

ANNEX X:
Grafton, VT

Grafton Town-All Hazards Mitigation Plan

INTRODUCTION AND PURPOSE

This appendix, when used with the appropriate sections of the basic plan, is an All-Hazard Mitigation Plan for the town of Grafton. The purpose of this plan is to assist the town of Grafton in identifying all of the hazards facing the town and to identify strategies to begin reducing risks from identified hazards.

Hazard mitigation is any sustained action that reduces or eliminates long-term risk to people and property from natural and human-caused hazards and their effects. Based on the results of previous Project Impact efforts, FEMA and state agencies have come to recognize that it is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck. This plan recognizes that communities have opportunities to identify mitigation strategies and measures during all of the other phases of Emergency Management – preparedness, response and recovery. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where the hazards are most severe and identify local actions that can be taken to reduce the severity of the hazard.

Hazard mitigation strategies and measures alter the hazard by eliminating or reducing the frequency of occurrence, averting the hazard by redirecting the impact by means of a structure or land treatment, adapt to the hazard by modifying structures or standards or avoid the hazard by stopping or limiting development, and could include projects such as:

- Flood-proofing structures
- Tying down propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters
- Identifying and modifying high traffic incident locations and routes
- Ensuring adequate water supply
- Elevating structures or utilities above flood levels
- Trimming trees in electrical and telephone easements
- Identifying and upgrading undersized culverts
- Proactive land use planning for floodplains and other flood-prone areas
- Proper road maintenance and construction
- Ensuring critical facilities are safely located
- Establish and enforce appropriate building codes
- Public information

Local Planning Process

The local planning process followed the steps listed in the Regional All-Hazard Mitigation Plan in Chapter 1. A local Hazard Mitigation Planning Committee was established. A complete list of participants is listed in Annex B Page 3.

The following hazard mitigation planning meetings were held:

- June 16, 2004, July 1, 2004 and November 16, 2004
- November 15, 2007, January 31, 2008

Hazard Mitigation Goals

- Reduce the loss of life and injury resulting from all hazards.
- Reduce the impact of hazards on the town's waterbodies, natural resources, and historic resources.
- Reduce the economic impacts from hazard events.
 - Minimize disruption to the road network and maintain access.

- Mitigate financial losses incurred by municipal, residential, industrial, agricultural and commercial establishments due to disasters.
- Ensure that community infrastructure is not significantly damaged by a hazard event.
- Encourage hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan, Capital Improvement Plan and Rapid Response Plan, and administration of flood hazard area and subdivision regulations.
- Ensure that members of the general public continue to be part of the hazard mitigation planning process.

Acknowledgements

The following people were involved in the hazard mitigation planning process:

- Eric Stevens, Chief, Grafton Fire Department, Grafton Planning Commission, Emergency Management Coordinator
- Jay Karpin, Town Health Officer, Selectboard
- Margaret Armstrong, President, Grafton Fast Squad
- Kent Armstrong, Assistant Chief, Grafton Fire Department, Fire Warden
- Bill Kearns, Grafton Fire Department, Grafton Planning Commission, Grafton Zoning Administrator
- Lisa Mancuso, Town Administrator, 1995-2005
- Robert Crawford, Selectboard – 2004 – 2007
- Anna Vesely, Grafton Selectboard - 2004 to 2007

TOWN PROFILE

Community Background¹

Grafton is located in northern Windham County in the southeast of Vermont, it is bordered by Chester to the North, Windham to the West, Townshend and Athens to the South and Rockingham to the East. The Town of Grafton has a total area of 36 square miles and is still relatively undeveloped, with most of its land in resource-related or low-intensity uses. It has a centrally located historic village surrounded by predominantly rural residential development along winding secondary roads, most of them narrow and unpaved. In addition to the village of Grafton, there are two hamlets; Cambridgeport in the Southeast and Houghtonville in the Northwest. The population of Grafton has grown slowly over the past thirty years. .

A distinctive topographical feature of Grafton is the short steep hillsides giving rise to a large number of streams draining into the Saxtons River. This is best illustrated by the number of bridges. Grafton has a total of 35 bridges, many of which were built in 1939 after the hurricane. Eighteen have a span of 20 feet or more; 17 are less than 20 feet. Of this total eight are on the state system. Under new Federal regulations, any bridge 20 feet or over is eligible for Federal funding assistance. Grafton has one functioning covered bridge, the Kidder Hill Bridge, built in 1870.

The climate is generally temperate with moderately cool summers and cold winters; as in the rest of Vermont. Average annual precipitation is over 40 inches, and snowfall averages 80 inches per year. The weather is unpredictable, and large variations in temperature, precipitation, and other conditions may occur both within and between seasons.

Development Trends²

The 2000 Census records a population of 649, in 454 residential units, and a growth rate of 8 percent between 1990 and 2000. This is lower than the state average increase for the same period (8.2 percent) but higher than the regional population growth rate (5 percent) in the same period. Grafton's population accounts for just over one percent of the region's population.

Current data shows that residential land use is mostly single-family, both permanent and vacation. Commercial and agricultural land is quite limited. Comparable to the agricultural downturn in most southern Vermont hill towns, Grafton's commercial agricultural land use has declined, thus making it very important to keep what agricultural land there is available. Grafton's remaining land is mostly forested or open. Forest-related land use is significant, taking into account non-commercial logging and wildlife habitat. This land is also used for recreation, hunting, fishing, hiking, winter sports, or just for your scenic pleasure.

Currently the only land use regulations in Grafton are in the Flood Damage Prevention Regulations (FDPR), by which the floodplains are managed, and the Subdivision Regulations. The FDPR are new, having been developed to coincide with the new Flood Insurance Rate Maps, which became effect September 28, 2007. The Subdivision Regulations are being currently revised to implement the polices and recommendations of the current and newly revised Town Plan, and thus will more precisely address, among other things, municipal services, fire and flood safety, as well as preservation of agricultural land, much of which is floodplain. There are no

¹ Adapted from Grafton Town Plan, 2001

² U.S. Census 2000; Grafton Town Plan, Draft, 2007

zoning regulations in Grafton. After a study on zoning was done, the residents did not want to pursue them.

Otter Creek Engineering conducted a water and water system feasibility study for the village. The study concluded that, though it is feasible to construct either a municipal water system or waste water disposal system or both, neither project proved to be cost beneficial in light of the current good quality of the water, the lack of septic problems and economical new technologies to replace failed systems, if necessary. Due to the projected cost, there is no demand for developing either municipal water or waste water systems

The village is characterized by several structures with architectural and scenic value, including the Old Tavern, the White Church, the Brick Church, the Kidder Hill covered bridge, and several residential houses. Other more modern or more modest structures in the village conform to orderly, neo-classical design standards. The organization of the village structures was not a result of early town planning but rather the result of the social and economic patterns and necessities of a rural New England farming village. There appears to be little interest among townspeople in the expansion of the village. With the topography and location of the village, expansion would be difficult. There is no development pressure for expansion.

The Route 121 corridor is very important to the town of Grafton as its main access to town running directly through the village from east to west. Currently, this corridor along with Townshend road contains acres of open agricultural soils and meadows, adjacent to three entrances of the village. Keeping these lands open, in agricultural use, unobstructed as floodplain, along with the aesthetics associated with these open spaces is critical to the safety of residents and the continuance of the quality of life that the Town of Grafton offers to its community and visitors alike.

COMMUNITY HAZARD INVENTORY AND VULNERABILITY ASSESSMENT

Methodology

A vulnerability analysis for each community begins with an inventory of possible hazards and an assessment of the risk that they pose. These are the questions to be answered. What hazards can affect your community? How bad can it get? How likely are they to occur? What will be affected by these hazards? How will these hazards affect you? The magnitude (percentage of the community affected) of the impact of the hazard can be classed as follows:

- Negligible: < 10% of properties damaged/Minimal disruption to quality of life.
- Limited: 10% to < 25% of properties damaged/Loss of essential facilities/services for up to 7 days/few (< 1% of population) injuries possible.
- Critical: 25% to 50% of properties damaged/Loss of essential facilities/services for > 7 days < 14 days/Major (< 10% of population) injuries/few deaths possible.
- Catastrophic: > 50% of properties damaged/loss of essential facilities/services for > 14 days/Severe (> 10% of population) injuries/multiple deaths possible.

The frequency of occurrence (Likelihood) is classified as shown:

- Unlikely: < 1% probability in the next 100 years.
- Possible: 1% to 10% probability in the next year, or at least one chance in the next 100 years.
- Likely: 10% to 100% probability in the next year, or at least one chance in the next 10 years.
- Highly Likely: Near 100% probability in the next year.

Additionally, seasonal patterns that may exist are considered, what areas are likely to be affected most, the probable duration of the hazard, the speed of onset (amount of warning time, considered with existing warning systems).

The combination of the impact of the hazard and the frequency was used to determine the community vulnerability as HIGH, MODERATE or LOW. For example, a flood event is highly likely (nearly 100% probability in the next year) in many communities but the degree of impact varies. A highly likely flood with critical or catastrophic impact rates the community vulnerability as HIGH. Another community with a highly likely or likely (at least one chance in the next 10 years) flood with a limited impact would receive a vulnerability rating of MODERATE. The vulnerability of a community having the occurrence of an event as possible or unlikely with limited or negligible impact would be LOW.

Likelihood:

U = unlikely

P = possible

L = likely

HL = highly likely

Impact:

N = negligible

L = limited

CR = critical

CA = catastrophic

Possible Hazard	Likelihood	Impact	Community Vulnerability	Most vulnerable facilities/populations
Tornado	L	M	MOD	
Flood	M	M	MOD.	Structures, roads, bridges
100-year flood	P	CR	MOD.	Structures, roads, bridges
Flash flood	L	CR	HIGH	Structures, roads, bridges, water source contamination
Hazardous materials	M?	L	LOW	Residences, businesses
Radiological Incident	L	N	LOW	Residences, businesses, agricultural producers
Structure Fire	HL	N	LOW	Structures
Power Failure	HL	L	MOD.	Residences
Winter & Ice Storm	HL	L	MOD.	Structures, roads, bridges, residences, businesses
High Wind	HL	L	MOD.	Structures, roads, bridges, residences, businesses
Air crash	P	N	LOW	structures
Water Supply Contamination	U	N	LOW	Wellhead protection areas, residences, businesses
Hurricane	P	L	LOW	Residences, businesses, agricultural producers
Earthquake	U	N	LOW	Residences, businesses, agricultural producers
Dam Failures	U	N	LOW	Structures, roads, bridges, residences, businesses
Drought	U	N	LOW	Private well failures, residences and businesses in wooded areas prone to wildfire
Highway Accidents	L	N	LOW	Winter road conditions
Wildfire	P	CR	HIGH	Structures on wooded sites, village due to absence of buffer area
Landslide	U	N	LOW	Roads, streams
School Safety Issues	P	CR	LOW	School students and faculty
Terrorism	U	N	LOW	School students and faculty

Detailed Hazard Analysis - Highest Hazards

Flash Floods

Floods have been the most common and costly hazard to affect the Town. Flooding can occur anytime of the year as a result of heavy rains, a thunderstorm, tropical storm, hurricane or Nor'easters. It can result from the overflow of major rivers and their smaller tributaries, or inadequate local drainage. Historically, floods have been a factor in over 80 percent of all federally declared disasters. People living in close proximity to bodies of water such as rivers, lakes, and streams are at risk from flooding. There is a 26 percent chance of experiencing a flood during the life of a 30-year mortgage compared to a 4 percent chance of a fire. Grafton is a member of the NFIP and maintains a Flood Hazard Area Bylaw. There are 94 properties either in the Special Flood Hazard Area (SFHA) as indicated by the Digital Flood Insurance Rate Map (DFIRM). Assuming a 10 percent loss of structures in the SFHA in a 1 percent chance flood the total loss would be \$1,476,730 or 1.52% of the grand list value.³

Winter Storms

Winter storms and ice storms can cause power lines to fail, damage trees and impede access to homes and businesses. The Region has experienced 24 snowstorms and ice storms that have resulted in damages of approximately \$3,074,000. On Town Meeting Day in 2001, a region wide snowfall resulted in a presidential declaration for a snow emergency (FEMA-3167-EM). The Town applied for assistance from this declaration.

Wildfire / Structure Fire

Wildfires can spread to residential areas, thus forcing whole communities to evacuate. When fires are followed by heavy rains, the potential for mudslides and flooding is increased. Most of Grafton is heavily forested. Hence, the potential, given the right conditions, for widespread forest fires is great. Downed trees, as result of the 1998 ice storm, greatly increase the potential for a large, devastating forest fire in this area. However, wildfire conditions do not occur frequently due to the relatively high annual precipitation level. Northern New England did experience some large forest fires in the late 1940s. Portions of the Vermont forest are now beyond the natural burn cycle. Communities or residents located in or along the edges of forested areas are particularly at risk. Wildland fires are most likely in the summer and fall months.

The Town has water supplies that meet National Fire Protection Association (NFPA) codes. There are fire hydrants throughout the Village and five (5) dry hydrants in rural areas. (See [Critical Facilities Map](#))

Power Failure

Power failure is a common event in Grafton and can occur anywhere in town. Power failures are typically the result of power lines damaged by high winds or heavy snow/ice storms. Power failures may also result from disruptions in the New England or national power grid, as indicated by the widespread power outages in 2003. Dead or dying trees in close proximity to power lines pose a particular threat for power failure.

For the last four (4) years Central Vermont Public Service has cleared, and continues to clear, the power line easements throughout Grafton to mitigate loss of power.

High Wind

High wind damages roofs, uproots trees, breaks branches from trees and downs power lines in the Town. Between 1993 and 2007, there have been approximately 39 significant windstorms in

³ Derived from 2007 tax assessments, Town of Grafton Listers.

the Windham Region. With an average of 3.5 high wind events each year, it should be expected that windstorms will continue to be a problem in the Region and the Town.

Risk Assessment - *Potential Loss Estimates*

In order to determine potential dollar losses to vulnerable structures due to natural and man-made hazards, each higher-risk hazard type was analyzed below. Human losses are not calculated during this exercise, but could be expected to occur depending on the type and severity of the hazard. Potential loss estimates are based on vulnerability and risk discussions held during Grafton Hazard Mitigation Committee meetings.

Flash floods

Flash floods typically occur in high elevation drainage areas as a result of summer thunderstorm activity. Damage from flash floods is difficult to predict since, flash flood areas are not mapped at this time. Infrastructure and structures along higher elevation streams and drainage areas are most susceptible to damage from flash flooding. Drainage ditches and culverts along Grafton Road are the biggest concern for local flash flooding events.

Wildfires/Structure Fires

Damage from wildfires is difficult to project. Forest fires are more likely during years of drought or during drier seasons (late summer or fall). Fire danger is generally universal and can occur practically at any time. Damage would depend upon the extent of the fire, the number and type of buildings damaged and the contents destroyed within the structures.

Structure fires are highly likely, but are typically not an annual event in Grafton. With an average assessed residential value of \$190,124 in 2007, and assuming one structural fire resulting in the total loss of a structure happens in a typical year, structural fires could result in \$190,124 in damage in an average year.

Winter / Ice Storms

Damage from heavy snow and ice storms can vary depending upon wind speeds, snow or ice accumulation, storm duration, and structural conditions (such heavy snow and ice accumulation on large, flat roofed structures). The assessed value of all residential and commercial property is \$97,153,353. Assuming a range of town-wide damage of 1% to 5%, a heavy snow or ice storm could result in \$971,533 to \$4,857,668 of total damage.

Power Failure

Potential loss estimates are difficult to predict for power failures, which typically are isolated in geographic area and short in duration. Therefore, they often have only minimal impact to people and property. Power failures usually result in minor inconveniences to residents; however, longer duration events might result in the loss of perishable items and business losses. Power outages in winter months could result in the loss of home heating, bursting water pipes and resulting structural water damage.

Existing Hazard Mitigation Programs, Projects and Activities

The following policies, programs and activities related to hazard mitigation are currently in place and/or being implemented in the town of Grafton. The Committee analyzed these programs for their effectiveness and noted improvements needed.

Type of Existing Protection	Description	Effectiveness/Enforcement/Hazard that is addressed	Gaps in Existing Protection/Improvements Needed
Town Master Plan	Plan for coordinated town-wide planning for land use, municipal facilities, etc	Flood Addressed	Town Plan to be updated in 2007, to be adopted in 2008
Emergency Operations Plan	Municipal procedures for emergency response	N/A	See RRP
Town of Grafton Rapid Response Plan (RRP)	Basic municipal procedures for emergency response	RRP NIMS Compliant	Will be augmented
Continuity of Government Plan	Selectboard and elected officials	Continuity of Government in the event of WMD incident	Needs to be updated after Town elections
Continuity of Operations Plan	Selectboard, Town officials	Continuity of Operations in the event of Pandemic flu or similar incident	Needs to be updated after Town elections
School Emergency Response Protocol	School procedures for emergency response	School Crisis Plan	Needs Coordination with Local ES
LEPC 6 Hazardous Materials Plan	Procedures for hazmat emergency response at regional level	LEPC 6 has the plan	Continued involvement with the LEPC 6
Mutual Aid – Emergency Services	Agreement for regional coordinated emergency services	Fire and Rescue MAA Contractor MOUs 2007	None identified
Mutual Aid – Public Works	Agreement for regional coordinated emergency highway maintenance services	Public Works MAA 2007	None identified
Road Standards	Design and Construction standards for roads and drainage systems	VTrans standards Bridge & Culvert Inventory	None identified

Subdivision Regulations	Regulates the division of land, standards for site access and utilities	Needs improvement	PC will review and update in 2008
Sewage Regulations	Regulates on-site sewage systems	Village Tank Pumping Ordinance	None identified
Flood Hazard Area Regulations	Regulates development in FEMA flood hazard areas	FHR adopted 2007	None identified
Site Plan Review	Site development standards	N/A	N/A
National Flood Insurance Program (NFIP)	Provides ability for residents to acquire flood insurance	Compliant	None identified
Maintenance Programs	Bridge & Culvert Inventory	Updated in 2007	None Identified
Building Code	Regulates building construction standards	N/A	N/A
Wetland protection – VT Wetland Rules	Protected by 1990 Vermont Wetland Rules	Protection of environment, water resources, wildlife, biota	None identified
Bio-Hazard Equipment and Supplies	Stockpiling Personal Protective Equipment (PPE) and disinfection supplies	Protection from Bio-Hazard / Infectious Disease and the spread of infection among the population	Public Education

Identified Hazard Mitigation Programs, Projects, and Activities

The Grafton's Emergency Planning Committee, acting as Grafton's Hazard Mitigation Committee identified the following new hazard mitigation activities based on an evaluation of hazard event vulnerability not addressed by existing hazard mitigation initiatives and the feasibility of new activities.

Programs and Policies

- Develop Town Emergency Shelter Implementation Plan.
- Review Town/School agreements on the shelter generator located at the school, and develop a plan for refueling, maintenance and periodic testing of the generator.
- Develop an agreement with the Windham Foundation concerning the shared use of the Foundation's generator in the Homestead building with the Town Hall.
- Develop an emergency response plan which coordinates the School Crisis Plan with the Rapid Response Plan and Shelter plans.
- Public Outreach: Personal responsibility for a) vaccination, infectious disease protection, food and water supplies. b) Emergency preparedness.

Structural

- Annual programs to upgrade drainage ditches and culverts
- Connect the Town Hall power with the Windham Foundation's generator in the Homestead building, or, in the alternative, install Town Hall generator.

Training

- ES Personnel are well-trained at present time – Strive to maintain this same level of competency into the future. Town should continue to pay for transportation and tuition costs for staff training activities.
- Offer ICS/NIMS training to all town and emergency services personnel.

Engineering Projects

- Encourage FEMA, and or VTrans, to perform hydraulic and hydrology studies on bridges and culverts repaired, rebuilt or replaced from the date of the 1996 flood incident to date.
- Maintain town wide culvert and bridge inventory up-to-date.
- Fluvial Erosion Hazard mapping in the Grafton Watersheds.
- On-going dry-hydrant installation.
- On-going: stone-line ditches.

Equipment Purchase

- Purchase a mobile generator.
- Continue to replace equipment on a rotating basis through the Capital Budget in order to ensure the town has sufficient equipment for emergency response.
- Stockpile PPE for Bio-Hazard and infectious disease mitigation.

Implementation Schedule for Prioritized Mitigation Projects⁴

The following implementation schedule was developed by the Grafton Hazard Mitigation Committee. Mitigation actions are listed in priority order, with the most critical needs listed at the top of the list. The following criteria were used in establishing project priorities. Each criterion was rated according to a numeric scale, with each score indicating the potential benefits of each project:

“0”	Not Applicable
“1”	Poor
“2”	Average
“3”	Good

- Does the action reduce damage?
- Does the action contribute to community objectives?
- Does the action meet existing regulations?
- Does the action protect historic structures or structures critical to town operations?
- Can the action be implemented quickly?
- Is the action socially acceptable?
- Is the action technically feasible?
- Is the action administratively possible?
- Is the action politically acceptable?
- Is the action legal?
- Does the action offer reasonable benefits compared to its cost of implementation?
- Is the action environmentally sound?

The ranking of these criteria is largely based on the best available information and best judgment as many projects are not fully scoped out at this time. The actions are listed in the table below in order of how they scored based upon this ranking system (36 is the highest possible score). The full scoring matrix used is located at the end of this annex.

⁴ Adapted from Rutland Regional Pre-Disaster Mitigation Plan

MITIGATION ACTION	WHO (LEADERSHIP)	WHEN (DEADLINE)	HOW (FUNDING SOURCE)	Project Priority (Potential Benefit Score)
Replacement of Emergency Response Equipment through Capital Budget Planning	Capital Budget Committee, Fire and Fast Squads, Emergency Planning Committee	Continuing	Fire and Fast Squad fundraisers, and General Fund assistance	36
Fluvial Erosion Mapping	WRC, Grafton Planning Commission	June 2009	Grant	35
Stockpile PPE for Bio-Hazard and Infectious Disease (Pandemic Flu) mitigation	Selectboard, Fire and Fast Squad	Continuing	Fundraisers, Grants, General Fund	33
Develop Agreement with Windham Foundation for connection of Town Hall shelter and EOC with Homestead Generator, or Purchase and install Town Hall Generator	Emergency Planning Committee and Selectboard	This Year	Grant Funding	30
Annual culvert program based on inventory	Selectboard	1 or 2 per year	General fund	30
Stone line drainage ditches	Selectboard	Each year	General fund	30

Install dry hydrant	Fire Department	On-going	Grant Funding	30
Review and firm up Shelter Generator Maintenance Agreements for School Shelter	Emergency Planning Committee and Selectboard	This year	N/A	30
Hydraulic and Hydrology studies for culverts replaced with FEMA disaster Funds	Highway Dept and Emergency Planning committee	Continuing	VTrans engineering services	30
Purchase Mobile Generator	Selectboard	June 2009	General Fund to assist with costs	29
School Crisis Plan coordinated with Fire and Fast Squads Emergency Operations Plans	School leadership and Fire and Fast Squads, with Emergency planning committee	June 2009	EMPG planning grant with consultant	28
Emergency Services Personnel training	Fire and Fast Squad	Continuing	General fund to assist with costs	28
NIMS compliance and NIMS/ICS Training	Selectboard and Fire and Fast Squad	Continuing	N/A	28
Town Emergency Shelter Implementation Plan	Emergency Planning Committee	June 2009	EMPG planning grant with consultant	28