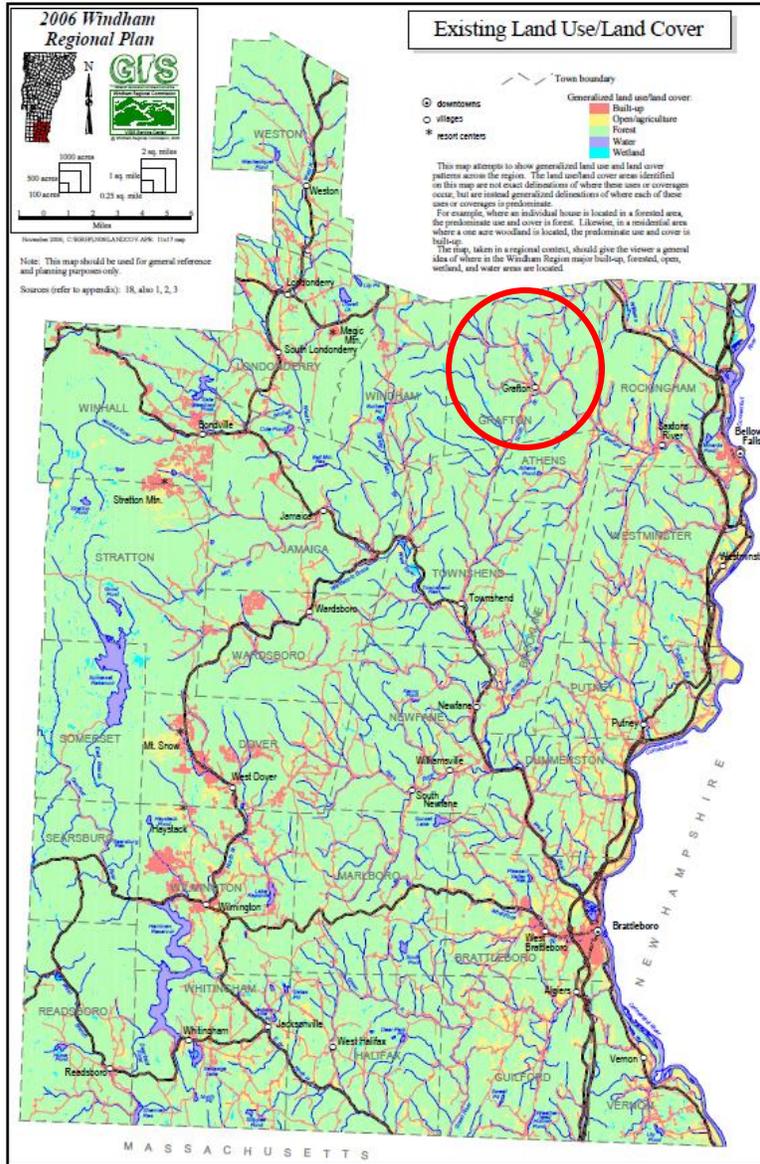


Single Jurisdiction Hazard Mitigation Plan Town of Grafton, Vermont



Prepared for:
Town of Grafton, VT
Main Street, Grafton, VT 05146
Windham County

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Adopted July 7, 2014

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INTRODUCTION AND PURPOSE

This Single Jurisdiction Hazard Mitigation Plan for the Town of Grafton is an update to the original Grafton Annex to the Windham Regional Multi-Jurisdictional Hazard Mitigation Plan that expired on December 5, 2012.

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
- 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

WINDHAM REGION GEOGRAPHY

The Region includes the towns of Athens, Brattleboro, Brookline, Dover, Dummerston, Grafton, Guilford, Halifax, Jamaica, Londonderry, Marlboro, Newfane, Putney, Rockingham, Stratton, Townshend, Vernon, Wardsboro, Westminster, Whitingham, Wilmington, and Windham in Windham County; the neighboring towns of Readsboro, Searsburg, and Winhall are in Bennington County; and Weston is in Windsor County. Situated in Vermont's southeastern corner, the Region is bordered by Bennington and Windsor Counties to the west and north, Massachusetts to the south and New Hampshire to the east. The Region's area is nearly 600,000 acres, or over 900 square miles.

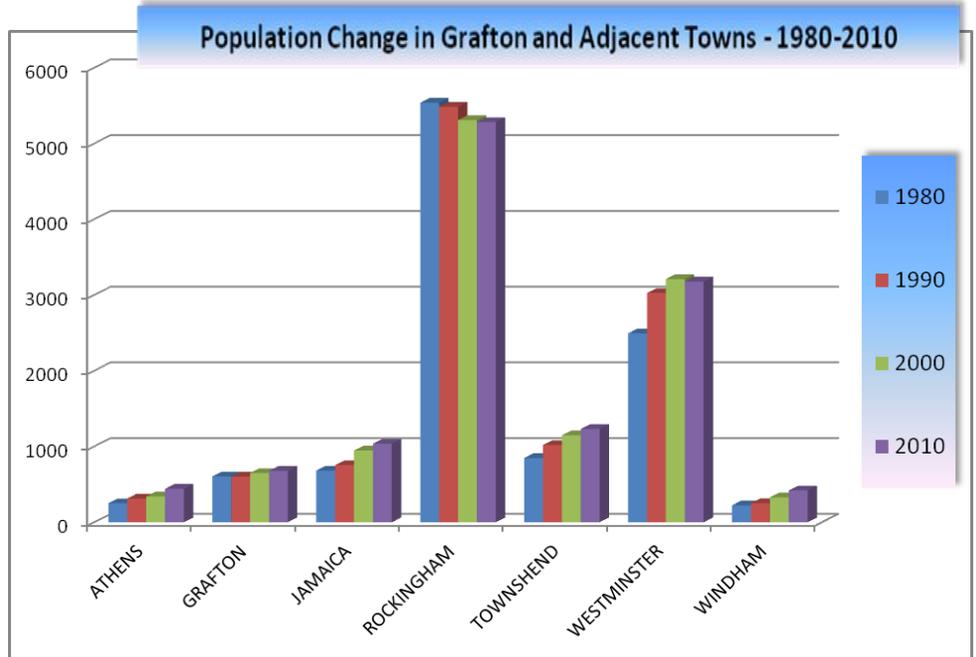
The topography is generally hilly, with steep slopes on the river valleys on the east slopes on the Green Mountains. The Connecticut River Valley contains areas of relatively flat and gently rolling land. The Green Mountains form the western edge of the region with a landscape of ridges and mountain peaks with narrow stream valleys. Stratton Mountain is the highest point in the region at 3,936 feet. The lowest point is along the Connecticut River in Vernon at 200 feet.

In addition to the Connecticut, other major rivers of the region are the Deerfield, Green, North, Saxtons, West, and Williams, all tributaries of the Connecticut. There are two major flood control reservoirs on the West River, Ball Mountain and Townshend, and two major storage reservoirs for hydropower generation on the Deerfield River, Somerset and Harriman.

GRAFTON GEOGRAPHY & TOWN PROFILE

Grafton is located in northern Windham County in the southeast corner 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 forty 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. Grafton has one functioning covered bridge, the Kidder Hill Bridge, built in 1870.

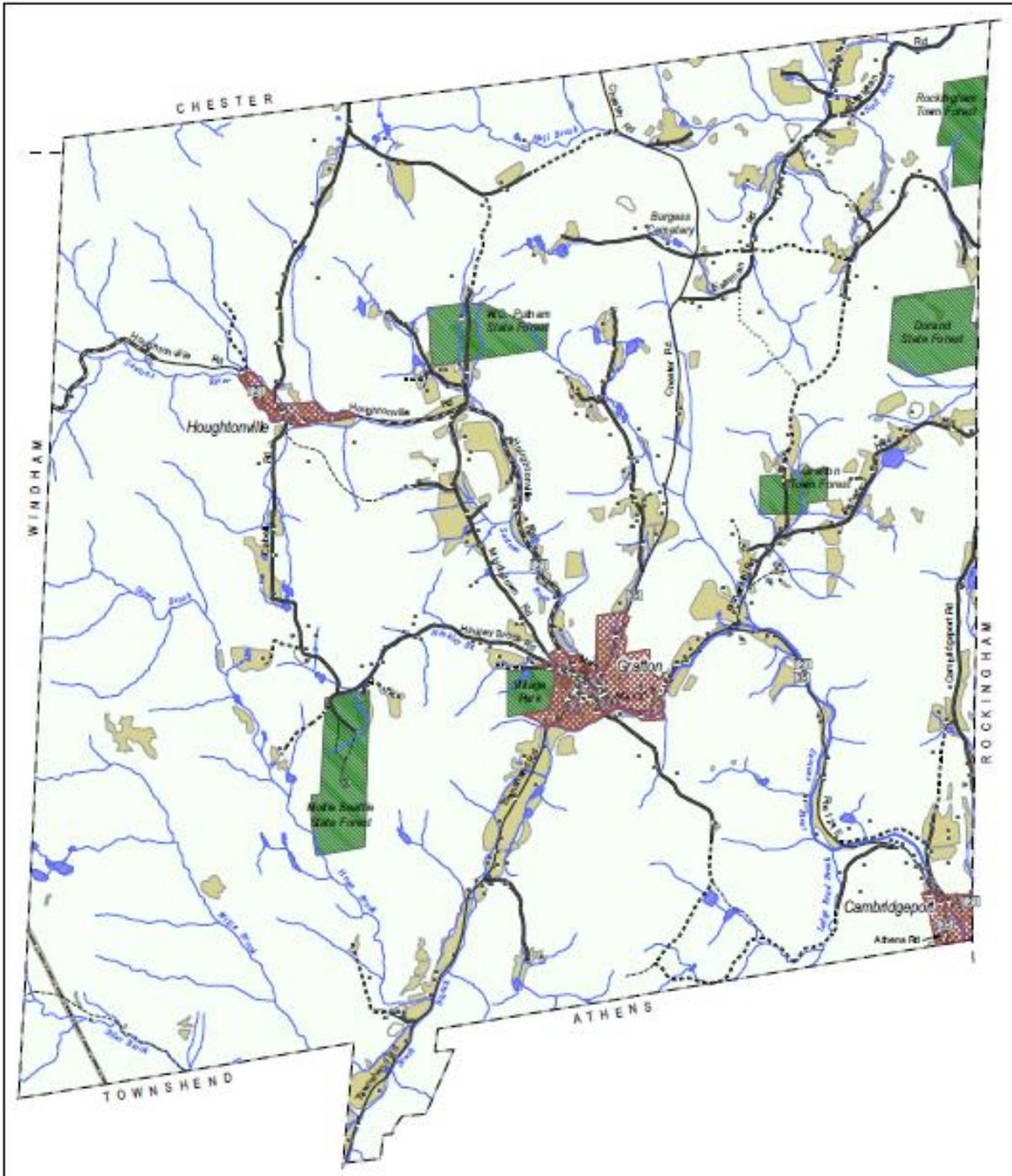


The Town rebuilt two new bridges that had been either destroyed or undermined by TS Irene in August 2011. The Town also replaced four major

Town	1980	1990	2000	2010	% Change 1980-1990	% Change 1990-2000	% Change 2000-2010	Ave % Change 1980-2010
ATHENS	250	313	340	442	25.20%	8.63%	30.00%	21.28%
GRAFTON	604	602	649	679	-0.33%	7.81%	4.62%	4.03%
JAMAICA	681	754	946	1,035	10.72%	25.46%	9.41%	15.20%
ROCKINGHAM	5538	5484	5309	5,282	-0.98%	-3.19%	-0.51%	-1.56%
TOWNSHEND	849	1019	1149	1,232	20.02%	12.76%	7.22%	13.33%
WESTMINSTER	2493	3026	3210	3,178	21.38%	6.08%	-1.00%	8.82%
WINDHAM	223	251	328	419	12.56%	30.68%	27.74%	23.66%

culverts that had been destroyed by TS Irene, in addition to the need to upgrade/upsized multiple culverts. Therefore, the resistance to flooding has now been significantly minimized compared to before TS Irene.

The climate in Grafton is generally temperate with moderately cool summers and cold winters; as is 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.



Existing Land Use Town of Grafton, Vt.

July 2008

1:42,000

**WINDHAM
REGIONAL
COMMISSION**
PLANNING, ADMINISTRATION, POLICY AND
PUBLIC RELATIONS

Legend

- Structures
- ▨ Village
- ▨ State forest, town forest, town park
- ▨ Forested area
- ▨ Open land, fields
- Stream
- ▨ Pond or river
- ▨ paved roads
- ▨ unpaved roads

Data source:

- Village boundaries were determined by the Grafton Planning Commission. Boundary data was developed by WRC GIS staff using existing road, surface water, and parcel data.
- Forested and open area was digitized by WRC GIS staff from 1989 1:5000 Vermont orthophotos.
- State and town forest lands were derived from VGRS 1:5000 DNRGIS coverage.
- Building locations were captured using Global Positioning System technology by GIS staff, including VT GIS staff, released 9-1-1 program. These data have been geotagged by Grafton's 99-1-1 coordinates. The positions of some buildings have been corrected by WRC GIS staff.

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PREREQUISITES

Adoption by the Local Governing Body

Certificate of Adoption
Town of Grafton, VT
Board of Selectmen

A Resolution Adopting the Single Jurisdiction Hazard Mitigation Plan, for the Town of Grafton, VT

WHEREAS, the Town of Grafton, VT has worked with the Windham Regional Commission to identify natural hazards, analyze past and potential future damages due to natural disasters, and identify strategies for mitigating future damages; and

WHEREAS, The Town of Grafton, VT Hazard Mitigation Plan analyzes natural hazards and assesses risks within the community; and

WHEREAS, the Town of Grafton, VT Hazard Mitigation Plan recommends the implementation of action(s) specific to the community to mitigate against damage from natural hazard events; and

NOW, THEREFORE BE IT RESOLVED that the Town of Grafton, VT adopts the Hazard Mitigation Plan for the Town of Grafton, VT.

Duly adopted this 7th day of July 2014.

date month, year

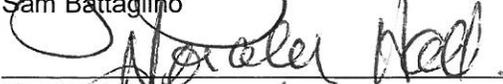
Board of Selectmen:



Skip Lisle, Chair



Sam Battaglino



Noralee Hall



Peter Jeziorski



Gus Plummer

ATTEST



Kim Record, Town Clerk

PLANNING PROCESS

Documentation of the Planning Process 2011-2013

A local stakeholder group met on February 28, 2013 to record the planning process that has been ongoing for the past two years to update the Hazard Mitigation Plan to a Single Jurisdiction Plan. Discussions included the numerous site visits by VT DEC Agency of Natural Resources (ANR), NRCS, VTrans, VT Fish & Wildlife and the USACE. In the wake of TS Irene, staff from all of the above mentioned agencies visited Grafton to talk to Emergency Managers, Road Crew, and Town Officials about future planning in the floodplain, and ways to resolve current issues as a result of the fluvial erosion flooding from TS Irene. ANR came to help the Town determine what to do with the debris and to issue permits for doing work in the streams. The Corps was on site to help them with work in wetlands and floodplain permitting issues. Corps permits were issued and work done in compliance with the permits. NRCS made site visits to look at 7-8 “cliffhanger” properties/emergency watershed protection sites. Three of the sites, two at the Main Street bridge and one below the Highway Garage, were identified where structures were threatened by further potential erosion. NRCS designed remediation strategies and funded the remediation work at those sites. VTrans worked with the Town on the need for hydraulic and hydrological studies for 8-10 bridges needing replacement or repair. Those studies were used in the design and construction of new structures. VT Fish & Wildlife were on the scene to discuss planning for ongoing recovery work in the streams.

In the wake of the TS Irene recovery the response team (see list in table below) and those actively involved in the recovery met and discussed and documented areas we did well, and areas of improvement and drafted an After Action Report, which is complete but not yet finalized, and documented our needs for FEMA paperwork for PA.

On February 28, there was also a long discussion with the stakeholder group about areas in Town that need mitigation within the next 1-3 years. Those areas were Eastman Road, Fisher Hill Road and Hinkley Brook Road, listed in mitigation strategies below.

Town residents who have taken part in the planning process for developing the Single Jurisdiction Hazard Mitigation Plan for Grafton tend to be affiliated with more than one association for the town. In rural areas of Vermont, it is typical that people who are most interested in the safety, health and welfare of their community will preside on more than one Board, in addition to possibly being a Town Official, or being the Fire Chief, or a school teacher, or a small business owner. Therefore, although the meeting may not have as many people in attendance as in a more populated community, those present at the meeting are representing a variety of roles.

The following people are the Stakeholder Group for the Town of Grafton to update the plan to a Single Jurisdiction Hazard Mitigation Plan.

Committee Member	Affiliations	Home
Bill Kearns	Selectboard (2012-2014), Emergency Mgmt. Director for Grafton (2007-2014), Admin. Officer for Grafton & Springfield VT (2007-2014)	Grafton
Eric Stevens	Chair-Grafton Planning Commission, Chief-Grafton Fire Department, Grafton Emergency Mgmt. Coordinator	Grafton
Alan Sands	Deputy Emergency Coordinator (2011-2014), Extensive NIMS training and emergency response experience	Grafton

Danny Taylor	Grafton Highway Foreman	Athens
Emergency Planner	Windham Regional Commission Emergency Planner	Brattleboro

Meetings held for writing the original Annex 2004-2008

See *Appendix A* for sign in sheets.

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

The list of people below were involved in the hazard mitigation planning process in 2004-2008:

- 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, Emergency Management Director.
- Lisa Mancuso, Town Administrator, 1995-2005
- Robert Crawford, Selectboard – 2004 – 2007
- Anna Vesely, Grafton Selectboard - 2004 to 2007

Public Participation 2011-2013

Making the Grafton Single Jurisdiction Hazard Mitigation Plan available for public comment includes the following efforts:

- Announcement in the *Grafton News*, providing information where to find the Draft plan online.
- Posted on the Windham Regional Commission website: <http://windhamregional.org/all-hazard>
- Flyers were placed on chairs at the 2013 Town Meeting to advertise the plan and ask for public comment. (See Appendix B)
- A link provided on Grafton's Facebook page.

Planning Process with Neighboring Towns 2011-2013

On the evening of January 15, 2013, representatives from eleven towns in the Windham Region came together to talk about proactive planning mechanisms they should consider to become better informed and more collaborative about making infrastructure and land use decisions as they relate to hazard mitigation planning. The following towns were represented:

Westminster – County Sherriff
 Londonderry – Emergency Mgmt. Director (EMD), Selectboard member, Town Administrator
 Windham – EMD
 Marlboro – EMD
 Jamaica – EMD, Selectboard member
 Townshend – EMD, Environmental Consultant, CERT/RACES
 Guilford – EMD, Selectboard Chair, Road Foreman

Grafton – EMD
 Vernon – County Fire Fighter
 Newfane – EMD
 Brattleboro -- Brattleboro Retreat

The invitation for the meeting went out to all members of the LEPC 6 (Local Emergency Planning Committee), to all Town Clerks and Town Managers, and all EMDs in the Windham region. The email asked that they bring anyone from their respective towns to participate.

The first part of the meeting entailed looking at a series of maps of the region. There were two very large maps displayed of the entire region, showing hydrology, relief, development patterns, public land, conservation land, wetlands, resort centers, villages and hamlets, and all classes of roads.

Several other smaller theme maps of the region were displayed showing; utilities, broadband and cell coverage, government facilities, watersheds, and health and social services facilities. Participants were asked to use sticky notes to write down problem areas and post them on those locations on the maps. Most of the problems identified were local, smaller, but reoccurring problem areas. The map exercise was followed by a group discussion with WRC staff prompting the group with questions. Main points that came out of the discussion are as follows:

- 1) An exchange of contact information between towns is critical so they are proactively prepared by having those phone numbers in an easily retrievable place.
- 2) An inventory of resources available by adjacent towns would be very useful. Sometimes towns reach out further than they need to when it might be next door. Knowledge of smaller companies that can help towns; such as, environmental firms, contractors, etc.
- 3) Communication from upstream towns to downstream towns about debris in streams that pose a problem during the next hard rain. A debris pile in their town may cause ponding, and once it releases could potentially wreak havoc on roads, culverts and/or bridges in downstream towns.
- 4) Contact list of who to call regarding hazardous debris in streams.
- 5) Coordinating future road construction projects so there is always a through path from town to town.
- 6) MOU's regarding emergency shelter space – if one town cannot provide enough space, adjacent towns can take in folks as overflow.
- 7) Mapping of tanks for *regulated* substances that are on personal property. Many towns do not have a clear understanding of where propane tanks are located in relationship to water ways - and could potentially pose a problem during flash flood events.
- 8) Working with towns in adjacent counties, Regional Planning Commissions and/or bordering states.

There was discussion about the major intersection in Townshend, VT, of Rt. 30 and Rt. 35. If a major hazard spill shut down that intersection – the area would be evacuated and it would result in a cut off of access to and from seven surrounding towns.

There were EMDs and Selectboard officials in adjacent towns who met for the first time. As they were departing, several people stated they felt the meeting was very important, and did not really realize the positive impact they would have by having a cross-town discussion about proactive planning for hazard events. See *Appendix C*, for documentation from the evening meeting.



The following communities were invited via email attachment to review and make comment to the draft Single Jurisdiction Hazard Mitigation Plan for the Town of Grafton:

- Town of Rockingham
- Town of Windham
- Town of Townshend
- Town of Chester
- Town of Athens

Grafton also has established Municipal Mutual Aid Agreements for radio communication channel sharing with public works in Townshend, Windham and Chester.

RISK ASSESSMENT

The risk assessment portion of a Hazard Mitigation Plan contributes to the decision-making process for allocating available resources to mitigation projects. 44 CFR Part 201.6(c)(2) of FEMA's mitigation planning regulations requires local municipalities to provide sufficient hazard and risk information from which to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

Identifying and Profiling Hazards – The community has identified and focused mitigation action items on the following hazards; Flood, Winter Storm/Ice Storm, High Wind events, and Structure Fires / Wildfires. Earthquake, Landslide, Avalanche and Extreme Heat, Drought, and Tornado/Microburst, are profiled in the State All Hazard Mitigation Plan, which applies to the Town of Grafton. This local plan will only profile and analyze natural hazards that have been deemed as having a “highly likely” impact on the Town of Grafton.

In the “Assessing Vulnerability: Overview” section beginning on page 16, a “Highly Likely” occurrence is one that has a 100% probability of occurring every year. The methodology is fully explained in that section.

The following hazards include a narrative explaining Location/Geographic Area and Extent (magnitude or severity), Probability, and discussion of Past Occurrences of all natural hazards that affect the planning area.

REGIONAL FLOODING

Aug. 28, 2011 – The Federally Declared Disaster, Tropical Storm Irene, tracked northeast across eastern New York and western New England during Sunday, August 28th, producing widespread flooding, and damaging winds across the region. The greatest impact from Irene across southern Vermont was due to heavy to extreme rainfall, which resulted in catastrophic flooding. Rainfall amounts generally averaged 4 to 8 inches. Much of the rain which fell occurred within a 12 hour period, beginning early Sunday morning, and ending Sunday evening. Route 9, the main route across southern Vermont was closed. Numerous evacuations were reported.

During 1978, flooding occurred throughout New England causing millions of dollars in damage. In 1996, flooding ravaged communities in northern New England resulting in significant damage and a Presidential Declaration of Emergency.

The Vermont Flood of 1927 was the deadliest natural disaster in the history of the State; eighty-four people were killed with over \$28 million in property damage. The Spring Floods of 1936, which had an effect on all of New England, caused \$113 million in damage, killed 24 people and made 77,000 people homeless. During this flood alone, the main street of Hooksett, New Hampshire was 18 to 20 feet underwater.

LOCAL FLOODING

Description and Geographic Area of Hazard

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.

Location

Houses and structures: a.) on Main St. upstream from the Main St. Bridge, b.) on Kidder Hill Street downstream from the Main St. Bridge for approximately 100 yards, c.) on Townshend Road at the culverts for Howe Brook, Willie Brook and Stiles Brook, and at the foot of Turner Hill Road, d.) on Hinkley Brook Road at and below 300 Hinkley Brook Road, e.) on Middletown Road from Hinkley Brook Road northerly for 50 yards, e.) on Parker Hill Road for 150 yards upstream of the Cambridgeport Bridge, f.) on Fisher Hill Road from Bell Road to VT Route 121 East, g.) on Eastman Road from approximately ¼ mile easterly of VT Route 35 for the next ½ mile, h.) on VT Route 121 East 50 yards upstream of the Howland Mill bridge and at the first culvert easterly of the Grafton Fire Station, and i.) on Route 121 West in the Village of Houghtonville for 100 yards on either side of the Cabell Road Bridge.

Extent

Were TS Irene flood heights worst case? Had FEMA Mitigation published the determined event incidence (e.g. 100-year flood, or 20-year flood) it would have been helpful for this determination and future planning. However numerous requests for such determination sent to Mitigation in the JFO post TS Irene went unanswered. TS Irene's flood heights equaled any past flood in the memory of those now living. At the sites mentioned above on Main St., Kidder Hill, VT Route 121 East easterly of the Fire Department, Parker Hill Road, and the Base of Turner Hill Road on Townshend Road water did enter structures in and out of the SFHA, and took the house upstream of the Howland Mill bridge, and swept away a garage upstream of the culvert easterly of the Fire House. On the other hand, residences on VT Route 121 West outside the village, below the Grapes' apple orchards and near the pig farm, which the flood maps depict as lying within the floodway were not touched by TS Irene floodwaters. Conclusion, the SFHA must be managed carefully and respected, but the SFHA is not a predictor of flood damage. In Grafton floods do damage as "flash floods" that cannot be contained by culverts and bridges, causing streams to come out of their beds and destroy roads, and occasionally houses and other structures. That is what destroyed so much infrastructure during TS Irene.

The Tropical Storm Irene event in August 2011 was an example of the most damaging flood event that has happened in Grafton in a few decades. The total damage was \$5.1 M. All connecting roads into Grafton were cut off.

Probability

According to the town emergency committee, floods are deemed Highly Likely to occur in Grafton.

Past Occurrences

Problem areas vulnerable to reoccurring minor flooding during a hard rain include Kidder Hill Road, Parker Hill Road, Hinkley Brook Road, Fisher Hill Road, Bell Road, Eastman Road, Townshend Road and Route 121 West in Houghtonville.

Aug. 28, 2011 – The Federally Declared Disaster, DR 4022 VT, Tropical Storm Irene, tracked northeast across eastern New York and western New England during Sunday, August 28th, producing widespread flooding, and damaging winds across the region. Grafton experienced constant rain fall from this storm event that caused severe flooding. Forty-five out of fifty-five miles of road were out of service and sections were either damaged or destroyed. The Town received \$3.5 M from FEMA PA, and \$1.5 M from the Federal Aid Highways. All connecting roads into Grafton were cut off. Route 121 both east and west was impassable in spots or completely gone. Several culverts in Grafton, south toward Townshend, and toward the north to Chester, were blown out.



Photos from TS Irene in Grafton, August 28, 2011



April, 2007 - A flooding event occurred which was associated with flash floods and inundation flooding over a period of several days in the spring (April 15-21). Rain and snow caused damage to roads and utility lines across Windham County and Grafton. Across the State nearly 3.6 million dollars was obligated as part of the FEMA Public

Assistance Program.

August 2004 - A severe period of flooding and thunderstorms, which lasted from the period of August 12- September 12 engendered Presidential Disaster Declaration DR – 1559.

August, 2003 - Nearly constant rain and thunderstorms affected Grafton from the period of July 21 through August 18. FEMA Declaration DR – 1488 was associated with this event.

1996 Floods – Flash flooding occurred. The debris from the erosion went straight through a house in the Village.

1976 Flood – Major flood event.

1973 Flood – Major flood event.

Sept. 21, 1938 - Hurricane Igor hit our region, paralyzing it for weeks. As it was coming, packing winds over 100 miles an hour, authorities were unaware of the magnitude so no evacuation

procedures were instituted and very few precautions were taken. As a result over 600 people lost their lives and tens of thousands were left homeless. Wind, rain and flash flooding wiped out trees, church steeples and buildings.

November 3, 1927 - After a wet October rivers were swollen and the ground was saturated. Nine inches of rain fell in a thirty-six hour period and horrendous flooding began. Though all of New England was affected, Vermont was devastated. The state flooded from Newport to Bennington, with the Winooski River Valley the hardest hit. Eighty-five people died and 9,000 were left homeless. Many of Vermont's roads and over 1,200 bridges were washed away. The great Flood of 1927 would change Vermont forever as communities turned to the state, and the state turned to the federal government for assistance.

Sources used

Local town knowledge and records.

FEMA website for past Presidential Declarations

<http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~ShowEvent~307631>

REGIONAL SEVERE WINTER STORM

The Region has a long history of severe winter storms and blizzards and usually experiences at least one or two Nor'easters each year with varying degrees of severity. There have been 114 winter storms in the Region since March 1960. A typical event begins as a low-pressure system that moves up the Atlantic Coast, into the Canadian Maritimes, dumping heavy snow across parts of Vermont. Snowfall accumulations are generally three to six inches in the valleys and 6 to 12 inches in the mountains. On Town Meeting Day in 2001, a region wide snowfall resulted in a presidential declaration for a snow emergency (FEMA-3167-EM). The Town of Grafton applied for assistance from this declaration.

LOCAL SEVERE WINTER STORM / ICE STORM

Description and Geographic Area of Hazard

Winter storms and ice storms can cause power lines to fail damage trees and impede access to homes and businesses. Damage from heavy snow and ice storms can vary depending upon wind speeds, snow or ice accumulation, storm duration, and structural conditions (such as heavy snow and ice accumulation on large, flat roofed structures).

- **Power Failure**

Power failure is a common condition associated to high winds or winter storm/ice storm and can occur anywhere in town. 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.

Location

A severe winter storm / ice storm could occur anywhere within the Town of Grafton. That said, since elevation is critical for temperature, severe winter / ice storms have a slightly higher degree of probability in the areas of Grafton above 1500 feet in elevation. Except for the westerly and northwesterly areas of Grafton (Cabell Road, Old Stagecoach Road, Hall Ranch Road) there are few residents living at or above 1500 feet in elevation.

Extent

An anticipated extent of winter snowfall can be as high as the winter of 2010-2011 which had record snowfall of 124.3 inches for the season. The severity or magnitude of winter storm to occur in southeast Vermont can range from moderate to very severe. The southeastern region of VT typically receives over 60 inches of snowfall per year, and most Vermonters are prepared to handle large amounts of snowfall. But in the season of 2010-2011, the problem arose with

finding locations to deposit huge quantities of snow during the season because there wasn't the typical mid-season melt off. Snow amounts are not necessarily a problem for Vermonters, but heavy, wet snow, or the event of rain on snow or frozen ground, are usually very problematic.

Probability

The town hazard emergency committee has stated that winter storm/ice storm is Highly Likely to occur in Grafton every winter.

Past Occurrences

A reoccurring threat from winter storms and cold temperatures is the formation of ice jams on the Saxton River upstream from the Kidder Hill Covered Bridge. The ice jams typically come extremely close to the bridge threatening destruction.

Feb. 25, 2011 - A storm system produced a widespread swath of heavy wet snow across southern Vermont during the day Friday. Snowfall rates of 1 to 2 inches per hour occurred, beginning during the early morning hours, and persisting until late afternoon. Snowfall amounts of 12 to 17 inches occurred across much of southern Vermont. The heavy wet snow created treacherous travel conditions for both the morning and evening commutes on Friday, and also led to numerous school and business closings.

Jan. 19, 2011 - Snow and sleet accumulations across southern Vermont varied from 3 to 9 inches, with ice accumulations of up to a half of an inch.

Jan. 12, 2011 - Heavy snow fell across southern Vermont with snowfall accumulations ranging from 14 inches up to 3 feet. A mesoscale snowband set up across the western New England, including southern Vermont, Wednesday morning resulting in snowfall rates of 3 to 6 inches an hour.

November 22, 1997 - A low pressure system south of Long Island on November 22, 1997 produced heavy wet snow across southern Vermont. Snowfall averaged 4 to 8 inches in Bennington and Windham Counties. The heavy wet snow downed trees and power lines, which produced scattered power outages. The power outages were most widespread in Windham County.

1998 – There was a threatening ice storm in the higher elevations (1,500-1,900 feet) of the region.

Nov. 26, 1996 - On November 26, a low pressure system brought a combination of snow and freezing rain to southern Vermont. Over Bennington and Windham Counties, snow and heavy freezing rain downed trees and power lines and caused numerous accidents. Across southern Vermont approximately 10,000 customers lost power.

Jan. 2, 1996 - A major winter storm developed over the Gulf coast states on January 2nd and tracked northeast along the eastern seaboard during January 3rd. Heavy snow fell across southern Vermont with the average snowfall ranging from 10 to 12 inches.

Sources used

www.usatoday.com/weather/storms/winter/2011-03-08-vermont-snow-reocrds

<http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~ShowEvent~307631>

Local knowledge and town records

REGIONAL HIGH WIND / TROPICAL STORM / HURRICANE

Windstorms are high-wind events that are sufficient enough to cause damage to property and can occur at anytime during a year. These include high winds in conjunction with a thunderstorm and high winds that sweep through the Region after the passage of a weather

front. During the past forty-six (46) years, the Region has had seventy (70) windstorms that have caused significant damages.

LOCAL HIGH WIND / TROPICAL STORM / HURRICANE

Description and Geographic Area of Hazard

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 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.

Location

All areas of Grafton are equally, potentially vulnerable to high wind, tropical storm, and hurricane events.

Extent

Based on past occurrences the Town of Grafton may anticipate winds in excess of 50 mph to affect the region due to low pressure systems coming out of the Canadian zone, or high pressures coming off the Gulf Coast. Extent/magnitudes of Hurricanes and Tropical Storms are ranked using the Saffir-Simpson Scale in the Western Hemisphere, as follows: CAT1=74-95 mph winds, CAT2=96-110 mph winds, CAT3=111-129 mph winds, CAT4=130-156 mph winds, Tropical Storm=39-73 mph winds, Tropical Depression=0-38 mph winds.

Probability

The town hazard emergency committee has stated that high winds are Highly Likely to occur in Grafton based on past occurrences.

Past Occurrences

After a long rain, or during spring thaw, the soaked ground allows trees to easily topple if high winds come through – anywhere in town.

Aug. 28, 2011 - Tropical Storm Irene tracked north northeast across eastern New York and western New England during Sunday, August 28th, producing widespread flooding, and damaging winds across the region. Strong winds occurred across southern Vermont, with frequent wind gusts of approximately 30 mph in Grafton. The strongest winds occurred from the north to northeast during the morning hours, then from the west to northwest during Sunday evening. The combination of strong winds, and extremely saturated soil led to numerous downed trees and power lines across the region. This also resulted in widespread long duration power outages.

Mar. 10, 2002 - The pressure gradient between deep low pressure over Ontario, and high pressure off the southeast coast, produced a strong southerly flow across southern Vermont on the evening of March 9. Then, a strong cold front moved across the region shortly after midnight, early on March 10th. A line of showers and embedded thunderstorms accompanied the front. Strong winds ahead of and along the front produced some damage across Windham County. Law enforcement personnel reported a large number of trees and power lines down throughout the county.

Nov. 27, 1997 - The passage of a cold front produced strong winds across southern Vermont during the early morning hours of November 27. Winds gusting to 40-50 miles an hour downed trees and power lines in Bennington and Windham Counties. Approximately 1,500 customers lost power for a six to eight hour period.

Jan 19, 1996 - An intense area of low pressure located over the Mid-Atlantic Region on Friday morning January 19th produced damaging winds across southern Vermont. This storm was associated with a strong southerly flow which resulted in scattered reports of downed trees, limbs and power lines.

Feb. 24, 1996 - A rapidly deepening low pressure system moved from southern New Jersey northeast to northern Maine by the morning of February 25. This system brought damaging winds to southern Vermont including Bennington and Windham counties, which downed many trees across the area and produced scattered power outages.

Jul 20, 1996 - An unusually intense low pressure system tracked across the northern Great Lakes to Quebec, Canada during July 19 and 20. The system generated strong northwest winds, which downed trees and power lines over parts of Windham County in southern Vermont.

July 1995 - High wind-shear occurred in town, which resulted in numerous road obstructions, tree destruction, and damage to town highway #2.

Sept. 21, 1938 - A hurricane Igor hit the region of Southeast Vermont to include the Town of Grafton, paralyzing it for weeks. As it was coming, packing winds over 100 miles an hour, authorities were unaware of the magnitude so no evacuation procedures were instituted and very few precautions were taken. As a result over 600 people lost their lives and tens of thousands were left homeless. Wind, rain and flash flooding wiped out trees, church steeples and buildings, leaving behind nearly \$400 million in damage.

Sources used

Local knowledge

<http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~ShowEvent~307631>

REGIONAL STRUCTURE FIRES / WILDFIRES

Vermont has the highest per capita death rate from fire in the nation. This is the deadliest form of disaster throughout the state. In 2000, there were 831 structural fires in the state, 12 of which resulted in 22 civilian deaths, and 20 of which occurred at residences. Smoke detectors have been required in rental housing for over 20 years.

Less frequent than the individual fires are the major fires that can destroy town centers and necessitate a large response and often-economic aid for recovery. A fire in an unprotected downtown can be devastating. For example, in a 15-month period between December of 1991 and July of 1992, 55,000 square feet of the Randolph Village business district was lost to fire. All were accidents or acts of nature.

From 2001 through 2003, there were 456 structure fires in the Region. Grafton Fire provided protection for Grafton. Newbrook Fire Company provides Brookline with protection, Saxtons River Fire Company provides Athens with protection and the Wilmington Fire Company provides Searsburg with protection. Structural fires will continue to be a serious problem for all fire companies and communities in the Region. The potential for Grafton to become isolated and on their own to fight fires, could easily happen, as they witnessed with TS Irene.

Wildfires pose a unique danger to communities and individuals. Wildfires are more likely to occur during dry seasons or dry spells, especially in the spring and summer. As residential areas expand into reforested areas, forest fires increasingly threaten people who are living in these areas. Protecting structures in these reforested areas from fire poses special problems, and can stretch firefighting resources to the limit. If heavy rains follow a major forest fire, other natural disasters can occur, including landslides, mudflows, and floods. Once ground cover has been burned away, little is left to hold soil in place on steep slopes and hillsides. A major wildfire can leave a large amount of scorched and barren land, and affected areas might not return to pre-fire

conditions for decades. If the wildfire destroys the ground cover, then erosion becomes one of several potential problems.

There are three different classes of wildland fires. A surface fire is the most common type and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire is usually started by lightning and burns on or sometimes below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildland fires are usually signaled by dense smoke that fills the area for miles around.

There is no history of wildfires in the Region. The only State information on wildfires is from 1998. Due to an extremely wet year, the 1998 fire season in Vermont was confined to a four-week period from mid-April through mid-May. During this abbreviated fire season there were 120 fires that burned 280 acres. The period of April 12-18 was very dry and there were fires caused by a railroad. On the first day of the problem period one train set a trail of fire for 28 miles along the tracks. After that, the railroad agreed to have a "chase" vehicle follow the train so there would not be any delay in getting fires reported. Showers finally ended the threat.

LOCAL STRUCTURE FIRES / WILDFIRES

Description and Geographic Area of Hazard

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. 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.

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.

Extent

Approximately 1 structure fires occurs every 1.5 years.

Probability

The town hazard emergency committee has stated that fires are Likely to occur in Grafton based on past occurrences.

Assessing Vulnerability: Overview

Methodology

A vulnerability analysis for each community begins with an inventory of possible natural 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 taking into consideration the existing warning systems).

The combination of the **magnitude** 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	U	L	MOD	
Flood	HL	CR	HIGH	Structures, roads, bridges, water source contamination
Hazardous materials	P	L	LOW	Residences, businesses
Radiological Incident	U	N	LOW	Residences, businesses, agricultural producers
Structure Fire	L	N	LOW	Structures
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	CR	LOW	Residences, businesses, agricultural

				producers
Earthquake	U	CR	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	L	LOW	School students and faculty

Assessing Vulnerability: Addressing Repetitive Loss Properties

According to the VT State Hazard Mitigation Officer, Grafton has no repetitive loss properties.

The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended, 42 U.S.C. 4102a. An SRL property is defined as a **residential property** that is covered under an NFIP flood insurance policy and:

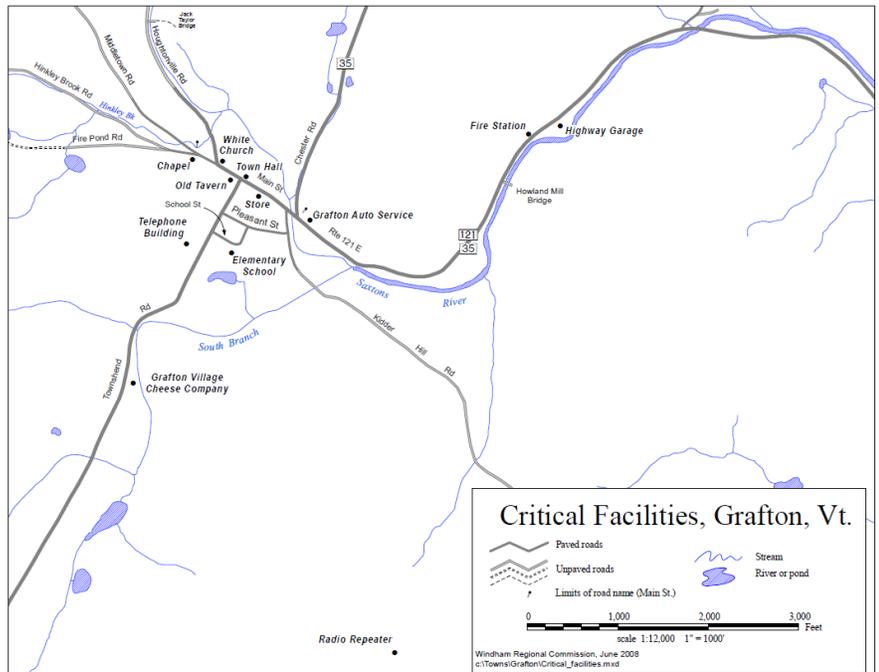
- (a) That has at least four NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or
- (b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart. <http://www.fema.gov/severe-repetitive-loss-program>

Assessing Vulnerability: Identifying Structures

434 houses, according to the 2000 US Census
 29 Businesses, which include 5 managed by the non-profit Windham Foundation
 457 total structures (approximately)
 Market value of all structures - \$160,346,000
 Total Town Employees – 15, plus 5 Selectmen

Below is a list of the most critical structures in Grafton.



- Highway Garage – (Southeast corner of the building is in the floodplain)
- White Church
- Brick Church
- Town Hall
- Chapel
- Old Grafton Tavern/Inn
- Store
- Elementary School
- Telephone Building
- Grafton Village Cheese Company
- Grafton Auto Services
- Fire Station

Twenty-four homes had minor flooding damage after TS Irene.

Assessing Vulnerability: Analyzing Development Trends

In General:

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 downtrend 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 were revised in 2009 to implement the polices and recommendations of the 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 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.

The Riverledge Foundation in Grafton recently purchased a large parcel of land adjacent to their original parcel on Grafton/Townshend Road, and has put the land into a conservation easement.

Development in SFHA during Recovery from TS Irene.

TS Irene destroyed or damage infrastructure on 45 of 55 road miles in Grafton. In the storm and recovery the following developments occurred in the SFHA:

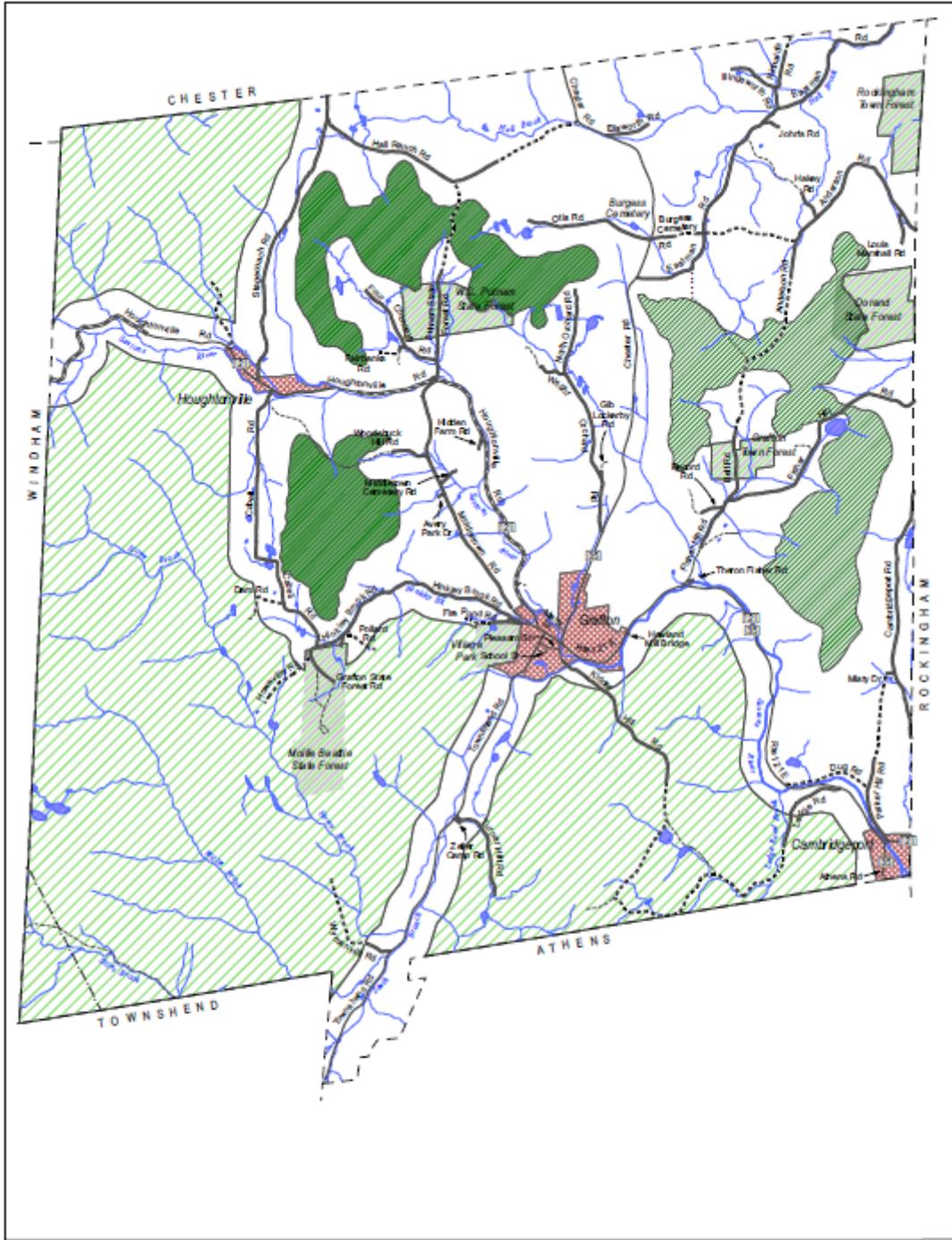
- In compliance with VT ANR guidelines, after Hydraulic and Hydrology Studies (H&H) were obtained and in compliance with the relevant H&H and accepted mitigation practices enlarge the following box culverts and bridges were installed:
 - Large culverts on Hinkley Brook near 300 Hinkley Brook Road, at Middletown Road, and at VT Route 121 West;
 - Large culvert on Eastman Road about $\frac{3}{4}$ of a mile easterly of VT Route 35
 - Concrete bridge off VT Route 121 West, known as Taylor Bridge;
 - Concrete bridge on the drainage on Richards Road;
 - Repair of Cambridgeport Bridge abutment;
 - Repair of Howland mills Bridge northerly abutment;
 - Debris removal from bridges and stream beds throughout the town as necessary to prevent further and future infrastructure damage
 - Upgraded in size all damaged culverts.
- Other developments in SFHA:
 - One house upstream from Howland Mill Bridge on VT Route 121 East washed away when its piling were damage then destroyed by stormwater; this house went through FEMA buyout and the parcel is cleared, vacant and transferred to Town.
 - Five other structures on three separate parcel sites were damaged by floodwater and are in the process of being bought out by the Town through HMGP;

Other Development in the SFHA since 2007 Plan

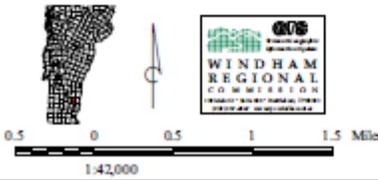
None. The Town of Grafton manages its SFHA. The Town of Grafton has very little new construction since 2007. There has been no construction in the SFHA. There has been no development above the SFHA which would adversely affect the amount or cfs flow from stormwater.

Development in Hazard Prone areas since 2007 Plan

There has been no residential or commercial development in hazard prone areas since the last Plan.



Proposed Land Use Town of Grafton, Vt. July 2008



- Proposed land use districts:**
- Conservation
 - Resource area above 1200 feet
 - Resource area above 1450 feet
 - Rural residential
 - Village
 - State or town forest
 - Stream
 - Pond or river

Data source:
 - Proposed land use area boundaries were determined by the Grafton Planning Commission. Boundary data were developed by WRC GIS staff using existing GIS data depicting roads, water features, parcels, and contours.

July 2008; © Town of Grafton, VT, 2008

MITIGATION STRATEGY

Local Hazard Mitigation Goals

The Hazard Mitigation Goals as outlined below were developed by consensus among the emergency stakeholder group during meetings for the Town of Grafton Single Jurisdiction Hazard Mitigation Plan.

Specific Goals to Grafton:

Problem Statement 1:

The culvert at the intersection of Fisher Hill and Bell Road is undersized and causes flooding and damage to the road. Subsequent culverts on the road below are also undersized. The BCA does not meet historical occurrences. The Town's stock piles of gravel for road building are above this location, posing a huge problem in the probable event that the road will wash out in the future.

Goal 1:

Upsize two culverts to larger culverts, and upsize one culvert to a wider bridge.

Strategy 1:

Via the VTrans highway bridge program and Grafton's Capital Plans budget, the town will save up money over the years – since an HMGP application will not apply due to lack of BCA ratio.

Problem Statement 2:

Seven culverts on Hinkley Brook Road are undersized and cause flooding and road damage. The BCA does not meet historical occurrences.

Goal 2:

Upsize the culverts.

Strategy 2:

Via the VTrans highway bridge program and Grafton's Capital Plans budget, the town will save up money over the years – since an HMGP application will not apply due to lack of BCA ratio.

General Mitigation Goals:

- Reduce the loss of life and injury resulting from all hazards.
- Reduce the impact of hazards on the town's water bodies, 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.
 - Being proactive in implementing any needed mitigation projects for public infrastructure such as roads, bridges, culverts, municipal buildings, etc.
- Encourage hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan, Capital Improvement Plan, and Town Basic Emergency Operation Plan
- Ensure that members of the general public continue to be part of the hazard mitigation planning process.

Identification and Analysis of Mitigation Actions

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.
- Maintain agreement with the Windham Foundation concerning the shared use of the Foundation's generator in the Homestead building with the Town Hall. The Town Hall is connected to the Windham Foundation generator. This location is approved by Red Cross as a warming shelter and transit station.
- Develop an emergency response plan which coordinates the School Crisis Plan with the BEOP and Shelter plans.
- Public Outreach: Personal responsibility for a) vaccination, infectious disease protection, food and water supplies. b) Emergency preparedness.

Structural

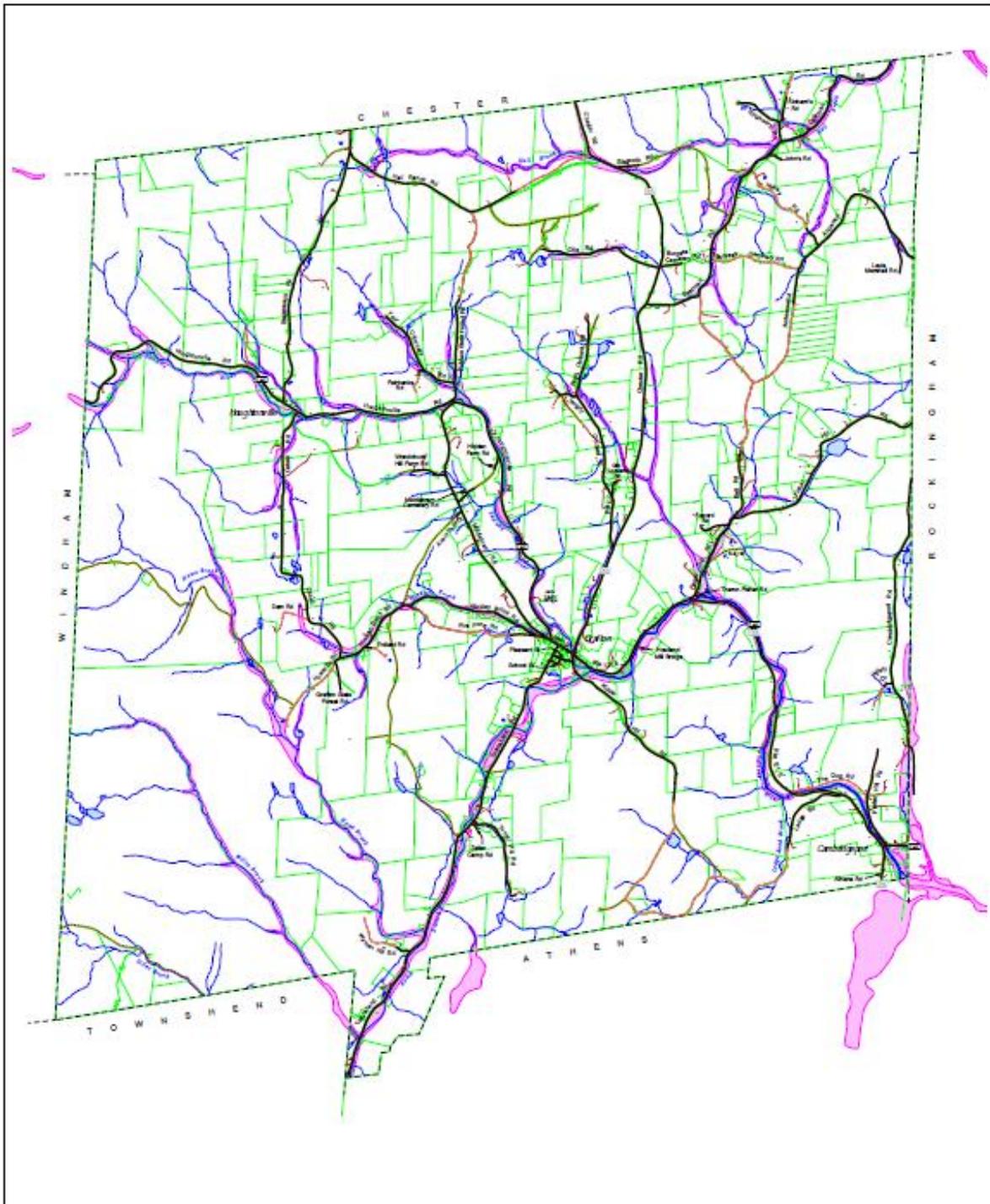
- Annual programs to upgrade drainage ditches and culverts

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, as well as Town Officials.

Engineering Projects

- 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.



Flood Hazard Areas Town of Grafton, Vt.

flood hazard areas effective September 28, 2007



This map is NOT the official Flood Insurance Rate Map for the Town of Grafton.
 This map shows D-FIRM (Digital Flood Insurance Rate Map) data with GIS data from Vermont Center for Geographic Information (VCGI) and Windham Regional Commission (WRC). D-FIRM data were produced independent of the other GIS data on this map. Locations of roads, buildings, and parcel lines may not be accurate relative to flood hazard area boundaries.
 Use the FEMA Flood Insurance Rate Map for official determinations and for more information on Special Flood Hazard Areas.



- LEGEND**
- Special Flood Hazard Areas (SFHAs) Subject to Insurance by the 1% Annual Chance Flood (Zone A - 10 Year Flood Frequency Interval)
 - Class 1 or 2 Iron Highway
 - Class 3 Iron Highway
 - Private road/road
 - Town boundary
 - Flood boundary - 1971 data
 - Ditchway
 - Stream
 - Stream
 - Stream in pond

DISCLAIMER
 Windham Regional Commission and the Town of Grafton do not warrant the accuracy or completeness of the information contained herein. The user assumes all liability for any use of the information contained herein. The user assumes all liability for any use of the information contained herein. The user assumes all liability for any use of the information contained herein.

WINDHAM REGIONAL COMMISSION
 100 Main St., Grafton, VT 05747
 802.253.2222 www.wrcvt.com

Mitigation Actions; Implementation

2008 – Mitigation Actions Identified / Accomplished.

In 2008 the Town of Grafton listed 14 Mitigation Actions to be implemented in the Town. 12 of them were accomplished:

- Wiring Town Hall to Emergency Generator of the Windham Foundation.
- Developing plans for warming shelter in town Hall and shelter in School,
- School Emergency Plan development,
- Dry hydrant installations on Chester Rd. and Wright Orchard Road,
- Stone lined ditches required in standards and done on new roads,
- Shelter Generator Maintenance Agreement with School assuming responsibility,
- Hydraulic and Hydrology studies required for all bridges and culverts in Road Standards,
- NIMS and ICS training completed and ongoing, beginning Fluvial Erosion hazard identification.

Those not accomplished included:

- The portable generator, which is no longer a priority, as the need for the generator has proven slight to nonexistent in the Town.
- Culvert replacement plan interrupted by TS Irene recovery in which most culverts were replaced; this is ongoing and included below in mitigation strategies table.
- The school has a crisis plan, but the coordination and exercising with Fire and Rescue has not occurred; this is included in the mitigation strategies below.

Current Mitigation Actions

Mitigation actions are listed below by hazard event. The following criteria were used in establishing project priorities. 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.

- 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 following list of mitigation strategies was put together in February and March 2013 by the current emergency planning stakeholder group in Grafton. At the time of applying for FEMA's PDM-C, FMA or HMGP grant programs, each project listed below will undergo full benefit-cost analysis (BCA) methodology, version 4.8 or higher to maximize savings.

HAZARD MITIGATED	ACTION	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE	M =MITIGATION P =PREPAREDNESS	Project Priority/Benefit/ Cost
HIGH WINDS	Annual tree inventory and trimming near power lines	Highway Dept.	Annually	Highway Budget	P	Medium/Medium/Low
HIGH WINDS	Bury wires in Village	Selectboard	2013-2016	Grafton Capital Budget	M	Low/Medium/High
WINTER STORM / WILD FIRE	Community education program to elementary schools and town residents by providing literature and making presentations at schools on how to reduce wildfire and ice hazards on their property.	Selectboard	Annually	<i>Grafton News</i> and visits to schools	M	High/High/Low
WINTER STORM	Bury power lines to critical facilities	Selectboard	2014-2018	Capital Budget	M	Low/Medium/Medium
FIRE	Annual sale of fire/smoke alarms and other fire protection devices	Fire Dept.	Annually	Fire Department Budget	P	Medium/medium/Low
FLOOD	Assure the Fluvial Erosion Hazard by State is completed for the Saxtons River and develop FEH Plan	WRC, Grafton Planning Commission	2014-2015	Grant	P	Medium/High/Low
FIRE/ WILDFIRE	Install Dry Hydrants	Fire Department	On-going	Grant	M	Medium/Medium/Low
FLOOD	Repair and Replace Culvert from the Ball Field (Townshend Rd.) to the Saxtons River	Selectboard/Town Highway	By 2016	Capital Budget	M	High/High/High
All Hazards	NIMS compliance and NIMS/ICS Training	Selectboard and Fire and Fast Squad	Continuing	N/A	M	High/High/Low
All Hazards	Emergency Services Personnel training	Fire and Fast Squad	Continuing	General fund to assist with costs	M	High/High/Medium
All Hazards	School Crisis Plan coordinated with Fire and Fast Squads Emergency Operations Plans	School and Fire & Fast Squad, with EMD	Continuing	EMPG planning grant with consultant	M	High/High/Low

HAZARD MITIGATED	ACTION	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE	M = MITIGATION P = PREPAREDNESS	Project Priority	Benefits *	Costs
FLOOD	Eastman Road culvert upgrade	Town Highway Dept.	2013-2014	VTrans budget or Capital Budget	M	High	Keep access and exit to and from Town to Chester and Rockingham/business, economic benefit	\$155m
FLOOD	Fisher Hill Road and Bell Road – upgrade 2 culverts and upgrade 1 culvert to a bridge	Town Highway Dept.	2013-2015	VTrans budget or Capital Budget	M	High	Keep access open to town garage and exit to and from Town to Rockingham/business, economic benefit	Culv. \$155m Each./ Bridge \$300m
FLOOD	Hinkley Brook Road – upgrade seven culverts	Town Highway Dept.	2013-2016	VTrans budget or Capital Budget	M	High	Local access and access to Windham, business and economic benefits.	\$125m to \$155m each

*Benefits. In Tropical Storm Irene, the replacement cost for these roads, destroyed by these undersized culverts and bridge was approximately equal to the cost of replacing the culverts. But over the years the cost has been 2 or more times the cost of the replacement. However, we have no records from which to build a benefit/cost analysis.

The town is dedicated to the replacement of these culverts and the bridge. The cost of replacement is being provided by the Town through its Capital Fund, which the town funds each year in its annual budget. The Town plans replacement of one or more structure and sets aside an amount that will meet the Town's share of VTrans structure grants. The money for the Fisher

Hill Bridge has been so set aside since 2012, and money was set aside this year 2014, for some of the culvert projects. It is impossible to benefit/cost the first 5 strategies.

Fluvial Erosion Hazard Zones (FEH)

Fluvial Erosion Mapping has not yet been done for the Town of Grafton. In acknowledgement that existing technical resources and land use guidance or regulatory authorities, such as the National Flood Insurance Program, do not adequately identify high risk areas for development along riparian corridors with respect to fluvial erosion hazards it is therefore deemed a high priority of this Hazard Mitigation Plan to provide the technical support for, and to develop and implement protection mechanisms at the local level that will serve to avoid land use investments that would be, over time, endangered by, incompatible or in conflict with fluvial adjustment and erosion processes. Fluvial assessments shall be conducted as guided by the VT ANR Fluvial Geomorphic Assessment Protocols, in the Town of Grafton, as VT ANR deems necessary.

No later than one year after completion of the fluvial geomorphic assessment, the town, under contract with the Regional Planning Commission, or other GIS mapping service provider, shall develop a fluvial erosion map. Such map shall be consistent with mapping standards and protocols developed by VT ANR.

The Windham Regional Commission has recently been awarded grant funding for FY 2013-2014 under the Ecosystem Restoration Grant Program to conduct Phase 1 & Stream Geomorphic Assessments on the Winhall River, Wardsboro Brook and the Green River, all within the Windham Region, however not located in the vicinity of Grafton.

Stream Geomorphic Assessment studies have been conducted on the Saxtons River which flows through the Town of Grafton, titled The River Corridor Plan for the Saxtons River Watershed Windham County, Vermont, dated September 30, 2010. The plan was prepared by Fitzgerald Environmental Associates under contract with the Windham County Natural Resources Conservation District and the Windham Regional Commission. No Fluvial Erosion Maps have been created from the report, although a great deal of data has been collected and can be found in the report, that can be accessed online at <https://anrnode.anr.state.vt.us/SGA/finalReports.aspx>.

PLAN MAINTENANCE PROCESS

Monitoring, Evaluating, and Updating the Plan

The Town Plan is monitored by the Grafton EMD with the assistance of the Grafton Emergency Committee, which includes those listed above as well as the School Principal, and Grafton Rescue Chief. The committee reviews the mitigation strategies periodically and works to implement them. As infrastructure is being improved the mitigation strategies are incorporated in the plan for new structures. This is facilitated in Vermont by the VTrans and ANR Stream Alteration requirements, including size and design of structures (culverts and bridges) that meet the VTrans Hydraulic and Hydrology studies for the site of the proposed replacement structure. The accomplishment of a listed strategy is noted and the plan edited to reflect it, and the impacts of that mitigation on other parts of the plan, if any. This is an ongoing process. The benefits of the completed mitigation strategies are evaluated with the next weather event or other incident for which the strategy was employed. It is the job of the EMD to see that this process continues every year. The EMD is responsible for updating the plan every 5 years. The Emergency Committee is involved in this updating.

Though it is the primary responsibility of the Grafton EMD to monitor, evaluate and update the plan throughout the 5 year period, the Town of Grafton will continue to work with the Windham Regional to meet these responsibilities. Following any FEMA disaster declaration the town will

consider applying for HMGP funding to fulfill mitigation projects. Other residents in the Town of Grafton and neighboring communities will be invited to participate in the ongoing update/review process. Historians, School Board Members, local business owners, and state agencies such as the Agency of Natural Resources and VT Department of Fish and Wildlife will be asked to be involved.

Additionally, all plan review meetings will be publicized and open to the public. The plan and any proposed revisions will be on the jurisdiction's website with information on how the public can direct questions/comments to the planning team.

The Emergency Management Director and the Town Administrator shall initiate a review for update by the Grafton stakeholder group at the end of the fourth year from the date this Plan was approved by FEMA year and complete the update revisions of this Plan and send it to FEMA for approval 6 months before this Plan's 5 year life expires.

Implementation of Mitigation Actions; Incorporating Mitigation into Existing Planning Mechanisms

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. Grafton uses all of the plans listed below to help plan for current and future activities with the town. For example: the Basic Emergency Operation Plan has a contact list that is used for response purposes in the case of a hazard event. The Town Plan directs visions and goals that include Natural Resources and Land-Use. The Subdivision Regulations require roads be built to construction and design standards to resist erosion, to accommodate emergency access and to meet e911 requirements. Road Standards are followed by the town and they do an annual culvert and bridge inventory that is mapped by the WRC. The town is compliant with the NFIP.

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 was updated and adopted in 2008. Town has received an MGP to update the plan in 2013.
Town of Grafton Basic Emergency Operations Plan (BEOP)	Basic municipal procedures for emergency response	BEOP NIMS Compliant	Updated every year after Town Meeting
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	Updated and adopted in 2009. Planning Commission will update the regs again in 2014 after the Town Plan update.
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	Fieldwork completed in 2012.	None Identified
Building Code	Regulates building construction standards	N/A	N/A

<p>Wetland protection – VT Wetland Rules</p>	<p>Protected by 1990 Vermont Wetland Rules</p>	<p>Protection of environment, water resources, wildlife, biota</p>	<p>None identified</p>
<p>Bio-Hazard Equipment and Supplies</p>	<p>Stockpiling Personal Protective Equipment (PPE) and disinfection supplies</p>	<p>Protection from Bio-Hazard / Infectious Disease and the spread of infection among the population</p>	<p>Public Education</p>

APPENDICES

Appendix A: Sign-in Sheets

Appendix B: Public Participation Documentation

Appendix C: Planning with Neighboring Towns Documentation

Appendix D: Special Flood Hazard Areas and FIRM Panel Numbers, Grafton VT

Appendix A: Sign in sheet from February 28, 2013

<p style="text-align: center;">GRAFTON, VT - LOCAL HAZARD MITIGATION PLAN MEETING February 28, 2013 Location: Grafton Fire Department</p> <p style="text-align: center;">SIGN IN SHEET</p>		
Name	Affiliations – Please list all	Town where you live
ALLAN SANDS	GRAFTON SELECT BOARD CHAIRMAN NAUFRANCH PARTNERS EMERGENCY PLANNER	GRAFTON
BILL KEARNS	GRAFTON SELECT BOARD EMERGENCY MGT DIRECTOR GRAFTON ADMIN OFFICER GRAFTON & SPRINGFIELD	GRAFTON
Eric Stevens	Grafton Planning Commission, Chair Grafton Fire Dept. Chief Grafton Emergency Management Coordinator	Grafton
Dinah Reed	WRC Planner	Brattleboro

Appendix B: Public Participation Documentation – this flyer was distributed at Town Meeting 2013, and posted at the Library and Town Office.

Are you ready to weather the next ice storm? Flood event? Extended power outage?



The Town of Grafton is developing a Hazard Mitigation Plan to address potential future hazards in our community.

As the Town is taking action to be prepared for whatever hazard event strikes, won't you join us in preparations? Your input is important! **We would like to know your feedback.** Let us know if you have suggestions or comments about the plan. Your local knowledge is critical to making the plan effective for Grafton.

Hazard Mitigation Goals

- Reduce the loss of life and injury resulting from all hazards.
- Reduce the impact of hazards on the town's water bodies, 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.
- Ensure that members of the general public continue to be part of the hazard mitigation planning process.



The Plan is available for review at the following locations:

- Town Office & Library – Hard Copy available



Please review sections of the plan that interest you and return comments to:

- Town Clerk, Kim Record gtclerk@vermontel.net
- Dinah Reed, Windham Regional Commission @ dreed@windhamregional.org , or (802) 257-4547 ext. 109



Appendix C: Planning with Neighboring Towns

MONTHLY MEETING



Tuesday, January 15, 2013 -- 5:30 pm

Location: Marlboro Graduate Center, Vernon Street, Brattleboro
Room – Second Floor East (2E) (parking available in lot south of the bldg.)

AGENDA

1. Introductions – Sign-in
2. Minutes of Previous Meeting
3. No Business meeting except for any important timely reports/announcements

Jan 15th Program:

Resiliency through Communication and Planning



Discussion Topics/Activities:

- 1) Viewing of Maps, place sticky notes at problem spots
- 2) Small groups - Roundtable Discussions between Towns
- 3) Establish notetaker - make notes on large white sheets of paper
- 4) Reorganize tables – sit with towns you have not yet sat with
- 5) Take photos
- 6) Final – Re-cap as large group – reflect on map areas – what did you learn from this?

Things to think about when discussing potential issues with neighboring towns:

1. Rivers/streams that flow through more than one town? How does what one town does upstream affect your town downstream?
2. Major roads in common? What if there is a detour/bridge out – how do you plan together to mitigate traffic impacts?

VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORMATION

PROGRAM: Local Emergency Planning Committee 6
 DATE OF MEETING: January 15, 2013
 MEETING LOCATION: Marlboro Graduate Center
 TOPIC: Local Hazard Mitigation Planning with Neighboring Towns
 MEETING TIME: 5:30 PM

VOLUNTEER ATTENDEES - CLAIMED

No.	NAME	SIGNATURE	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
						0.585	\$28.00
1	Carla Gylack	<i>Carla Gylack</i>	Townshend EMD	40		-	-
2	Michelle Baro	<i>Michelle Baro</i>	MRC	1.5		-	-
3	Tom Barrows	<i>Tom Barrows</i>	WCFT	15		-	-
4	Sam Epicewo	<i>Sam Epicewo</i>	Bratt. Retreat	3		-	-
5	Herb Meece	<i>Herb Meece</i>	Guilford EMD			-	-
6	Lisa LaBrock	<i>Lisa LaBrock</i>	Guilford E.M.			-	-
7	Paul Favreau	<i>Paul Favreau</i>	VSP			-	-
8	David Desjardins	<i>David Desjardins</i>	Townshend EMD			-	-
9	Holly Harkness	<i>Holly Harkness</i>	Townshend			-	-
10	Paul Fraser	<i>Paul Fraser</i>	Warren EMD			-	-
11	David More	<i>David More</i>	NOUFARE EMP			-	-
12	Paula Corbett	<i>Paula Corbett</i>	VDH			-	-
13	Heath Bager	<i>Heath Bager</i>	WINDHAM EMD			-	-
14	Diak Charle	<i>Diak Charle</i>	Guilford Select.			-	-
15	Glenn Herrin	<i>Glenn Herrin</i>	Marlboro			-	-
16	Eric Stevens	<i>Eric Stevens</i>	Grafton			-	-
17	Kevin Beattie	<i>Kevin Beattie</i>	Land Onberry			-	-
18						-	-
19						-	-
Sub Total				0.00	0.00	\$0.00	\$0.00

NON VOLUNTEER ATTENDEES - CAN NOT CLAIM

No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME	
1	John F. Ansel	VIDEAMHS			0.375	\$20.00	
2	KETHN CLARK	WCSD			-	-	
3					-	-	
4					-	-	
5					-	-	
6					-	-	
7					-	-	
8					-	-	
9					-	-	
10					-	-	
Sub Total				0.00	0.00	\$0.00	\$0.00

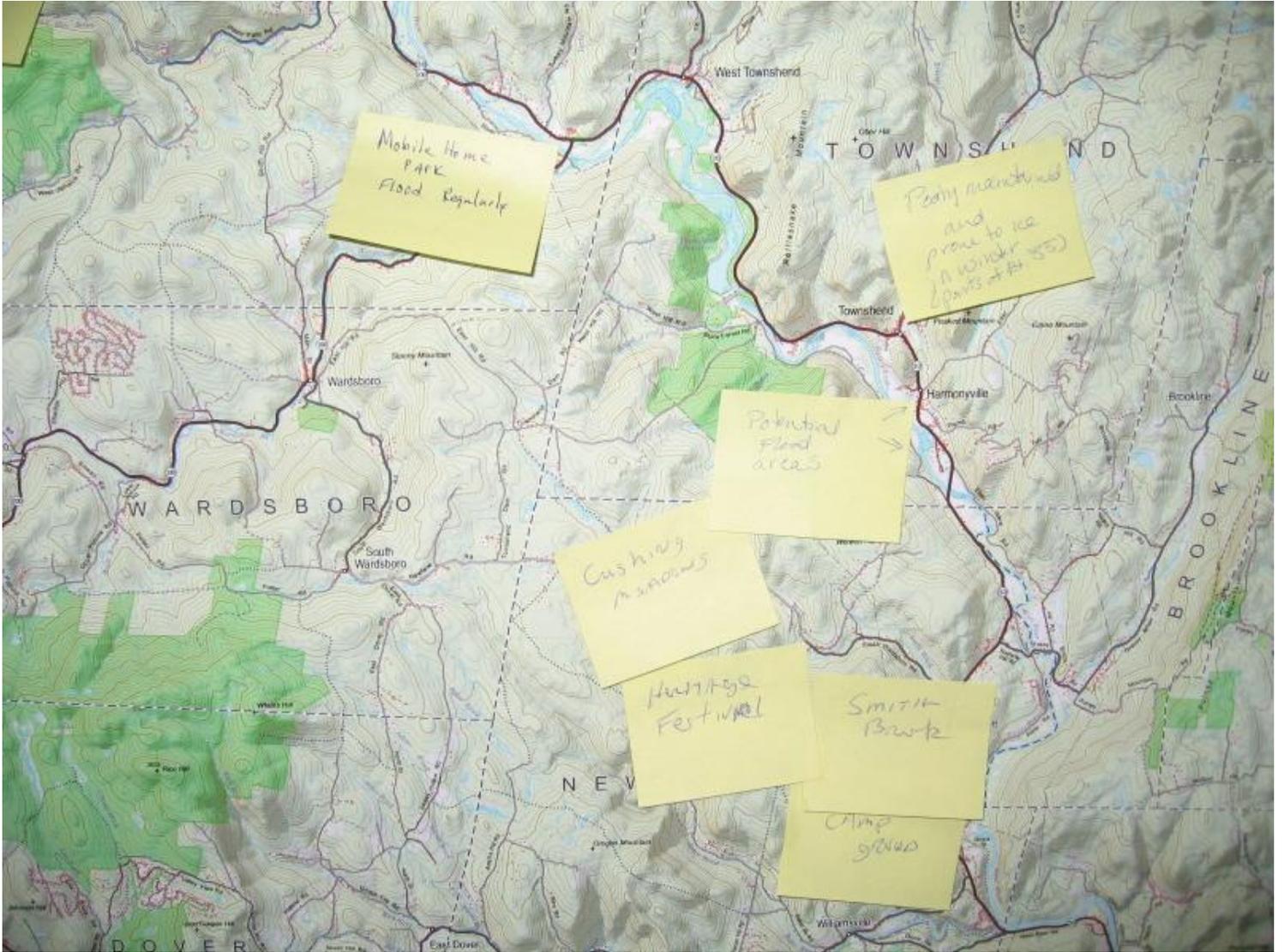
TOTAL MATCH \$0.00

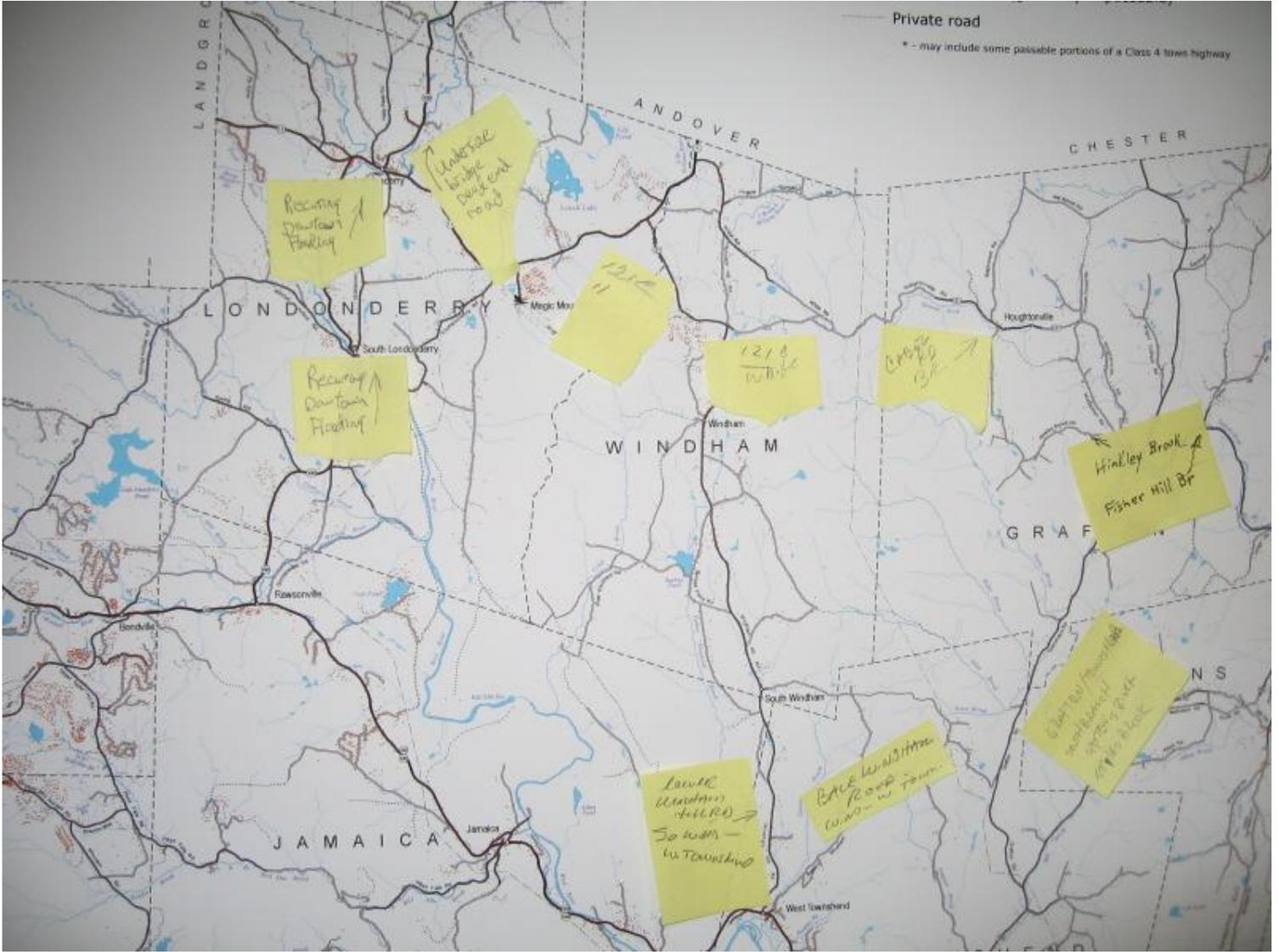
TOTAL Non-Volunteer Match -

TOTAL VOLUNTEER MATCH \$0.00

Photo Documentation from Jan. 15th Planning with Adjacent Towns Meeting







Appendix D: Special Flood Hazard Areas and FIRM Panel Numbers, Grafton VT

