigation Plan for your community.

Prepare a hazard mitigation project proposal for submission to HSEM.

Create, revise, or update Dam Emergency Action plans.

Update your local Emergency Operations Plan (EOP). Consider updating a number of specific annexes each year to ensure that the entire plan is updated at least every four years.

If applicable, develop or incorporate a regional HazMat Team Annex into your EOP.

Develop an Anti-Terrorism Annex into your EOP.

Develop a local/regional Debris Management Annex into your EOP.

Develop and maintain pre-scripted requests for additional assistance (from local area public works, regional mutual aid, State resources, etc.) and local declarations of emergency.

Develop and maintain written duties and responsibilities for EOC staff positions and agency representatives.

Develop and maintain a list of private non-profit organizations within your local jurisdiction to ensure that these organizations are included in requests for public assistance funds.

Prepare a submission for nomination as a “Project Impact” Community.

Training Activities may include:

Staff members attend training courses at the Emergency Management Institute.

Staff members attend a “field delivered” training course conducted by HSEM.

Staff members attend other local, State, or nationally sponsored training event, which provides skills or knowledge relevant to emergency management.

Staff members complete one or more FEMA Independent Study Courses.

Identify and train a pre-identified local damage assessment team.

Drills and Exercises might include:

Conduct multi-agency EOC Exercise (Tabletop or Functional) and forward an Exercise Evaluation Report, including after action reports, to HSEM (external evaluation of exercises is strongly encouraged). Drills or Exercises might involve any of the following scenarios:
Hurricane Exercise
Terrorism Exercise
Severe Storm Exercise
Communications Exercise
Mass Causality Exercise involving air, rail, or ship transportation accident
Participate in multi-State or multi-Jurisdictional Exercise and forward Exercise Report to HSEM.
HazMat Exercise with Regional HazMat Teams
HSEM Communications Exercises
Observe or evaluate State or local exercise outside your local jurisdiction.
Assist local agencies and commercial enterprises (nursing homes, dams, prisons, schools, etc.) in developing, executing, and evaluating their exercise.
Assist local hospitals in developing, executing and evaluating Mass Care, HazMat, Terrorism, and Special Events Exercises.
Administrative Projects and Activities may include:
Maintain an Emergency Operations Center (EOC) and alternate EOC capable of accommodating staff to respond to local emergencies.
Establish and maintain a Call-Down List for EOC staff.
Maintain an Emergency Operations Center (EOC) and alternate EOC capable of accommodating staff to respond to local emergencies.
Establish and maintain a Call-Down List for EOC staff.
Establish and maintain Emergency Response/Recovery Resource Lists.
Develop or Update Emergency Management Mutual Aid Agreements with a focus on Damage Assessment, Debris Removal, and Resource Management.
Develop and maintain written duties and responsibilities for EOC staff positions and agency representatives.
Develop or Update Procedures for tracking of disaster-related expenses by local agencies.

FLOOD MITIGATION ASSISTANCE (FMA) PROGRAM

FMA was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA regulations can be found in 44 CFR Part 78. Funding for the program is provided through the National Flood Insurance Fund. FMA is funded at $20 million nationally. FMA provides funding to assist States and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP).

There are three types of grants available under FMA: Planning, Project, and Technical Assistance Grants. FMA Planning Grants are available to States and communities to prepare Flood Mitigation Plans. NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project Grants. FMA Project Grants are available to States and NFIP participating communities to implement measures to reduce flood losses. Ten percent of the Project Grant is made available to States as a Technical Assistance Grant. These funds may be used by the State to help administer the program. Communities receiving FMA Planning and Project Grants must be participating in the NFIP. A few examples of eligible FMA projects include: the elevation, acquisition, and relocation of NFIP-insured structures.

States are encouraged to prioritize FMA project grant applications that include repetitive loss properties. The FY 2001 FMA emphasis encourages States and communities to address target repetitive loss properties identified in the Agency's Repetitive Loss Strategy. These include structures with four or more losses, and structures with 2 or

more losses where cumulative payments have exceeded the property value. State and communities are also encouraged to develop Plans that address the mitigation of these target repetitive loss properties.

APPENDIX C:

SAFFIR/SIMPSON HURRICANE SCALE

Courtesy of National Hurricane Center

This can be used to give an estimate of the potential property damage and flooding expected along the coast with a hurricane.

Category	Definition	Effects
One	Winds 74-95 mph	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal road flooding and minor pier damage
Two	Winds 96-110 mph	Some roofing material, door, and window damage to buildings. Considerable damage to vegetation, mobile homes, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of center. Small craft in unprotected anchorages break moorings.
Three	Winds 111-130 mph	Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain continuously lower than 5 feet ASL may be flooded inland 8 miles or more.
Four	Winds 131-155 mph	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach. Major damage to lower floors of structures near the shore. Terrain continuously lower than 10 feet ASL may be flooded requiring massive evacuation of residential areas inland as far as 6 miles.
Five	Winds greater than 155 mph	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Major damage to lower floors of all structures located less than 15 feet ASL and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5 to 10 miles of the shoreline may be required.

Above information can be found at: http://www.fema.gov/hazards/hurricanes/saffir.shtm

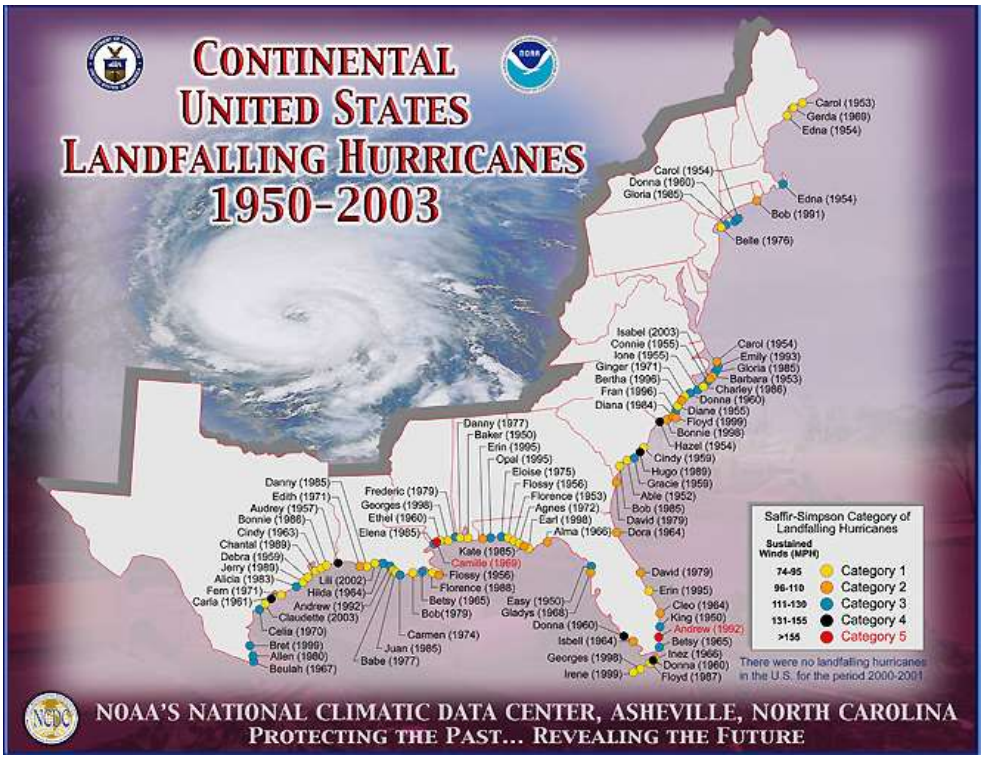


Figure 2: Hurricane Landfall History

APPENDIX D:

FUJITA TORNADO DAMAGE SCALE

Developed in 1971 by T. Theodore Fujita of the University of Chicago

SCALE	WIND ESTIMATE *** (MPH)	TYPICAL DAMAGE
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

*** IMPORTANT NOTE ABOUT F-SCALE WINDS: Do not use F-scale winds literally. These precise wind speed numbers are actually guesses and have never been scientifically verified. Different wind speeds may cause similar-looking damage from place to place -- even from building to building. Without a thorough engineering analysis of tornado damage in any event, the actual wind speeds needed to cause that damage are unknown.

Information depicted above can be found at: http://www.spc.noaa.gov/faq/tornado/f-scale.html

Enhanced Fujita (EF) Scale

2007 – present 3 second gust mph

Fujita (F) Scale

1971- 2007 3 second gust mph

- EF0 – 65-85 mph - F0 – 45-78 mph Gale
- EF1 – 86-110 mph - F1 – 79-117 mph Weak
- EF2 – 111-135 mph - F2 – 118-161 mph Strong
- EF3 – 136-165 mph - F3 – 162-209 mph Severe
- EF4 – 166-200 mph - F4 – 210-261 mph Devastating
- EF5 – over 200 mph - F5 – 262-317 mph Incredible

APPENDIX E

THUNDERSTORM/DOWNBURST DESCRIPTION

A **thunderstorm**, also known as an **electrical storm**, a **lightning storm**, or a **thundershower**, is a type of storm characterized by the presence of lightning and its acoustic effect on the Earth's atmosphere known as thunder.[1]The meteorologically assigned cloud type associated with the thunderstorm is the cumulonimbus. Thunderstorms are usually accompanied by strong winds, heavy rain and sometimes snow, sleet, hail, or no precipitation at all. Those that cause hail to fall are called **hailstorms**. Thunderstorms may line up in a series or rain band, known as a squall. Strong or severe thunderstorms may rotate, known as supercells. While most thunderstorms move with the mean wind flow through the layer of the troposphere that they occupy, vertical wind shear causes a deviation in their course at a right angle to the wind shear direction.

Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of over 20 km (12.45 miles). As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards the Earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of cold air and moisture that spreads out at the Earth's surface, causing the strong winds commonly associated with thunderstorms, and occasionally fog.

Thunderstorms can generally form and develop in any particular geographic location, perhaps most frequently within areas located at mid-latitude when warm moist air collides with cooler air.[2] Thunderstorms are responsible for the development and formation of many severe weather phenomena. Thunderstorms, and the phenomena that occur along with them, pose great hazards to populations and landscapes. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorm cells are capable of producing tornadoes and waterspouts

Definition of a Downburst: A strong downdraft which induces an outburst of damaging winds on or near the surface. A family of downburst is called a "downburst cluster" or collection of downburst having overall lengths of over 50 to 60 n miles. The overall size of an individual downburst can vary from 4 to 6 n miles. The damage pattern at the surface is '*highly divergent*.' Several microburst can be identified within an individual downburst. We have seen and documented this damaging wind pattern in a number of cases. During his studies in the mid 1970s most downburst winds (47%) fell into the category of F0 (traditional Fujita scale) which means that estimated wind speeds varied from 40 to 72 mph. About (32%) of the downburst reached F1 category with wind speeds varying from 73 to 112 mph. About 20% of the downburst cases reached or exceeded F2 intensity.
Definition of a Microburst: A strong downdraft which induces an outburst of damaging winds over an area from 1/2 to 1 statue mile. The life time of a microburst is less than 20 minutes. Several microbursts can occur within a downburst as shown in the middle figure above.

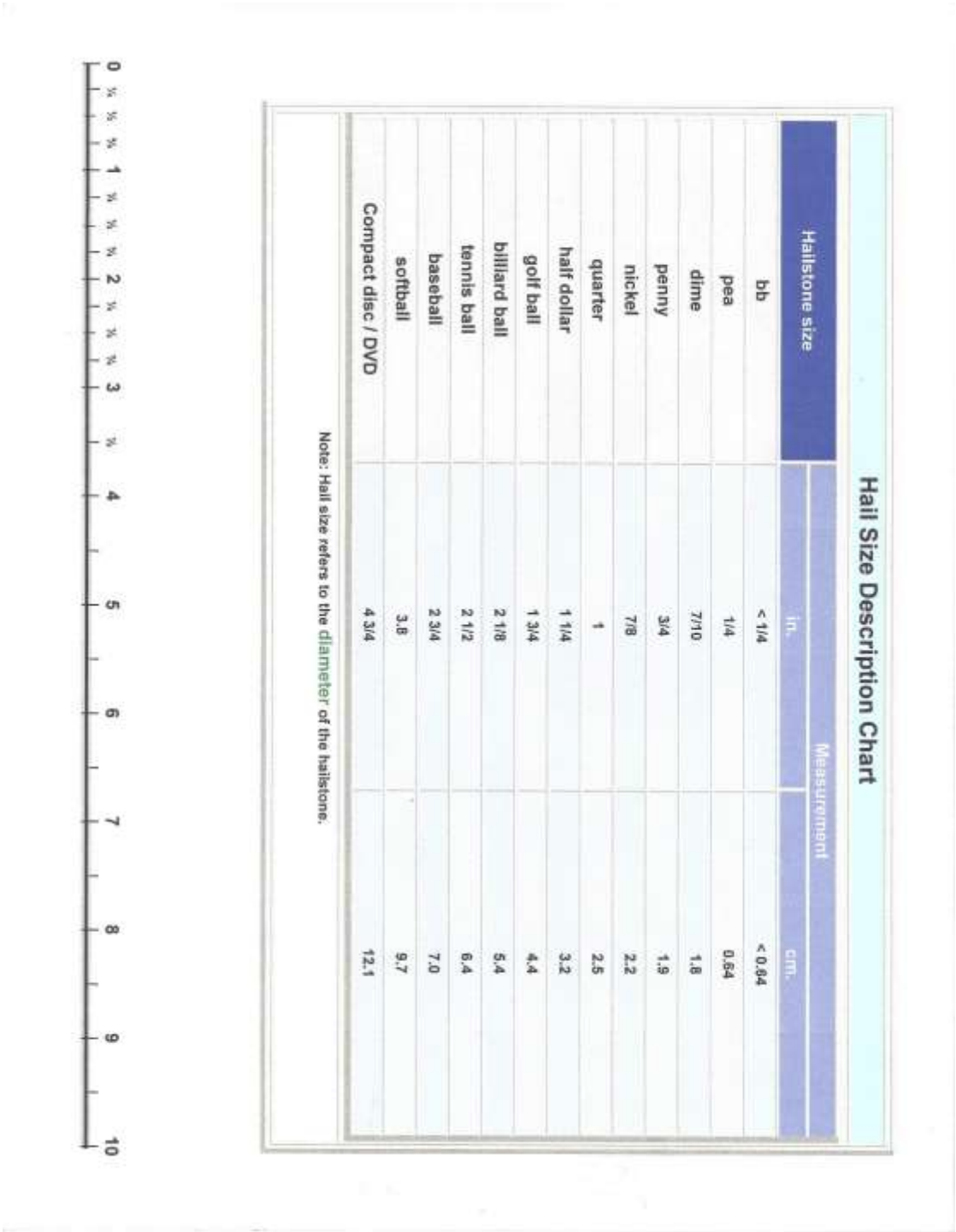
APPENDIX F

LIGHTNING ACTIVITY LEVELS

Lightning Activity Level (LAL)	
Is a scale which describes lightning activity. Values are labeled 1-6:	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater then 15 cloud to ground strikes in a 5 minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

APPENDIX G

Hail Size Chart



Hail Size Description Chart

Hailstone size	Measurement	
	in.	cm.
bb	< 1/4	< 0.64
pea	1/4	0.64
dime	7/10	1.8
penny	3/4	1.9
nickel	7/8	2.2
quarter	1	2.5
half dollar	1 1/4	3.2
golf ball	1 3/4	4.4
billiard ball	2 1/8	5.4
tennis ball	2 1/2	6.4
baseball	2 3/4	7.0
softball	3.8	9.7
Compact disc / DVD	4 3/4	12.1

Note: Hail size refers to the diameter of the hailstone.

APPENDIX H

ICE ACCUMULATION INDEX

The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) *Revised-October, 2011	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
0	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	0.10 – 0.25	15 - 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	> 15	
2	0.10 – 0.25	25 - 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 - 25	
	0.50 – 0.75	< 15	
3	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 - 35	
	0.50 – 0.75	15 - 25	
	0.75 – 1.00	< 15	
4	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 - 35	
	0.75 – 1.00	15 - 25	
	1.00 – 1.50	< 15	
5	0.50 – 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> = 25	
	1.00 – 1.50	> = 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

APPENDIX I

WILDFIRE FIRE SIZE VALUES

Standard data values

Standard data values are provided when a data attribute has a pre-determined set of terms, codes, or numbers that must be used in order for the data to be valid. The purpose of standard data values is to ensure consistency and accuracy within a system and across multiple systems.

November 14, 2009

The following list provides NWCG's standard data values for this data attribute:

Value	Description
A	Greater than 0 but less than or equal to 0.25 Acres
B	0.26 to 9.9 Acres
C	10.0 to 99.9 Acres
D	100 to 299 Acres
E	300 to 999 Acres
F	1000 to 4999 Acres
G	5000 to 9999 Acres
H	10000 to 49999 Acres
I	50000 to 99999 Acres
J	100000 to 499999 Acres
K	500000 to 999999 Acres
L	1000000 + Acres

APPENDIX J

THE RICHTER MAGNITUDE SCALE

Earthquake Severity

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

Information above found at: http://www.seismo.unr.edu/ftp/pub/louie/class/100/magnitude.html

The Richter Magnitude Scale

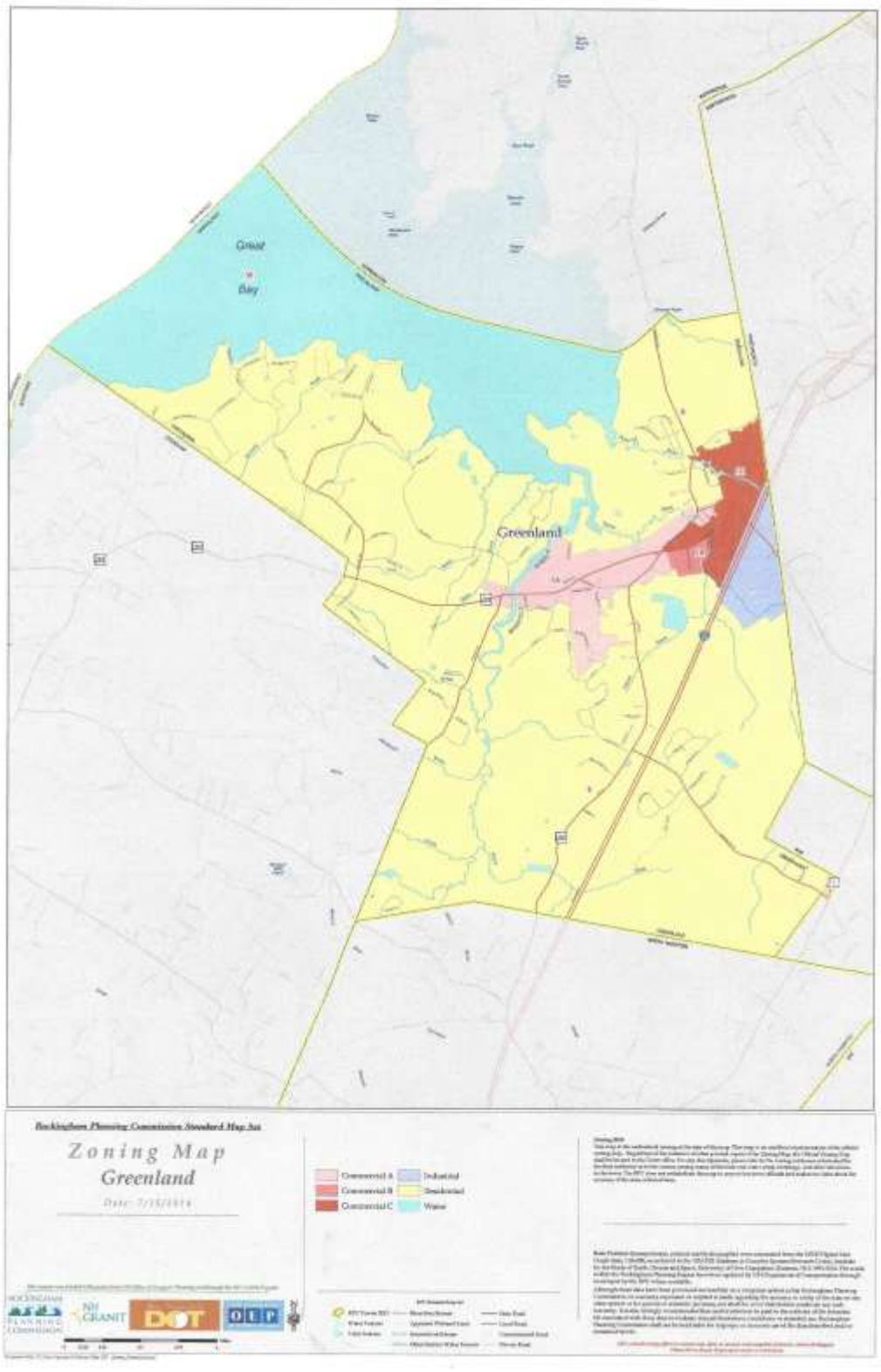
Seismic waves are the vibrations from earthquakes that travel through the Earth; they are recorded on instruments called seismographs. Seismographs record a zig-zag trace that shows the varying amplitude of ground oscillations beneath the instrument. Sensitive seismographs, which greatly magnify these ground motions, can detect strong earthquakes from sources anywhere in the world. The time, locations, and magnitude of an earthquake can be determined from the data recorded by seismograph stations.

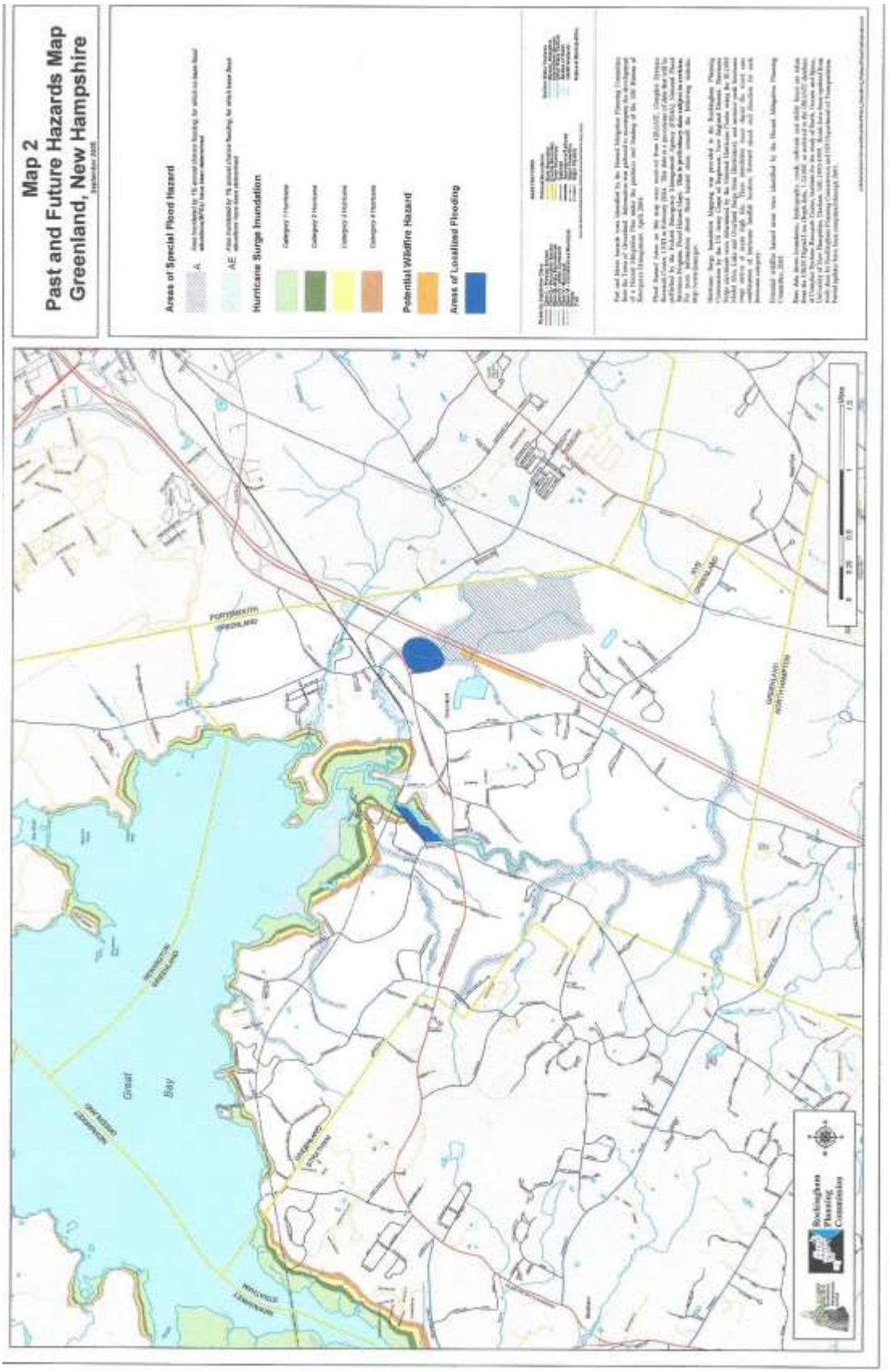
The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquakes. On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

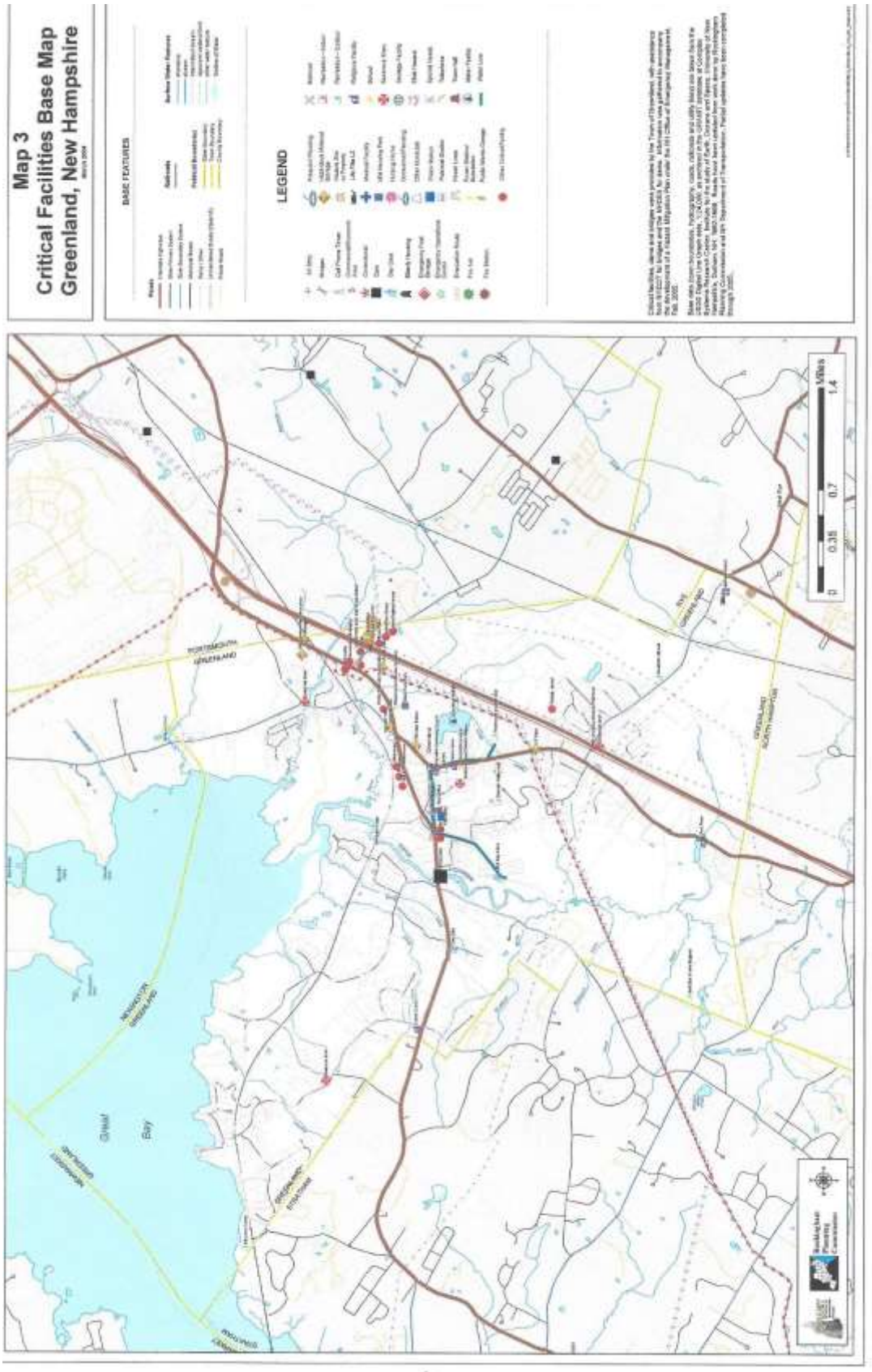
At first, the Richter Scale could be applied only to the records from instruments of identical manufacture. Now, instruments are carefully calibrated with respect to each other. Thus, magnitude can be computed from the record of any calibrated seismograph.

Earthquakes with magnitude of about 2.0 or less are usually call microearthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. Events with magnitudes of about 4.5 or greater - there are several thousand such shocks annually - are strong enough to be recorded by sensitive seismographs all over the world. Great earthquakes, such as the 1964 Good Friday earthquake in Alaska, have magnitudes of 8.0 or higher. On the average, one earthquake of such size occurs somewhere in the world each year. The Richter Scale has no upper limit. Recently, another scale called the moment magnitude scale has been devised for more precise study of great earthquakes. The Richter Scale is not used to express damage. An earthquake in a densely populated area which results in many deaths and considerable damage may have the same magnitude as a shock in a remote area that does nothing more than frighten wildlife. Large-magnitude earthquakes that occur beneath the oceans may not even be felt by humans.

Above information can be found at: http://neic.usgs.gov/neis/general/handouts/richter.html


Great
Bay
Greenland
Rockingham Planning Commission Standard Map Set
Zoning Map
Greenland
Date: 7/15/2014
Commercial A
Commercial B
Commercial C
Industrial
Residential
Water
ROCKINGHAM PLANNING COMMISSION
NH GRANIT
DOT
OEP


Map 2
Past and Future Hazards Map
Greenland, New Hampshire
Areas of Special Flood Hazard
Hurricane Surge Inundation
Potential Wildfire Hazard
Areas of Localized Flooding
Great
Bay


Map 3
Critical Facilities Base Map
Greenland, New Hampshire
BASE FEATURES
LEGEND
Miles
0.35
0.7
1.4
PORTSMOUTH
GREENLAND
Great
Bay

MEETING INFORMATIONAND NOTICE SECTION

Hazard Mitigation Plan

By Ken Fernald

The Federal Emergency Management Agency requires that all towns and cities in the United States have a Hazard Mitigation Plan. The purpose of the plan is to reduce or eliminate long-term risk to people or property from natural or human-caused hazards and their effects. Communities must have an approved plan to be eligible to apply for Federal Grants to help mitigate identified problems or to apply for disaster relief funds should one occur.

The Town of Greenland's Hazard Mitigation Plan was developed and approved in 2006. The Federal Emergency Management Agency requires that this plan be updated every five years. We have begun that process, and a Task Force Team from different Town departments is meeting on the fourth Thursday of each month at 7:00 p.m. at the Town Office to review and update the current plan.

Members on the Team are:

Ken Fernald, Emergency Management Director
Ken Bellevue, Board of Selectmen
Don Moore, Planning Board
Ann Mayer, School Board
Don Miller, general public
Mike Maloney, Police Chief
Ralph Cresta, Fire Chief

These meetings are open to the public and we welcome any resident to attend. There will be time for public comment at these meetings.

Greenland Grapevine Inc
Fall 2011

GREENLAND EMERGENCY MANAGEMENT
HAZARD MITIGATION PLANNING TEAM
Meeting # 1 Agenda

Goal of tonight's meeting: 1. Introductions

3.Handout Material

4.Gain an Understanding and Importance of Hazard Mitigation

4.Role of Team

5.My Role

6.Meeting dates

1. Introduction of Team members

2. Handout material

A.Local Multi-Hazard Mitigation Guidance

B.Greenland Hazard Mitigation Plan 2006

3. Purpose - Page 3, Planning Guidance

4. Authority & Requirements - Page 4, Planning Guidance

5. Plan Updates & Importance - Page 6, Planning Guidance

6. Organization of Planning Guidance - Page 6, Planning Guidance

7. Submittal Process - Page 7, Planning Guidance

8. Time Frame - Must be completed and approved by 8 September 2013

9. Review 2006 Plan

10. Establish Meeting Dates

KNF 4/28/11

GREENLAND EMERGENCY MANAGEMENT

HAZARD MITIGATION PLANNING TEAM 2011

Meeting # 1
Date: 4/28/11

NAME	MAILING ADDRESS	PHONE #	E-MAIL	AGENCY
Ken Bellevue	12 Liams Court	(603)498-8320	Ken.bellevue@gmail.com	Selectman
Ann Mayer	3 Fairview Terr	603-436-9354	romay@comcast.net	S.L. Board
David Moore	150 Great Bay Rd	603 498 3074	dave.moore@wpcintl.com	Planning Bo
Ken Fernald	19 Sgt Dr	603 436 5135	KennithFernald@comcast.net	EM

Meeting

HAZARD MITIGATION
TEAM MEETING ADGENDA

7/28/11
Meeting 2

1. Review new State Guidelines
   1.1 Library of reference material
2. Develop Public Information Plan
   2.1 Assign Team responsibilities'
3. Establish meeting dates
4. Begin review of current plan against crosswalk.

KNF

GREENLAND EMERGENCY MANAGEMENT

HAZARD MITIGATION PLANNING TEAM 2011

Meeting # 2
Date: 7/28/11

NAME	MAILING ADDRESS	PHONE #	E-MAIL	AGENCY
Ken Fernald				EMD
Donald Miller	51 Post Rd.	603 436 9469	donald.miller@comcast	Gen Public
Ken Bellows				Selectman
Michael J. Maloney	PO Box 68 NO. Hampton	603-502-4311	Michael_Maloney@comcast.net	Chief of Police
David Moore				Planning Bd.
Ann F. Mayer	3 Fairview Terr.	603-436-9354	romany@comcast.net	School Board

Meeting

HAZARD MITIGATION
TEAM MEETING #2 MINUTES

7/28/11

1. Review new State Guidelines
   1.1 Library of reference material
   Action: K Fernald to place documents in Emergency Management closet

2. Develop Public Information Plan
   2.1 Assign Team responsibilities'
   Action: D Miller to develop public notice
   K Fernald & M Maloney to contact "Greenland Grapevine"

3. Establish meeting dates
   Action: Meetings to be held on 4th Thursday of each month, 7.00PM at Town Office

4. Begin review of current plan against crosswalk.
   Action: Began review

KNF

NOTE: MEETING CANCELLED DUE TO HURRICANE

HAZARD MITIGATION
TEAM MEETING #4 AGENDA

9/22/11

1. Review minutes meeting #2, 7/2811

2. Current and future hazard mitigation activities
   Karen Anderson, Town Administrator

3. Agenda for 10/27/11 meeting

KNF

GREENLAND EMERGENCY MANAGEMENT

HAZARD MITIGATION PLANNING TEAM 2011

Meeting # 4
Date: 9/12/11

NAME	MAILING ADDRESS	PHONE #	E-MAIL	AGENCY
Ken Fernald	on Record	—	—	~~[illegible]~~ GEMD
Don Miller				Citizen
Ken Bellevue				Selectman
Michael P. Maloney				Chief of Police
Ann F. Mayer				School Board

Meeting

HAZARD MITIGATION
TEAM MEETING #5 AGENDA

10/27/11

1. Review minutes meeting #4 *9/22/11* (to be mailed)

2. Current and future hazard mitigation activities
   Building Codes
   Bob Cushman - Building Inspector

3. Addressing Vulnerability
   Review/Identify Structures

4. Date & Agenda for next meeting

KNF

HAZARD MITIGATION
TEAM MEETING #4 MINUTES

1. Review minutes meeting #2, 7/2811

2. Current and future hazard mitigation activities
Karen Anderson, Town Administrator

Karen provide an overview of ongoing activities.

Tree trimming; Culvert replaced on Portsmouth Ave; State to removing dam on Winnicut River.

3. Agenda for 10/27/11 meeting

GREENLAND EMERGENCY MANAGEMENT

HAZARD MITIGATION PLANNING TEAM 2011

Meeting # 5
Date: 10/27/11

NAME	MAILING ADDRESS	PHONE #	E-MAIL	AGENCY
Kim Fernald	On Record			EMD
Don Miller				Public
Ken Bellevue				Selectman
Ann Mayes				School Board
Bob Cushman				Building Insp

Meeting

HAZARD MITIGATION
TEAM MEETING #5 AGENDA

10/27/11

1. Review minutes meeting #4 *9/22/11* (to be mailed)

2. Current and future hazard mitigation activities
   Building Codes
   Bob Cushman – Building Inspector

3. Addressing Vulnerability
   Review/Identify Structures

4. Date & Agenda for next meeting

KNF

HAZARD MITIGATION
TEAM MEETING #5 MINUTES

1. Reviewed minutes meeting #4, 7/2811

2. Current and future hazard mitigation activities
   Building Codes
   Bob Cushman - Building Inspector
   Bob updated Team on Building Codes. 100MPH requirement now in code.
   New Building Inspection form now in use.

3. Addressing Vulnerability
   Review/Identify Structures

   Team toured Town and were in agreement with Building Inspector that there were no structures that had significant vulnerabilities.

4. Date & Agenda for next meeting

Because of upcoming Holidays and then all the meeting required in preparation for Town Meeting in March, Team decide next meeting will be the 4th Thursday in April 2012.

KNF

Greenland Town Report for 2011

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EMERGENCY MANAGEMENT

It is a requirement of the Federal Emergency Management Agency that every community in the nation have a Hazard Mitigation Plan and that it be updated every five years. While other emergency plans are approved at the State level, all Hazard Mitigation Plans must be approved by FEMA. An approved plan is a requirement for the Town to qualify for emergency grant funding. In 2011, we began work on the update to the Town's plan. We have a Team in place representing the various Town departments and we will be holding a number of public hearings throughout the year to solicit input.

In 2011 we also began are-write of the Radiological Emergency Response Plan. This update is a result of new requirements for the structure of the plan as set forth by FEMA and the Nuclear Regulatory Commission.

The Greenland Emergency Operations Center was activated on two occasions in 2011.

Leading up to Hurricane Irene, the Town's emergency team held a number of pre-event planning meetings and then activated the EOC on the day of the storm. Greenland was fortunate that very little damage was sustained. The EOC was also activated in the Halloween snow storm when much of the community lost power.

I would like to thank Fire Chief Cresta and Police Chief Maloney for the professionalism shown by their respective departments throughout these emergencies. Also, a job well done for the efforts of the Town Administrator, Selectmen and others of the Emergency Management Team.

As I have said in the past, it is the local community that must be prepared to respond first to take care of its neighbors. We continue to seek individuals to join our emergency management team in protecting our community. Please contact me or leave your name at the Town Office if you are interested .

. Any individual who has a special need, or requires special assistance during an emergency, should contact myself, the Town Clerk, Fire or Police Departments or the NH Office of Emergency Management so that we can have this information on file to help you if the need arises. This information is held in the strictness of confidence in a sealed file.

Respectfully submitted,

Kenneth N. Fernald

Emergency Management Director

HAZARD MITIGATION
TEAM MEETING NOTICE

To all Team members.

Due to the tragic loss of our Police Chief, the meeting scheduled for this month has been canceled. I know we are all grieving and the next few months will be difficult. It will take us some time to get through this.

Ken

4/16/12

HAZARD MITIGATION
TEAM MEETING NOTICE

To all Team members.

It is the consensus of the Team that as our emotions are still high from the events of 4/12/12, and now with the sudden death of the Building Inspector that we forego any more meetings for 2012. We'll pick up again in April 2013.

In the mean time I will continue to work on the draft and cross walk

Ken

7/30/12

~ EMERGENCY MANAGEMENT~

In 2013 we completed the re-write of the Town's Radiological Emergency Response Plan for Seabrook Station. This update was a result of new requirements for the structure of the plan as set forth by FEMA and the Nuclear Regulatory Commission and has been incorporated in to the Town's Local Emergency Operations Plan. The plan was forwarded to NH Homeland Security Emergency Management and has been forwarded to FEMA for final comments.

The Greenland Emergency Management Team held several training sessions to review the new plan and each individual's responsibilities. In 2014 there will be 5 training exercises conducted by NH HSEM, FEMA and the NRC to test the Town's ability to respond to an incident at Seabrook Station.

We also have continued work on the update to the Town's Hazard Mitigation Plan. The completion date was moved out to September 2014 at FEMA's request. It is a requirement of the Federal Emergency Management Agency that every community in the nation have Hazard Mitigation Plan and that it be updated every five years. While other emergency plans are approved at the State level, all Hazard Mitigation Plans must be approved by FEMA. An approved plan is a requirement for the Town to qualify for emergency grant funding. As mentioned in last year's report, the Planning Team will be holding public hearings on the plan later in the summer.

All emergency plans are living documents and as such we continually review them to make sure they reflect the actions needed to protect the citizens of the town in any emergency situation. This year I will be updating the sections of our Local Emergency Operations Plan dealing with the movement and storage of hazardous material within the town.

I would again remind residents that if you have a special need or require special assistance during an emergency, or know of any individual who might require that assistance, to contact me, the Town Clerk, Fire or Police Departments or the NH Office of Emergency Management so that we can have this information on file to help you if the need arises. This information is held in the strictest confidence in a sealed file.

We continue to seek individuals to join our emergency management team in protecting our community. Please contact me or leave your name at the Town Office if you are interested.

I would like to thank the Town Administrator, Selectmen, Fire and Police Chiefs and others of the Emergency Management Team for their efforts in assuring that the Town of Greenland is prepared to deal with emergencies when they occur.

Kenneth N. Fernald
Emergency Management Director
Greenland NH

HAZARD MITIGATION
TEAM MEETING # 6 NOTICE

To all Team Members

The Team will hold a meeting on Wednesday August 27, 2014 to review the final draft of the plan before it is submitted to NH HSEM. This meeting will be open for public comment.

Ken

8/23/14

NAME	MAILING ADDRESS	PHONE #	E-MAIL	AGENCY
Don Miller	511 POST Rd GREENLAND	603 436 9469	donald.Miller4@comcast.NET	EM staff
Vaughan Morgan	16 Holly Ln	603 436 0281	hmzrd@yahoo.com	Selctn
Ken Fernald	19 Sept Drive	603-436-5135	KennethFernald@comcast.net	EMD

XFINITY Connect kennethfernald@comcast.ne

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Greenland Hazard Mitigation Plan

From : kennethfernald@comcast.net Mon, Aug 25, 2014 11:23 AM

Subject : Greenland Hazard Mitigation Plan

To : dcote@northhampton-nh.gov, seachill@fr.cityofportsmouth.com, demanuel@emanuelengineering.com, Kwalsh@town.rye.nh.us, 138@newingtonnhpd.com

Cc : Karen Anderson <kanderson@greenland-nh.com>

Good morning,
This is to advise you as the EMD's of our neighboring communities, that the Greenland Hazard Mitigation Plan has been updated and a public hearing at the Greenland Town Office is scheduled for this Wednesday, evening, 8/27,2014 at 7.00PM. None of our mitigation strategies impact your communities in any way, but I wanted you to be aware that our plan as been updated.
If there are any other members of your community who you feel would be interested in our update, please pass this information on to them. A draft copy of the plan will be posted on our Town website on Tuesday 9/02/2014.
Thanks,
Ken Fernald
Greenland EMD

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