

**Southern Windsor County Regional Planning Commission
Multi-Jurisdictional All Hazard Mitigation Plan**

CHESTER, VT

ANNEX D

March 5, 2012

INTRODUCTION

PURPOSE

This annex, when used with the appropriate sections of the SWCRPC Regional Plan, is an All-Hazard Mitigation Plan for the Town of Chester. The purpose of this plan is to assist in identifying all of the hazards facing the town and to identify strategies with which they can 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
- Securing propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters in flood-prone areas
- 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
- Providing information to the general public

TOWN PROFILE

A. Community Background²

Chester is located within Windsor County in southeastern Vermont, bordered by the towns of Springfield, Baltimore, Cavendish, Ludlow, Andover, Windham, Grafton and Rockingham. Regional highways, including VT Routes 10, 11 and 103, connect with large population areas outside of Chester. Route 103 is part of the National Highway System and Vermont Truck Network. Evacuation routes are detailed on Map D-1.

Current land use in the Town of Chester follows patterns of traditional Vermont villages. The village areas of Main Street, Chester Depot, and the Stone Village have a mixture of commercial, industrial, and residential uses, as well as services such as post offices, health care, an elementary school, bus stops, and municipal offices. The village center is served by municipal water and sewer service, while outlying areas are served by private wells and on-site septic systems. Residential areas outside the village centers are primarily rural in nature and of low or moderate density.

The majority of the land area in the town is forested. Steep slopes, undeveloped ridgelines, and large wetland areas not only add to the scenic beauty of the landscape, but are also important habitat areas for deer, moose and bear. Dairy farms, hay and corn fields, pumpkin patches, open fields, and agricultural pasture lands are important assets to the town and define its rural character. Of Chester's 33,892.31 acres of land (which does not include the area of land covered by state and local roads and highways), roughly 118.3 acres are state lands: 2.2 acres are used for the Agency of Transportation's garage, 8.1 acres are Department of Fish and Wildlife land, and 108 acres are held by the Department of Forests, Parks, and Recreation Lands.

As in all of Vermont, the climate is generally temperate with moderately cool summers and cold winters. Average annual precipitation is around 40 inches, and snowfall generally ranges from a minimum of 70 inches to as much as 200 inches in the mountains. The weather is unpredictable, and large variations in temperature, precipitation, and other conditions may occur both within and between seasons.

Elevations range from a low point of approximately 700 feet along the Williams River in the southeast corner of town to a high point of 2,309 feet at the summit of Steadman Hill.

B. Development Trends

The U.S. Census Bureau indicates a 2010 population of 3,154 and a growth rate of 3.4% between 2000 and 2010. This is comparable with the Vermont state population growth rate, but significantly higher than the -1.3% growth rate for Windsor County. Within Chester, the positive growth rate indicates future development may occur, however, adopted regulatory tools such as zoning regulations and flood hazard regulations prevent future development in areas deemed unsafe and potentially hazard prone. Although an increase in development has occurred, mitigation priorities remain unchanged.

The ongoing growth and expansion at Okemo Mountain Resort and other nearby ski areas may put some residential and commercial development pressure on the Town of Chester. The current zoning map designates uses and areas of development that are sufficient to handle current development trends.

² Adapted from Chester Town Plan, 2009

LOCAL PLANNING PROCESS

The local planning process used to develop this town annex followed a process similar to that used to develop the SWCRPC Regional All-Hazard Mitigation Plan. This process, outlined in Chapter Two of the Regional Plan, was developed utilizing guidance issued by FEMA and Vermont Emergency Management (VEM).

The review and revision process for the Chester All Hazard Mitigation Plan began at a meeting held at the Chester Town Hall on June 24, 2008. The purpose and intent of this meeting was to familiarize town departments and staff with the current mitigation plan and identify areas for improvement. Attendees at this meeting included the Chester Volunteer Fire Department Chief, Chester Ambulance Director, Chester Highway Foreman, Chester Police Department Chief, and the Interim Town Manager at the time. During this meeting, the plan was reviewed in entirety and additional focus was placed on reviewing current threats and potential mitigation actions.

In the fall of 2010, SWCRPC staff reviewed and edited the previous version of the Chester Hazard Mitigation Plan to continue the revision process. This included updating population statistics in the community profile section, incorporating hazard events that occurred since the last plan revision into hazard analysis, and reviewing the progress of past mitigation actions. Following the draft edits completed by SWCRPC, a publicly noticed meeting was held at the Chester Town Hall on October 18, 2010.

Attendees of this meeting consisted of current members of the Chester Planning Commission, town staff, and SWCRPC staff. The meeting agenda included a section by section review of the previous plan with an emphasis on identifying hazards and mitigation actions specific to the town. The meeting began with the definition of hazard mitigation and its role in reducing risk and cost to the town, with an emphasis on the distinction between mitigation and preparedness. The next topic of discussion was the identification of highest hazards facing the town. The previous version of the Chester Hazard Mitigation Plan as well as the SWCRPC Regional Plan were provided as examples to facilitate the discussion of highest hazards facing the town. Attendees of the meeting collaborated in creating the hazard vulnerability analysis seen in the Hazard Identification section of this Plan (Table 2). Members at the meeting also discussed areas of town most likely to be affected by these hazards as well as future goals and mitigation strategies that may be undertaken to reduce the risk of future harm and cost to the town. These mitigation strategies were incorporated into the implementation schedule at the end of this document. Changes in priorities, development, and local mitigation efforts were also considered both in this meeting and the entire revision process. Following the meeting, SWCRPC staff made the revisions proposed at the meeting and drafted a new, updated plan which is available for review at the Chester Town Office, posted on the SWCRPC website (www.swcrpc.org) and Facebook page. During this revision process, the purpose and community background sections were the only sections that were not updated.

The Local Emergency Planning Committee (LEPC) #3 is a regional volunteer organization comprised of first responder departments, state and local officials and other interested parties, including the public. The mission statement of LEPC 3 is *"To provide resources and guidance to the community through education, coordination and assistance in All Hazard mitigation, preparedness, response and recovery planning to assure public health and safety."* A meeting of the LEPC was held on February 10th, 2010 at the Windsor Fire Department during which the hazard mitigation planning process and updates were

discussed. The group reviewed the highest hazard analysis along with discussing potential mitigation projects. Following this meeting, SWCRPC staff incorporated the recommendations of the committee into the plan.

In addition to the local meetings, the Chester Mitigation Plan and SWCRPC Multi-Jurisdictional All-Hazard Mitigation Plan was sent to the Vermont State Hazard Mitigation Officer on June 16, 2011 for review and comment. Since that time, SWCRPC has been working with FEMA plan reviewers and the Vermont Hazard Mitigation Officer to meet the mitigation plan requirements as set forth by FEMA guidance.

Throughout these several rounds of revisions, key areas of the plans have been updated, including the hazard analysis and planning process sections. Greater historical data for past hazard events as well as more detailed information for hazard vulnerability and location have been added to strengthen the plan. The process section has also been revised to describe a more holistic narrative of the planning process including specific opportunities for stakeholder involvement.

This plan has been revised to reflect progress in local mitigation planning efforts. Mitigation actions from the previous version of this plan included:

Table 1: 2006 Mitigation Actions and Status

2006 Plan – Mitigation Action	Progress and Implementation
Construct temporary bridge on Popple Dungeon Road	Complete
Reconstruct Popple Dungeon Bridge	Complete
Stabilize river bank	Ongoing – as funding allows
Upgrade drainage ditches and culverts	Ongoing
Keep culvert / bridge inventory updated	Ongoing
Purchase three emergency generators	Not completed; town has submitted applications for the VEM Generator Grant
Capital program for equipment replacement	Ongoing
New emergency services facility – land purchase	Land purchased
New emergency services facility – building construction	No construction to date
Develop EOP	Reviewed and updated yearly

Identified actions that were not completed remain priorities for the town and have been included in the final section of this plan. A lack of town funding and grant opportunities as well as town capacity are reasons for the above actions not being completed rather than a change in priorities. In addition to the above table and actions, a Hazardous Materials Commodity Flow study has been completed for the region which will aid in the identification of future mitigation actions related to hazardous materials and transportation disruption. Tropical Storm Irene, in the late summer of 2011, helped to emphasize further areas in need of mitigation efforts and these have been incorporated into this revision process as well.

The future method for monitoring and evaluating the Chester Hazard Mitigation Plan includes annual meetings of the Hazard Mitigation Review Committee. The purpose of these meetings will be to continue to identify and prioritize hazards within the town and to develop and review strategies to alleviate the impacts of those hazards on the community through mitigation projects and actions. The

committee will meet on a yearly schedule to monitor and evaluate the plans in an effort to keep the plans current. Every effort will be made to involve representatives from the Chester Planning Commission, Chester Selectboard, Chester Police, Fire, and Ambulance Departments, and interested members of the public and local business community. An effort will be made to include additional community stakeholders that have not been included in previous revision processes.

In addition, outreach will be conducted to include representation from community members and businesses that have not been included in the previous revision process. The Town of Chester and the SWCRPC recognize the importance of public participation in hazard mitigation planning, as evidenced by the devastating effects of Tropical Storm Irene in summer of 2011. Efforts will be made to provide ample opportunity for review and comment, including providing draft plans at the town hall for review, ensuring their availability during large town events such as town meeting, and possibly developing a survey prior to the next full scale plan update.

Moving forward, the Chester Hazard Mitigation Review Committee will be responsible for monitoring the plan to ensure that specific mitigation actions are implemented as resources or opportunities become available. This includes the identification of, and application for, additional funding opportunities in cooperation with the SWCRPC. The committee will also be responsible for reviewing the plan to ensure that proposed mitigation actions remain in keeping with current town goals, strategies, and policies.

Four years into the five year revision process, the Southern Windsor County Regional Planning Commission and the Local Emergency Planning Committee 3 will assist the Hazard Mitigation Review Committee in making revisions and updates that incorporate the issues that have been identified during mitigation meetings. The plan update process will begin in January 2015 (assuming a spring 2012 adoption) with the first publicly noticed meeting of the Hazard Mitigation Review Committee.

Meetings will be duly warned following town protocols, including the publication of notice in the local paper of record. Efforts will be made to include businesses, non-profits, academia, and both state and local officials in the review process.

Following this meeting, a draft plan will be made available for public comment. The plan will be available on the SWCRPC website, LEPC 3 website, and paper copies will be available at the town office. A second publicly noticed meeting will be held no later than April 2015 in which any substantial revisions will be discussed. The SWCRPC will make necessary edits to the plan and provide the committee with a revised version that can be put before the town for final review. Subsequently, the plan will be sent to the Vermont State Hazard Mitigation Officer for referral to FEMA for Approval Pending Adoption (APA). Following APA, the town can then adopt the multi-jurisdictional plan including the Chester Annex and forward a copy of the adoption resolution to FEMA to complete the revision cycle.

HAZARD IDENTIFICATION AND RISK ASSESSMENT

Hazards facing the Town of Chester are in many instances similar or identical to the hazards identified in chapter three of the Regional Plan. The following assessment addresses the town's vulnerability to all of the highest hazards identified in the Regional Plan as well as additional hazards identified by the Hazard Mitigation Committee. The likelihood of occurrence and impact on the town were used to assess community vulnerability to each hazard. A detailed description of the hazard vulnerability assessment method follows:

HAZARD 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 the hazards 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 for each hazard was 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) was classified as:

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

A combination of the hazard impact and frequency were used to rank 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

Table 2: Hazard Vulnerability Assessment

Identified Hazard	Likelihood	Impact	Community Vulnerability	Most Vulnerable Facilities and Populations	Hazard Extent / Location
Tornado	P	L	LOW	Village area	Entire town
Flood	L	L	MODERATE	Ice jams may occur along Route 103 north	FEMA identified 100-year flood areas including A Zone, AE Zone
100-year flood	P	CR	HIGH	72 bridges in town, village areas are vulnerable	FEMA identified 100-year flood areas including A Zone, AE Zone
Flash flood	L	L	MODERATE	Higher elevation drainages and structures located along mountain streams	FEMA identified 100-year flood areas including A Zone, AE Zone and highland drainage areas
Hazardous materials	L	L	MODERATE	Aquifer protection districts, village areas, schools along major travel corridors	Identified Hazard Waste Facilities
Radiological Incident	P	L	LOW	Village areas although very dependent on wind direction and speed	Entire town
Structure Fire	HL	L	MODERATE	Residential structures, non-sprinklered commercial/industrial structures	Entire town
Power Failure	HL	L	MODERATE	Elderly, medically dependent on electricity, water/sewer plant	Entire town
Winter & Ice Storm	HL	L	MODERATE	Electric utilities, town roads, elderly and those needing sheltering	Entire town
High Wind	L	L	LOW	High elevation areas, electric utilities, town roads	Entire town, particularly higher elevations
Air crash	P	L	LOW	Localized area of impact	Entire town
Water Supply	U	L	LOW	Aquifer protection areas,	Entire town although

Contamination				residents utilizing municipal system	largely dependent on location and severity
Hurricane	P	L	LOW	Dependent upon intensity and location	Entire town
Earthquake	P	L	LOW	HAZUS indicated only minor potential damage	Entire town
Dam Failures	U	L	LOW	Residences downstream of affected structures	Structures located immediately downstream of damaged structure
Drought	P	L	LOW	Farms, buildings served by public water supply, shallow well owners	Entire town dependent on wells
Highway Accidents	HL	L	MODERATE	Motoring public, tourist/ski travel corridor	Entire town
Railroad Accidents	P	L	LOW	Facilities located nearby tracks	Areas of town near railways, including downtown
Wildfire	P	L	LOW	Home and businesses located within wooded areas	Entire town is vulnerable given forest cover
Landslide	U	L	LOW	Facilities located along steep banks	High elevation drainages, entire town
School Safety	P	L	LOW	Elementary School, High School and students	All schools within town

DETAILED HAZARD ANALYSIS: HIGHEST HAZARDS

While the town may be affected by all of the hazards listed in the Regional Plan, the detailed hazard analysis and potential loss estimates focus on hazards listed as “significant” in the Regional Plan and those that were classified as at least a “moderate” threat to the town in the hazard vulnerability assessment.

Multiple hazards from the vulnerability assessment were grouped for analysis purposes. For example, the Fire category includes both structure fires and wildfires. These and other subcategories are indicated in bold lettering throughout the following detailed hazard analysis section.

Less significant hazards did not have occurrence frequencies or levels of impact that would necessitate a level of analysis more detailed than that contained in the Regional Plan. 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 Hazard Mitigation Review Committee meetings.

The following Hazards are listed in the Regional Plan as significant hazards to the region:

- A. Fire
- B. Flooding
- C. Severe Winter Weather
- D. Transportation Incidents or Disruption
- E. Hazardous Materials
- F. High Wind Events
- G. Earthquake

Where possible, past occurrence data was included that was specific to the Town of Chester, however, that was not possible for all hazard events and the data included is currently the best available information. For future plan revisions and updates, both the Town of Chester and the SWCRPC will make efforts to gather more localized data.

A. FIRE

Structure fires were identified in the hazard vulnerability assessment as a “moderate” risk to the town due to their high probability of occurrence. Structure fires are common throughout Vermont during the winter months and such fires may result in loss of property and/or life. They can affect a single residential structure or spread to other homes, businesses, or apartment complexes. Residential fires kill more people in the U.S. each year than all other natural disasters combined.

In Vermont there were 3,089 reported incidences of fire in 2010, 64% of which were structural fires. These fires resulted in 4 civilian deaths and amounted to over 18.5 million dollars in estimated property losses in 2010 alone⁵.

With an average housing unit value of \$106,800⁶, and twelve structure fires occurring within the town in 2010⁷, damage from structural fires could result in significant costs to the Town of Chester. The annual

⁵ 2010 Annual Report of the State Fire Marshal Report

⁶ US Census Figures

report of the Vermont State Fire Marshall provides a breakdown of fire calls by the Chester Volunteer Fire Department:

- 2007 – eight structure fires
- 2008 – twenty-two structure fires
- 2009 – twenty structure fires
- 2010 – twelve structure fires.

For the next plan update, the Town and SWCRPC will make efforts to improve the accuracy and quality of town level historical hazard data for structural and wild fires.

Although this is only the best available town specific data for structure fires at this time, it does reflect the hazard that structure fires pose in the town and throughout the region. The most significant common factor in fire fatalities in Vermont continues to be the absence of a properly functions smoke detector in the sleeping areas of residential structures. Structure fires may also be caused by improperly disposing of ashes with live coals from wood stoves or by faulty electrical wiring.

Wildfires are relatively uncommon events in the State of Vermont. The State Hazard Mitigation Plan’s analysis of wildfire threat states that “Wildfire conditions in Vermont are typically at their worst either in spring when dead grass and fallen leaves from the previous year are dry and new leaves and grass have not come out yet, or in late summer and early fall when that year’s growth is dry”. The 2010 Fire Marshal Report states that wildfires damaged 2.51 acres in Windsor County. In that year, nine wildfires are listed as having occurred in the Town of Chester⁸.

Responses to wildfire calls by the Chester Volunteer Fire Department are listed below⁹ and reflect the best available data at this time:

- 2007 – five wildfire calls
- 2008 – ten wildfire calls
- 2009 – three wildfire calls
- 2010 – nine wildfire calls

Given the forest cover within Chester, it is anticipated that small brush fires will continue to occur throughout Chester at a rate similar to the data above, however, given the appropriate seasonal conditions, the threat for large wildfire remains.

This is currently the best level of detail for fires within the Town of Chester. The future plan update process as outlined in the Planning Process section at the beginning of this plan calls for additional local input and meetings. During these meetings, previous wildfire occurrences will be discussed in an effort to develop a more comprehensive historical record of fires within the town. In addition, SWCRPC staff will coordinate with the Chester Volunteer Fire Department to develop a greater database of fire data specific to the town. Additional data resources, including the Vermont State Archivist, historical society, and local town knowledge will be utilized to ensure the comprehensiveness of the historical data.

⁷ 2010 Annual Report of the State Fire Marshal Report

⁸ 2010 Annual Report of the State Fire Marshal

⁹ 2007- 2010 Annual Report of the State Fire Marshal Report

Table 2: Vermont Wildfire Statistics for 2010¹⁰

COUNTY	2010		2009		2008		2007		2006	
	#Fires	Acres	#Fires	Acres	#Fires	Acres	#Fires	Acres	#Fires	Acres
Addison	1	.5	10	9	6	10	4	4.5	2	1.20
Bennington	4	3.35	4	40.5	12	20.8	3	25.13	8	40.18
Caledonia	5	6.75	13	3	3	2.5	12	8.3	7	3.40
Chittenden	9	23.95	2	4	12	10.68	5	3.96	7	2.64
Essex	1	.75	1	3	2	5	0	0	2	1.32
Franklin	19	10.56	15	27	25	29.87	7	84.95	22	53.92
Grand Isle	0	0	0	0	0	0	0	0	0	0
Lamoille	2	.16	6	5	11	5.8	8	4.39	13	12.63
Orange	6	3.65	16	46	4	2.39	8	14.15	12	31.66
Orleans	9	6.72	4	2.5	4	.31	5	.46	6	4.35
Rutland	6	5.3	3	4	9	30.93	2	.5	8	30.15
Washington	9	3.86	7	3	10	6.12	5	3.1	4	4.6
Windham	11	15.77	8	12	14	10.45	16	11.65	23	61.65
Windsor	6	2.51	6	5	3	3.35	6	18.7	4	6.5
TOTALS	88	83.83	95	164	115	138.19	81	179.79	118	254.2

B. FLOODING

Flooding is a significant natural hazard that threatens the Town of Chester, including 100-year flood events, seasonal flooding, and flash flooding. The town is currently a non-sanctioned and active member of the National Flood Insurance Program.

A flood is defined by the National Oceanic and Atmospheric Administration (NOAA) as¹¹:

Flood: An overflow of water onto normally dry land. The inundation of a normally dry area caused by rising water in an existing waterway, such as a river, stream, or drainage ditch. Ponding of water at or near the point where the rain fell. Flooding is a longer term event than flash flooding: it may last days or weeks.

The SWCRPC Multi-Jurisdictional All Hazards Mitigation Plan provides detailed history of past flooding events and maps of known areas of flood hazard (“Water Resources” map). The following tables display FEMA disaster declarations for the Town of Chester, including the recent Tropical Storm Irene event.

Table 3: Major Disaster Declarations for Windsor County: Flood

YEAR	DATE	INCIDENT DESCRIPTION	DISASTER NUMBER
2011	1-Sep	<u>Tropical Storm Irene</u>	<u>4022</u>
2003	12-Sep	<u>Severe Storms and Flooding</u>	<u>1488</u>
2000	27-Jul	<u>Severe Storms And Flooding</u>	<u>1336</u>
1999	10-Nov	<u>Tropical Storm Floyd</u>	<u>1307</u>
1998	30-Jun	<u>Severe Storms and Flooding</u>	<u>1228</u>

¹⁰ Fire Statistics for 2010 – Vermont Department of Forest, Parks, and Recreation

¹¹ <http://www.srh.noaa.gov/mrx/hydro/flooddef.php>

1996	27-Jun	<u>Flooding</u>	<u>1124</u>
1996	13-Feb	<u>Storms and Flooding</u>	<u>1101</u>
1992	18-Mar	<u>Flooding, Heavy Rain, Ice Jams</u>	<u>938</u>
1976	5-Aug	<u>Severe Storms, High Winds, Flooding</u>	<u>518</u>
1973	6-Jul	<u>SEVERE STORMS, FLOODING, LANDSLIDES</u>	<u>397</u>
1969	30-Aug	<u>SEVERE STORMS, FLOODING</u>	<u>277</u>

The SWCRPC Region, including Chester, was not impacted by severe storms and flooding that occurred throughout the northern counties of Vermont in spring 2011. Recent notable flood events that have occurred in Chester are¹¹:

- Flash flooding (6/1960)
- Ice jams on Williams River, Middle Branch Williams River, So. Branch Williams River (2/1976)
- Ice jam on Williams River (1/1990)
- Ice jam on Williams River (1/1996)
- Ice jam on Williams River (1/1999)
- Ice jams (2) on Williams River (12/2000)
- Flooding resulted in serious damage to Popple Dungeon Road (2003) over 155k spent on flooding in 2003.
- Ice jams on Williams River (2007)
- Flash flooding following Tropical Storm Irene (2011)

Damage from **spring and 100-year flood** events can vary a great deal depending upon the amounts of precipitation, snow cover, spring melt, soil saturation levels, and topography. The Federal Emergency Management Agency (FEMA) has designated floodplains in the town for areas including the South Branch, Middle Branch, and main tributaries of the Williams River. Particularly at risk are the three village areas located along the identified floodplains and near to the confluence of the Williams River and Middle Branch Williams River. These areas are identified by FEMA as 100-year floodplain, or areas where there is a 1% annual chance of flooding in any given year.

A **100-year** flood event can be described as a flood, with a known flood stage, that has a one (1%) percent chance of happening in any given year.¹²

The areas of high population concentration and services, namely Chester Village, the Chester Depot, and Stone Village, are either within or surrounded by floodplains. A significant **flooding or 100-year flood** event in these areas would disrupt evacuation routes, and could impact many residences, special population areas, and hazardous waste storage sites.

Damage from spring and 100-year floods is influenced by the following factors:

- Estimated number of residential buildings in the 100-year flood zone: 58 structures in town are within the 100-year floodplain as mapped by FEMA of which 16 are located within the floodway.

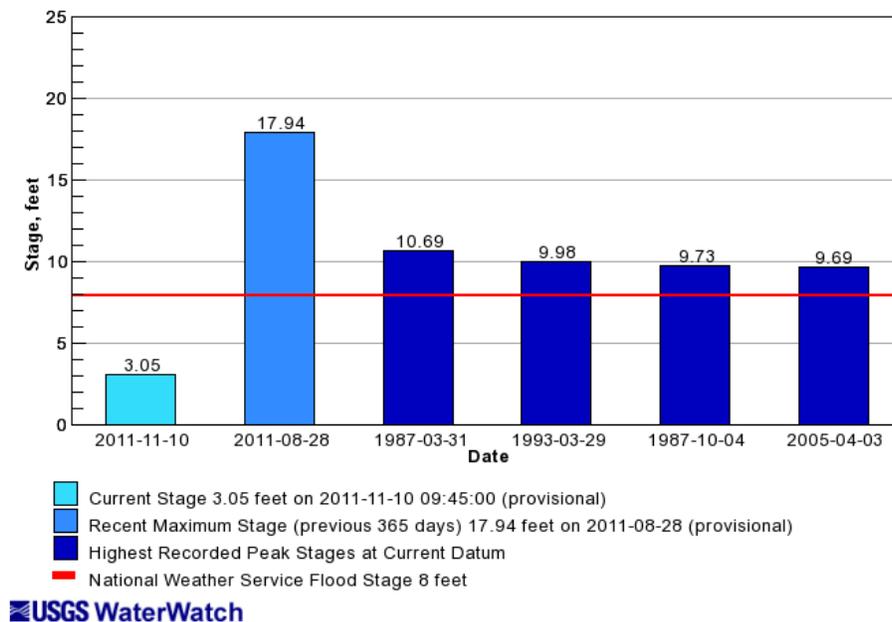
¹¹ Cold Regions Research and Engineering Laboratory (CRREL)

¹² <http://ga.water.usgs.gov/edu/100yearflood.html>

- Estimated number of commercial buildings in the 100-year flood zone: 10 structures in town are within the 100-year floodplain as mapped by FEMA of which 1 is located within the floodway.
- Estimated number of bridges and culverts within Chester from the Vermont Online Bridge and Culvert Inventory Tool is 746 (44 bridges, 704 culverts); last inventoried in 2010
- The 2009 assessed value of all residential and commercial property is \$408,561,000
- A number of Tier II sites are close to or within the flood zone, including 2 gas stations, state highway maintenance garage, and a construction business.
- The Chester-Andover Elementary School is within the flood zone.

Damage from spring runoff and 100-year flooding events can vary a greatly depending upon the amounts of precipitation, snow cover, spring melt, soil saturation levels, and topography. The following figure displays historical data of river depth for the Williams River in the Town of Rockingham, located directly south-east of Chester. This figure depicts the highest recorded water levels over the past century:

Figure #1: Historical River Levels for the Williams River
01153550 WILLIAMS RIVER NEAR ROCKINGHAM VT



The National Weather Service maintains a river gauge on the Williams River in the Town of Rockingham, located directly to the southeast of Chester. Between the two towns there are no flow interruptions such as dams or other impoundments, therefore, river gauge data on the Williams River in Rockingham may be used to determine extent within Chester. According to the National Weather Service:

- Action stage for the Williams River is 6.0 feet
- Minor flooding will begin to occur at 8.0 feet
- The record flood stage prior to Tropical Storm Irene was 10.69 feet or a flow of 11,500 cubic feet per second.

The following table displays flood events recorded by the National Oceanic and Atmospheric Administration. These flood events occurred within Windsor County with many floods affecting the area region-wide, including the Town of Chester. This represents the best available flood data at this time. The Town and SWCRPC will continue to search out more accurate and detailed historical data for this and other highest hazards.

Table 4: NOAA Flood Events in Windsor County¹²

Date	Time	Type	Property Damage
1/19/1996	9:00 AM	Flood	2.8M
1/20/1996	5:00 PM	Flood	5K
5/11/1996	3:00 AM	Flood	15K
7/13/1996	7:00 PM	Flood	5K
7/13/1996	7:45 PM	Flood	10K
6/17/1998	3:30 PM	Flood	5K
1/24/1999	3:00 PM	Flood	10K
4/4/2000	9:00 AM	Flood	10K
12/17/2000	10:00 PM	Flood	5K
4/13/2002	11:00 PM	Flood	50K
10/29/2003	3:00 PM	Flood	1K
3/28/2005	7:30 PM	Flood	5K
10/9/2005	12:15 AM	Flood	20K
1/18/2006	3:00 PM	Flood	3K
5/14/2006	10:15 AM	Flood	25K
8/6/2008	12:00 PM	Flood	100K
1/25/2010	14:28 PM	Flood	25K
10/1/2010	8:30 AM	Flood	0K
10/15/2010	9:22 AM	Flood	50K
3/6/2011	22:20 PM	Flood	0K
4/27/2011	6:00 AM	Flood	100K
8/28/2011	16:00 PM	Flood	20.0M

Ice jams are common in New England and occur during winter and spring months when river ice begins to break up and flow downstream. Such ice flows can build up against bridge abutments or other obstructions and create a temporary dam impounding large volumes of water that have the potential to flood the surrounding areas and damage infrastructure. The loss of a bridge could disrupt transportation corridors and isolate residential areas. The most devastating winter floods have been associated with a combination of heavy rainfall, warm temperatures, rapid snowmelt, and resulting ice jams. Winter weather with less than average snowfall can result in greater ice buildup on streams and rivers, potentially resulting in greater ice jam damage. Ice jams threaten many of the same properties as 100-year flood events, and damage can be expected to be similar. There are two recorded ice jams on the Williams River in Chester for the years 1976-2011 recorded by the US Army Corps of Engineers, Cold Regions Research and Engineering Laboratory (CCREL).

¹² NOAA National Climatic Data Center 1996-2011: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

Table 5: Ice Jam Events Chester, VT 1940-2010

Town	River	Jam Date
Chester	Williams River	12/17/2000
Chester	Williams River	12/17/2000
Chester	Williams River	1/24/1999
Chester	Williams River	1/19/1996
Chester	Williams River	1/23/1990
Chester	South Branch Williams River	2/1/1976
Chester	Middle Branch Williams River	2/1/1976
Chester	Williams River	2/1/1976

Many additional ice jams have occurred in town historically but have not been recorded. Ice jams frequently occur in the Williams River at bridges along VT Route 103 between Trebo Road and VT Route 10. Infrastructure damage is most likely to occur at these locations.

Flash floods were identified by the town as a natural hazard to which they are vulnerable. Flash flooding typically occurs in high elevation drainage areas as a result of summer thunderstorm activity or snow melt runoff. The National Weather Service describes a flash flood as:

“A flood caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through river beds, urban streets, or mountain canyons sweeping everything before them. They can occur within minutes or a few hours of excessive rainfall. They can also occur even if no rain has fallen, for instance after a levee or dam has failed, or after a sudden release of water by a debris or ice jam¹³”.

Infrastructure and structures along higher elevation streams and drainage areas are most susceptible to damage from flash flooding. Due to the nature of flash flood events, it is difficult to accurately predict potential losses to public infrastructure.

The damage caused by **flash flooding and 100-year flooding** varies immensely based on factors such as total rainfall, ground saturation, and river level prior to the storm. Recent events in Chester indicate that Popple Dungeon Road, homes and infrastructure along the South Branch of the Williams River, Williams River main stem, and smaller tributaries such as Potash Brook are susceptible to flooding events.

Flood damage and extent, whether it is from **100-year flooding, flash flooding, or ice jams** can be extrapolated from data provided within this hazard mitigation plan. Utilizing USGS stream gauge data, Tropical Storm Irene crested along the Williams River at a height of 17.94 feet, nearly seven feet about the previous record. The level of flooding created by this event is the ‘worst case’ scenario for the Town of Chester as indicated by the level of damage caused. From the USGS data, which represents the best available data at this time, it can be estimated that homes, businesses, and infrastructure located along the Williams River and its major tributaries may be subject to inundation with flood depths reaching nearly 10 feet.

¹³ National Weather Service <http://www.srh.noaa.gov/mrx/hydro/flooddef.php>

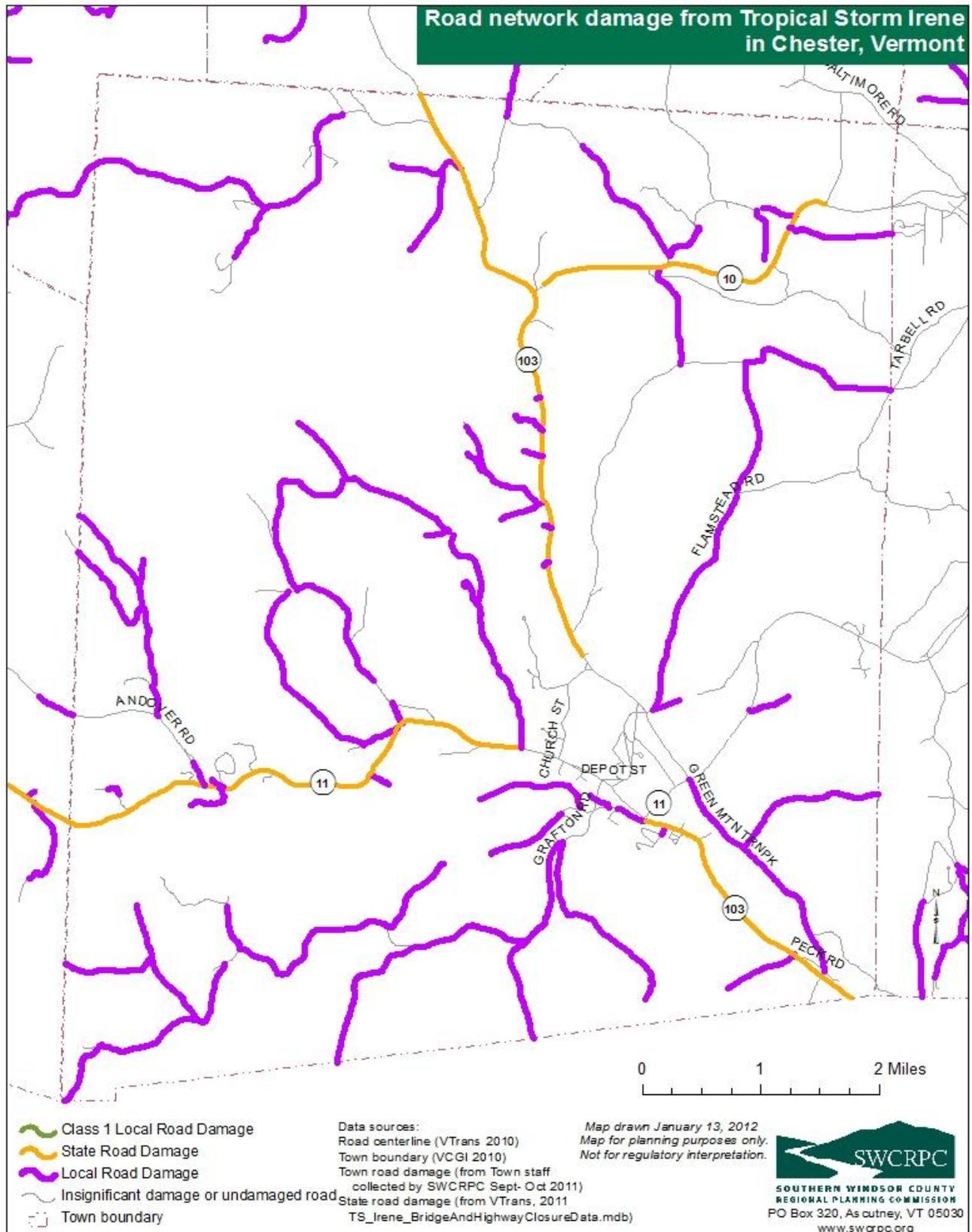
Although these events are uncommon, hazards posed can be significant challenges as seen in the Tropical Storm Irene event in the summer of 2011, which has set the benchmark for flooding extent within Chester. A map of roads damaged during Tropical Storm Irene follows.

Tropical Storm Irene, in late August, 2011 and brought much devastation to the Town of Chester. Several roads were completely washed away, leaving a river bed instead of a road. Bridges were destroyed and culverts were washed downstream. The sewer main which crosses under the Williams River was washed downstream, allowing sewage to spill into the river. Large tracts of land were washed away and homes were lost.

The total damage sustained by the Town of Chester is estimated at \$1.8 million. All roads were impacted by the storm and required repairs. In addition, most culverts required either replacement or repair. The most heavily impacted areas were as follows:

- Christmas Tree Road
- Goldthwaite Road
- Missing Link Bridge
- Popple Dungeon Road
- Potash Brook Road
- Smokeshire Road
- Wymans Falls Road
- Sewer Line Crossing under the Williams River
- Pump Stations

All work has been completed, with the exception of five bridges on Missing Link Road, Wyman Falls Road, Cavendish Gulf Road, Goldthwaite Road and Potash Brook Road.

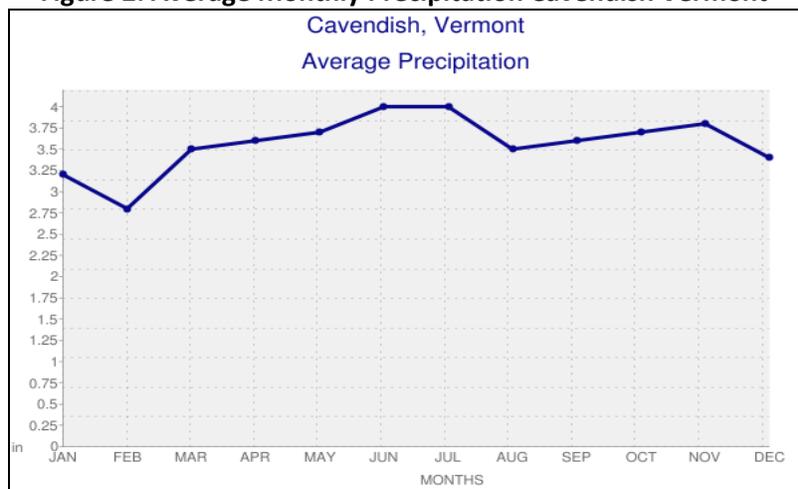


Chester, like many other towns within Southern Windsor County, is at risk for **fluvial erosion hazard** flooding events. Stream geomorphic assessments completed for neighboring towns indicate that the area is prone to erosion hazards and additional assessments are necessary.

No source of historical flood and precipitation data could be identified for the Town of Chester, but the Town of Cavendish, Vermont located a few miles to the north has historical flood data for the last 100 years. Given the close proximity of the towns, precipitation and flood data for the Town of Cavendish can be used gain an understanding of the potential impacts these hazards pose to the Town of Chester.

The following graph was compiled from 108 years of climate data and reveals that the months of June and July experience the greatest amount of precipitation on average. It is also notable that the Months of March and April have relatively high precipitation averages as these are also the months during which the winter snow cover melts, further increasing the water load of local streams and rivers.

Figure 2: Average Monthly Precipitation Cavendish Vermont¹⁴



C. SEVERE WINTER WEATHER

Winter storms and blizzards, with snow, ice, and freezing temperatures in varying combinations are commonplace in Chester and occur town wide. Heavy wet snows of early fall and late spring, as well as ice storms can result in property damage and in loss of electric power, leaving people without adequate heating capability. Power loss is often the result of downed trees which can also disrupt traffic and emergency response by making roads and driveways impassable. Over 176 storm events have been reported in Windsor County since 1993 and have resulted in over 12 million dollars in property damage¹⁵.

A winter storm is considered severe when there is a possibility of:

- Six or more inches of snow fall at a given location within 48 hours,
- There is property damage, injuries, or death

A **nor'easter** is a large weather system traveling from South to North, passing along or near the

¹⁴

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

Atlantic seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds impact the coast and inland areas from a northeasterly direction. The sustained winds may meet or exceed hurricane force. The Dolan-Davis Nor'easter Classification Scale is utilized to determine the severity of Nor'easters:

Table 6: The Dolan-Davis Nor'easter Classification Scale

STORM CLASS	% OF STORMS	AVERAGE RETURN INTERVAL	AVERAGE PEAK WAVE IN FEET	AVERAGE DURATION IN HOURS
1 WEAK	49.7	3 DAYS	6.6	8
2 MODERATE	25.2	1 MONTH	8.2	18
3 SIGNIFICANT	22.1	9 MONTHS	10.8	34
4 SEVERE	2.4	11 YEARS	16.4	63
5 EXTREME	0.1	100 YEARS	23.0	96

Below is a historical record of winter snowfall recorded at the Chester town garage since 1984:

SNOWFALL

Snowfall is measured at the Town Garage, elevation 622 feet above sea level. Some areas of town exceed 1,800 feet in elevation; therefore, snow totals there may be higher. Steadman Mountain at 2,300 is the highest elevation in Town.

Shown in Inches

SEASON	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	TOTAL
1984-85	0	10	16.25	7	11	13	5	62.25
1985-86	0	11.5	14.5	27	18	8.5	8.5	79.5
1886-87	0	18	23	54.5	1	9	4	109
1987-88	4	11	15	19	36	7.5	1	89.5
1988-89	0	0	9.5	7.5	15.5	9	6	47.5
1989-90	0	5	15.5	38	27	6	0	91
1990-91	0	1	13.5	21	10.5	8.5	0	54.5
1991-92	0	2	20.5	5.5	8.5	5	7.5	47
1992-93	0	3	5.5	26.5	40	26	7	108
1993-94	.5	0	13.5	46	13	22	0	94
1994-95	0	5	6	7	15	4	0	37
1995-96	0	8	29.5	32	9.5	22.5	11	112.5
1996-97	.5	4	19.75	30	22.75	22	8	106.5
1997-98	0	19	13	25.5	7	15	0	79.5
1998-99	0	1.5	6	34	9.5	19	0	70
1999-00	0	.5	2.5	20.25	26.5	15	1	65.25
2000-01	.5	1	16	6	27.5	53	0	103
2001-02	0	0	8	30.5	5.5	20.5	2	68.5
2002-03	7	18.75	31.5	27.5	17.5	5	15.5	122.75
2003-04	.5	5	30.75	10	14.5	12.25	0	68.5
2004-05	0	0	11	29.75	16.25	22	0	79
2005-06	1	4.5	17.5	21.5	13.5	0	0	56.5
2006-07	0	0	4	4.25	24.25	25.25	18.75	76.5
2007-08	0	2.5	40	17.5	38	12	1	111
2008-09	0	2	35	35	15.5	6.5	0	94
2009-10	0	0	22					
Average	0.56	5.12	16.83	21.92	17.73	14.74	3.85	76.99

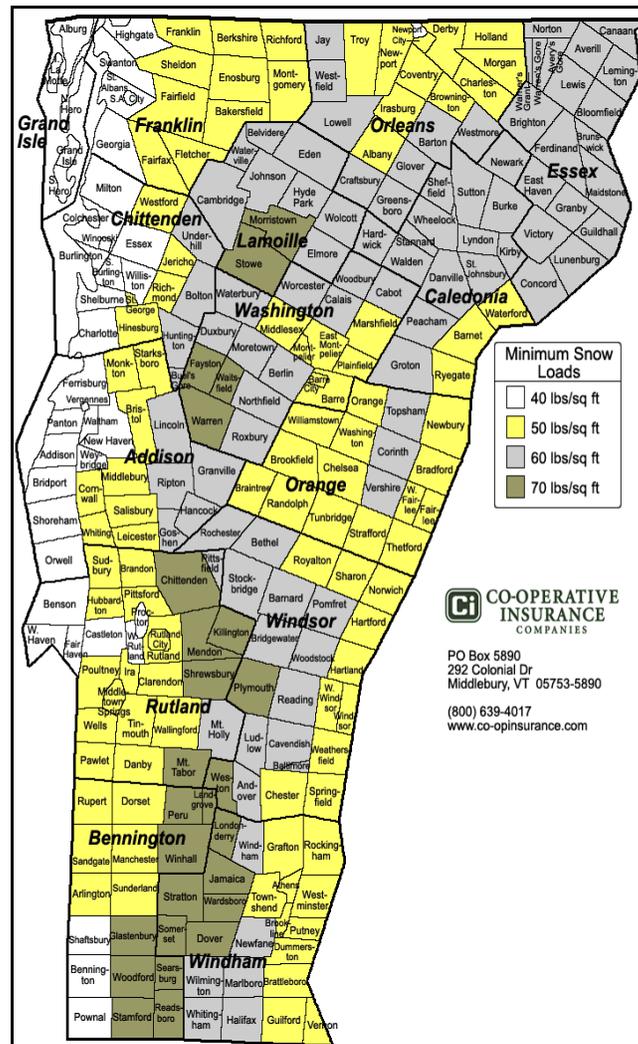
Blizzards are defined by the National Weather Service as “sustained winds or frequent gusts of 35 mph or greater (and) considerable falling and/or blowing snow reducing visibility frequently to 1/4 mile or less for a period of three hours or more¹⁶.” Damage from blizzards, snow, and ice storms can vary 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 in Chester is \$408,561,000¹⁷. Assuming a range of town-wide damage of 1% to 5%, a heavy snow or ice storm could result in \$4.8 million to \$20.4 million in total damage. The table below displays average minimum snow loads for the state of Vermont. Chester residents can expect at least 50 pounds of weight per square foot on their infrastructure during winter months.

Figure#3: Expected Snow Loads for Vermont Towns¹⁸

¹⁶ National Weather Service Glossary

¹⁷ Vermont Department of Taxes 2010

¹⁸ Vermont State Hazard Mitigation Plan



Ice storms are defined by the National Weather Service as “a storm which results in the accumulation of at least 0.25-inch of ice on exposed surfaces.¹⁹” The 1998 ice storm had a tremendous impact on Northern New England, with high elevation locations being the most severely impacted. Multiple sources state that a ¼ inch of ice accumulation from an ice storm can add 500 pounds of weight on the lines between two power lines.

Power Failure is a common, annual event in Chester and can occur anywhere in town. Power failures are typically a secondary hazard caused by severe winter weather and was identified in the hazard vulnerability assessment as a “moderate” hazard to the town due to its frequency. Power failures may also result from disruptions in the New England or national power grid, as indicated by the widespread power outages in August 2003. Dead or dying trees in close proximity to power lines pose a particular threat for power failure as these trees are often brought down by winter storms.

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

¹⁹ National Weather Service Glossary

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. Elderly or homebound people who may require electricity for medical equipment, such as a personal breathing device, are particularly at risk.

The following table displays a full historical record of winter storm events and federally declared disasters for Windsor County. Although this data is not town specific it is the best available data at this time. Severe winter weather events are common in the Region and have incurred over 12 million dollars in cost over the past twenty years.

Table 7: Major Disaster Declarations for Windsor County: Winter Weather²⁰

YEAR	DATE	INCIDENT DESCRIPTION	DISASTER NUMBER
1998	15-Jan	<u>Ice Storms</u>	<u>1201</u>
1996	13-Feb	<u>Storms and Flooding</u>	<u>1101</u>

Table 8: Winter Storm Events Windsor County 1993-2011²¹

Date	Time	Type	Property Damage
1/3/1993	1300	Freezing Rain	500K
1/13/1993	100	Heavy Snow	500K
2/12/1993	700	Heavy Snow	500K
2/16/1993	700	Heavy Snow	500K
2/21/1993	1100	Heavy Snow	50K
3/23/1993	2200	Snow	50K
4/1/1993	300	Snow	50K
4/22/1993	1200	Snow	50K
12/4/1993	1600	Snow	50K
12/21/1993	100	Heavy Snow	500K
12/29/1993	2000	Heavy Snow	50K
2/8/1994	800	Heavy Snow	50K
2/23/1994	500	Heavy Snow	50K
3/2/1994	1800	Heavy Snow	500K
3/21/1994	2030	Heavy Snow	500K
12/7/1994	500	Snow	25K
12/9/1994	1600	Snow/sleet	0.2M
12/10/1994	2000	Snow/sleet	0.1M
12/31/1994	2000	Snow/freezing Rain	0.2M
1/1/1995	0	Snow Freezing Rain	50K
1/6/1995	2100	Snow Freezing Rain	50K

²⁰FEMA Vermont Disaster History http://www.fema.gov/news/disasters_state.fema?id=50

²¹ NOAA National Climatic Data Center 1996-2011 <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

1/11/1995	1000	Snow Freezing Rain	25K
2/4/1995	500	Heavy Snow	50K
2/15/1995	1500	Snow Freezing Rain	25K
3/8/1995	1800	Snow	50K
4/15/1995	1800	Snow	25K
11/14/1995	1200	Heavy Snow	45K
12/14/1995	800	Heavy Snow	0
12/19/1995	1200	Heavy Snow	0
1/3/1996	12:00 AM	Winter Storm	95K
1/12/1996	1:00 PM	Winter Storm	80K
2/16/1996	10:00 PM	Winter Storm	60K
3/3/1996	5:00 AM	Winter Storm	30K
3/5/1996	4:00 AM	Winter Storm	15K
3/7/1996	12:00 PM	Winter Storm	125K
4/10/1996	3:00 AM	Winter Storm	55K
11/26/1996	1:00 AM	Winter Storm	20K
12/7/1996	12:00 PM	Winter Storm	560K
1/9/1997	10:00 PM	Winter Storm	180K
1/24/1997	6:00 PM	Winter Storm	85K
1/27/1997	6:00 PM	Winter Storm	110K
2/4/1997	9:00 PM	Winter Storm	55K
3/5/1997	10:00 PM	Winter Storm	385K
3/14/1997	9:00 AM	Winter Storm	205K
3/31/1997	9:00 AM	Winter Storm	95K
4/18/1997	10:00 AM	Winter Storm	220K
11/14/1997	8:00 AM	Winter Storm	80K
11/22/1997	6:00 AM	Winter Storm	20K
12/22/1997	12:00 AM	Heavy Snow	25K
12/25/1997	3:00 AM	Light Snow	5K
12/29/1997	10:00 PM	Winter Storm	240K
1/6/1998	9:00 PM	Ice Storm	480K
1/15/1998	10:00 AM	Winter Storm	55K
1/23/1998	9:00 AM	Winter Storm	80K
2/24/1998	12:00 PM	Winter Storm	60K
3/14/1998	10:00 AM	Heavy Snow	100K
3/21/1998	10:00 AM	Heavy Snow	115K
1/3/1999	2:00 AM	Winter Storm	40K
1/8/1999	5:00 PM	Winter Storm	65K

1/13/1999	2:00 AM	Light Snow	60K
1/14/1999	3:00 PM	Winter Storm	60K
1/27/1999	8:00 PM	Light Snow	60K
3/6/1999	8:00 AM	Winter Storm	0
11/15/1999	3:00 PM	Light Snow	2K
12/14/1999	8:00 PM	Light Snow	12K
1/7/2000	5:00 PM	Light Snow	50K
1/25/2000	10:00 AM	Winter Storm	45K
1/30/2000	11:00 PM	Light Snow	40K
2/10/2000	10:00 PM	Light Snow	8K
2/13/2000	6:00 PM	Winter Storm	60K
2/18/2000	2:00 PM	Winter Storm	80K
3/11/2000	4:00 PM	Winter Storm	5K
3/16/2000	9:00 PM	Winter Storm	20K
4/9/2000	11:00 AM	Light Snow	20K
10/29/2000	8:00 AM	Light Snow	3K
12/14/2000	1:00 AM	Light Snow	10K
12/19/2000	11:00 PM	Light Snow	30K
12/31/2000	5:00 AM	Winter Storm	30K
2/5/2001	5:00 PM	Winter Storm	150K
3/5/2001	3:00 PM	Winter Storm	200K
3/9/2001	6:00 PM	Winter Storm	20K
3/22/2001	3:00 PM	Winter Storm	150K
3/30/2001	11:00 AM	Winter Storm	150K
12/8/2001	9:00 PM	Light Snow	20K
12/17/2001	9:00 AM	Light Snow	0
1/7/2002	1:00 AM	Heavy Snow	50K
1/15/2002	9:00 PM	Light Snow	8K
1/31/2002	7:00 PM	Winter Storm	30K
2/1/2002	12:00 AM	Winter Storm	35K
2/17/2002	5:30 AM	Light Snow	80K
2/27/2002	12:00 PM	Snow Squalls	8K
3/18/2002	10:00 AM	Light Snow	7K
3/20/2002	7:00 PM	Winter Storm	110K
4/22/2002	8:00 PM	Light Snow	4K
10/22/2002	11:00 PM	Light Snow	2K
10/25/2002	11:00 PM	Light Snow	3K
11/6/2002	5:00 AM	Winter Storm	1K

11/17/2002	4:00 AM	Winter Storm	45K
12/12/2002	4:00 AM	Winter Storm	30K
12/25/2002	5:00 PM	Winter Storm	45K
1/4/2003	2:00 AM	Winter Storm	60K
1/9/2003	1:00 AM	Winter Weather/mix	5K
2/18/2003	2:00 AM	Winter Storm	45K
4/4/2003	5:00 AM	Winter Storm	80K
12/6/2003	2:30 PM	Winter Storm	40K
12/15/2003	1:00 AM	Winter Storm	20K
2/3/2004	11:00 PM	Winter Storm	20K
2/6/2004	8:00 AM	Winter Weather/mix	40K
3/16/2004	8:00 PM	Winter Storm	15K
1/2/2005	3:00 PM	Winter Weather/mix	90K
1/6/2005	6:00 AM	Winter Weather/mix	20K
1/12/2005	9:00 AM	Winter Weather/mix	50K
1/22/2005	11:00 PM	Winter Storm	10K
1/26/2005	4:00 AM	Winter Weather/mix	45K
2/10/2005	10:00 AM	Winter Storm	80K
2/14/2005	6:00 PM	Winter Weather/mix	15K
2/21/2005	1:00 AM	Winter Weather/mix	35K
3/1/2005	7:00 PM	Winter Storm	110K
3/8/2005	8:00 PM	Winter Storm	120K
3/12/2005	2:00 PM	Winter Storm	10K
3/23/2005	10:00 PM	Winter Weather/mix	15K
3/28/2005	5:00 AM	Winter Weather/mix	20K
10/25/2005	8:00 PM	Winter Weather/mix	100K
11/24/2005	1:00 PM	Winter Weather/mix	60K
12/9/2005	11:00 AM	Winter Storm	40K
12/16/2005	10:00 AM	Winter Storm	60K
1/15/2006	4:00 AM	Winter Storm	40K
2/24/2006	5:00 AM	Winter Weather/mix	15K
2/25/2006	6:00 PM	Winter Storm	30K
12/7/2006	16:00 PM	Winter Weather	5K
12/30/2006	6:00 AM	Winter Weather	10K
1/1/2007	2:00 AM	Winter Weather	5K
1/15/2007	5:00 AM	Winter Storm	10K
1/19/2007	18:00 PM	Winter Weather	2K
2/2/2007	16:00 PM	Winter Weather	3K

3/2/2007	2:00 AM	Winter Storm	10K
4/4/2007	15:00 PM	Winter Storm	10K
4/12/2007	6:00 AM	Winter Storm	10K
4/15/2007	9:00 AM	Winter Storm	25K
12/2/2007	16:00 PM	Winter Storm	10K
12/11/2007	20:00 PM	Winter Weather	5K
12/13/2007	14:00 PM	Winter Weather	3K
12/16/2007	2:00 AM	Winter Storm	10K
12/19/2007	16:00 PM	Winter Weather	2K
1/1/2008	13:00 PM	Winter Storm	10K
1/11/2008	3:00 AM	Winter Weather	10K
1/14/2008	3:00 AM	Winter Weather	5K
2/1/2008	11:00 AM	Winter Weather	5K
2/5/2008	1:00 AM	Winter Weather	5K
2/6/2008	3:00 AM	Winter Storm	5K
2/9/2008	16:00 PM	Winter Weather	5K
2/12/2008	21:00 PM	Winter Weather	5K
2/26/2008	12:00 PM	Winter Storm	10K
3/1/2008	1:00 AM	Winter Storm	10K
3/4/2008	23:00 PM	Winter Weather	5K
3/28/2008	3:00 AM	Winter Weather	5K
11/24/2008	23:00 PM	Winter Weather	5K
12/11/2008	16:00 PM	Winter Storm	250K
12/17/2008	1:00 AM	Winter Weather	5K
12/19/2008	13:00 PM	Winter Storm	5K
12/21/2008	8:00 AM	Winter Storm	10K
2/19/2009	12:00 PM	Winter Weather	0K
2/22/2009	7:00 AM	Winter Storm	15K
3/9/2009	2:00 AM	Winter Weather	1K
11/27/2009	21:00 PM	Winter Weather	4K
12/9/2009	6:00 AM	Winter Storm	5K
12/9/2009	6:00 AM	Winter Weather	0K
12/28/2009	7:00 AM	Winter Weather	5K
1/2/2010	15:00 PM	Winter Storm	15K
1/2/2010	15:00 PM	Winter Weather	5K
2/23/2010	15:00 PM	Winter Storm	50K
12/13/2010	15:00 PM	Winter Weather	5K
12/26/2010	18:00 PM	Winter Storm	15K

1/18/2011	4:00 AM	Winter Storm	5K
2/7/2011	21:00 PM	Winter Weather	5K
3/6/2011	18:00 PM	Winter Storm	10K
			12.133M

As evidenced by the graph and data above, severe winter weather is a yearly hazard within Vermont, Windsor County, and Chester.

This data represents the most town specific data available for winter storm events within the Town of Chester. Similar to other hazards, more detailed information will be sought out during future meetings of the Hazard Mitigation Review Committee. Town archives, local interviews, libraries, and the Chester Historical Society will also be utilized to build a comprehensive database of previous occurrence data.

D. TRANSPORTATION INCIDENTS OR DISRUPTION

Highway accidents are common in Chester. The table below lists accidents recorded by VTrans for the years 2005 through 2009. Accidents on roadways can cause property damage, bodily injuries, or death and increased automobile insurance rates for individual drivers. Highway accidents can also result in short term disruption of important local and regional travel corridors.

Table#8: Highway Accident Locations 2005-2009

Route	# of Accidents	Injuries	Fatalities
VT 11	66	26	1
VT 103	87	38	0
VT-10	35	22	0
VT-35	6	4	0
Weston-Andover Rd.	1	0	0

A significant threat to the town posed by transportation incidents is the potential for releasing hazardous materials into the surrounding area.

E. HAZARDOUS MATERIALS

There are multiple sources of hazardous material incident data in the State of Vermont and each gives a different picture of the frequency of Hazardous Material Spills in the town and in the region.

The US Department of Transportation lists seven hazardous materials incidents that have occurred in Windsor County since 1971. Only one of the incidents, occurring in 1998, was classified as serious, causing \$64,000 dollars’ worth of damage when a tanker truck hit a bridge on Route 11 in Chester, overturned, and ruptured, releasing 2,400 gallons of fuel oil. This was also the only incident that occurred as the result of a traffic accident. The six other incidents were due to overfilling, dropping, or leaking of the material upon delivery and released less than 50 gallons of material. Hazardous materials included in these incidents were gasoline, potassium hydroxide solution, liquefied petroleum gas, paint, and the previously mentioned fuel oil.

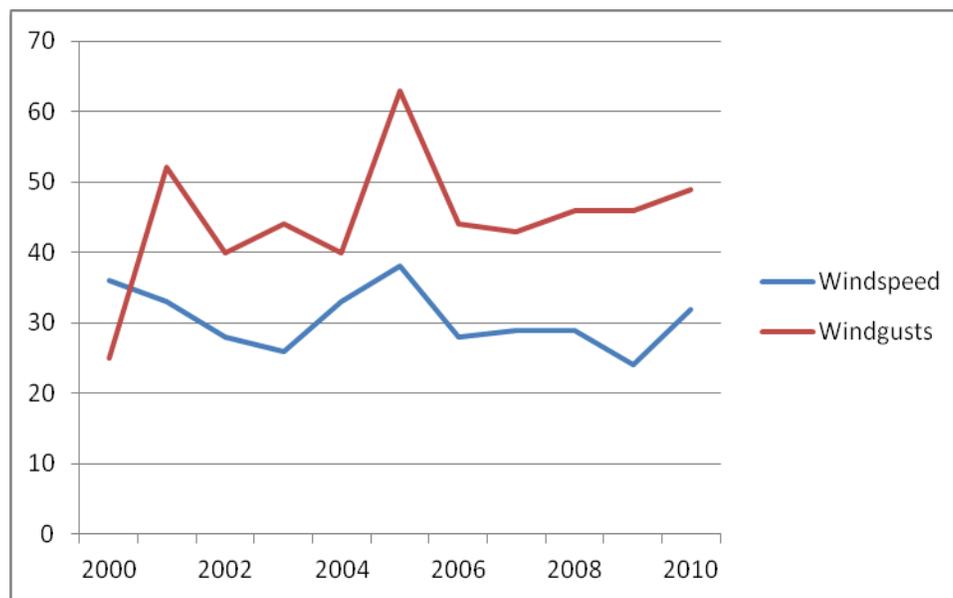
F. HIGH WIND EVENTS

High winds can result from hurricanes, tropical storms, summer thunderstorms, and tornadoes. The State of Vermont Emergency Operations Plan states that hurricanes and tropical storms are rare events in the region and that high winds are most commonly the result of severe summer thunderstorms. Damage from summer thunderstorms in the region is limited in both scope and cost. The table below describes the damage extent of different wind speeds.

Table #9: Beaufort Wind Scale

Beaufort Number	Wind Speed	Conditions
6	25 to 31 mph	Large branches in motion; whistling in telephone wires.
7	32 to 38 mph	Whole trees in motion; inconvenience felt walking against wind.
8 - 9	39 to 54 mph	Twigs break off trees; wind generally impedes progress.
10 - 11	55 to 73 mph	Damage to chimneys and TV antennas; pushes over shallow-rooted trees. Severe thunderstorm criteria begin (58 mph).
12 - 13	74 to 112 mph	Peels surfaces off roofs; windows broken; mobile homes overturned; moving cars pushed off road.
14 - 15	113 to 157 mph	Roofs torn off houses; cars lifted off ground.

The following graph displays a historical record of maximum wind speeds for the nearby Town of Cavendish Vermont. This is the most detailed information available for windspeed in the Chester area. Over the past decade, the highest recorded windspeed approached 40 miles per hour with gusts of wind topping 60 miles perhour.

Figure 4: Maximum Windspeed (mph) Cavendish Vermont 2000-2010²²

Using the above data, the likely magnitude for future high wind events will fall between 40 and 50mph or Beaufort scale number 8-9 and will likely result in downed trees and small damage. However, the possibility remains for a larger high wind event such as the 1998 tornado, a F3 on the Enhanced Fujita Scale.

Hurricanes are an infrequent event in Chester. The Vermont State Hazard Mitigation Plan states that “the last major windstorm disaster in Vermont was the 1938 hurricane.” More often, Vermont experiences localized micro-bursts and wind shears that tend to knock down trees and blow the roofs off barns and other structures. Aside from trees falling on houses, the major problem with a 1938 hurricane type event is widespread power outages from downed trees. This is a function of Vermont’s very rural nature with a large segment of its population living in remote locations dependent upon long extensions of the power grid.

High wind events such as hurricanes and tornadoes are very infrequent events with the Town of Chester; therefore, there is an acknowledged lack of previous occurrence data. During the next plan update process, all available data sources will be utilized in an effort to develop the most comprehensive list as possible. Data sources may include the National Weather Service, Burlington Office, State of Vermont historical data, Chester historical society along with the knowledge of Chester residents.

Tornadoes have the potential to cause more significant damage but occur rarely in our area and their effects, although severe, are very localized in extent. The State of Vermont Hazard Mitigation Plan states that “Overall, Vermont has averaged less than one tornado per year since 1950. This ranks the state as 47th out of the 50 states in tornado frequency.” The largest tornado that has occurred within 50 miles of the Town of Chester occurred in 1998 and registered as an F3 tornado, with wind speeds over 158 miles

²²Historical windspeed data from Wunderground: <http://www.wunderground.com/>

per hour²³. The vast majority of tornadoes that have occurred in our region had wind speeds of less than 113 mph. There are no reported deaths from tornadoes in our region. No high wind hazard areas have been identified or mapped in our region.

Power failure is a common secondary hazard caused by high wind events and was identified in the hazard vulnerability assessment as a “moderate” hazard to the town due to its annual frequency of occurrence. Power outages can occur on a town-wide scale. Power failures are typically the result of power lines damaged by high winds or heavy snow/ice storms, but 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 as these trees are often brought down by winter storms.

Potential loss estimates are difficult to predict for power failures, which are typically isolated in geographic area and short in duration. Therefore, they often have only a minimal impact on people and property. Power failures usually result in minor inconveniences to residents; however, longer duration events may result in the loss of perishable items as well as business losses. The loss of power for extended periods of time would be particularly difficult on the milking operations at the three Chester dairy farms. Power outages in winter months could result in the loss of the ability to heat homes, as well as an increase in bursting water pipes and the resulting structural water damage.

G. EARTHQUAKE

An earthquake is a sudden rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth’s surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, avalanches, and tsunamis. The magnitude and intensity of an earthquake is determined by the use of scales like the Richter Scale and the Mercalli Scale.

Table #10: The Richter Scale

Magnitude	Effects
Less than 3.5	Recorded on local seismographs, but generally not felt.
3.5 - 5.4	Often felt, but rarely cause damage.
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can cause damage to poorly constructed buildings and other structures in areas up to about 100 kilometers across where people live.
7.0 - 7.9	"Major" earthquake. Can cause serious damage over larger areas.
8.0 - 8.9	"Great" earthquake. Can cause serious damage and loss of life in areas several hundred kilometers across.
9	Rare great earthquake. Can cause major damage over a large region over 1000 km across.

²³ <http://www.homefacts.com/tornadoes/Vermont/Windsor-County/Windsor.html>

New England states are located on the North American Tectonic Plate and are subject to internal plate earthquakes, as opposed to plate boundary earthquakes that are prevalent in California. New England earthquakes are not directly correlated with known fault lines and affect a wider geographic area than the western quakes when they occur.

The table below shows significant historical earthquake information for the State of Vermont. The effects of these earthquakes were minimal but did occur statewide, including the Town of Chester. The largest earthquake to occur within the state registered a 4.1 magnitude on the Richter scale²⁵ meaning that it was likely felt by many residents in the area but did not cause damage to buildings.

Table 12: Significant Earthquakes with Vermont Epicenters²⁶

Date	Time	Mag.	MMI	Epicenter
12/18/1867	Unknown	Unknown	V	Burlington, VT
4/10/1962	09:30am	4.1	V	Middlebury, VT
7/06/1943	05:10pm	4.1	IV	Swanton, VT
3/31/1953	07:59am	4	V	Brandon, VT

The odds that a damaging earthquake with a magnitude of 5 or more will occur somewhere in New England in any given year are 1 in 20 or 90% probability in within the next 50 years. The odds for a magnitude 6 earthquake are 1 in 300 or about 30% in 50 years.

Although this hazard is listed in the Regional Plan as a significant threat to our area, the Hazard Mitigation Committee assessed their vulnerability to this threat to be “low” due to the infrequent nature of earthquake events in the region. The State of Vermont Emergency Operations Plan states that “sixty-three known or suspected earthquakes have been centered in Vermont since 1843.” The plan goes on to state that “there is little earthquake risk in Vermont at 100 and 250 year recurrence intervals: however, there is a potential risk in Vermont at the 500-year recurrence level.” The State Plan also cites a study that identified five likely earthquake epicenters in our region and concludes that earthquakes at these locations would result in “tens to hundreds of millions of dollars in structural and economic losses and undetermined casualties.”

Earthquakes pose a hazard to the Town of Chester due to the historical nature of residential and commercial buildings in the town. The historic nature of buildings is problematic as many of these structures are not securely fastened to their foundations, making them more vulnerable to earthquake damage. A full analysis of regional earthquake vulnerability can be found in Appendix B of the Regional Plan, the Hazus Earthquake Analyses Maps, which estimate between \$28,000 and \$143,000 dollars in structural damage town wide during a 500 year earthquake, predicted to have a magnitude between 5.7 and 6.6.

²⁵ A Report on the Seismic Vulnerability of the State of Vermont by John E. Ebel, Richard Bedell and Alfredo Urzua, July, 1995.

²⁶ A Report on the Seismic Vulnerability of the State of Vermont by John E. Ebel, Richard Bedell and Alfredo Urzua, July, 1995.

MITIGATION STRATEGY

EXISTING HAZARD MITIGATION AUTHORITIES, POLICIES, PROGRAMS, AND RESOURCES

The following policies, programs, and activities supporting hazard mitigation are currently in place and being implemented by the Town of Chester.

The town currently participates in the NFIP program and will continue to regulate floodplain use through the Chester Flood Hazard Regulations last updated and adopted on September 26, 2007; these regulations refer to the FEMA flood insurance rate maps last revised by FEMA in 2007 and adopted on September 28th, 2007. The town will continue to enforce these regulations to maintain future NFIP compliance. As outlined in the regulations, the Administrative Officer is charged with implementing and advising residents on floodplain development and NFIP compliance.

One structure in Chester has been listed as repetitive loss by FEMA, a non-residential structure. The building carries flood insurance and is currently valued at approximately \$319,000. There are 44 NFIP insurance policy holders within the Town of Chester, 31 of which are located in the 100 year flood zone. Thirty nine claims have been filed since 1978, totaling \$74,734 dollars in payouts.

The following authorities, policies, programs, and resources related to hazard mitigation are currently in place and/or being implemented in the Town of Chester in addition to the NFIP. These programs reduce the effects of hazards to existing, new, and future buildings, infrastructure, and critical facilities by preventing their location in identified hazard areas and ensuring that infrastructure and buildings are designed to minimize damage from hazard events. The Committee analyzed these programs for their effectiveness and noted any improvements that may be needed.

Table#11: Existing Resources for Mitigating Hazards: Authorities, Policies, and Programs

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness
Town Plan	Plan for coordinated town-wide planning for land use, municipal facilities, etc.	Effectively addresses issues with floodplains, transportation, safety, municipal and critical facilities; revised and readopted in 2010	Plan is updated on a five year cycle, the next revision may be strengthened to include additional hazard mitigation goals and policies
Basic Emergency Operations Plan	Basic municipal procedures for emergency response	Outlines procedures for call-outs, evacuations, etc.; last updated in 2010	Plan is reviewed and updated yearly following town meeting; statewide template can restrict additional functionality
School Emergency Response Protocol	School procedures for emergency response	Utilizes template provided by state; provides a checklist of actions for use by administrators and first responders during emergency situations	Coordinating response procedure among planning tools may improve effectiveness
LEPC All Hazards	Outline resources	Effective in providing data	Should be revised to include

Resource Guide	available to town in emergency situations	and resources to town first responders	resources specific to Chester
Mutual Aid – Emergency Services	Agreement for regional coordinated emergency services	Member of Keene and Connecticut Valley Mutual Aid	All mutual aid agreements should be formalized
Road Standards	Design and construction standards for roads and drainage systems	Effective through continued use and implementation	Continued implementation of road standards is critical to effectiveness
Subdivision Regulations	Regulates the division of land, standards for site access and utilities	Effective through their continued implementation	Continued updates and enforcement are important for continued effectiveness
Flood Hazard Area Regulations	Regulates development in FEMA flood hazard areas	Effective at limiting development in known hazard areas	Continued updates and enforcement are critical to greater effectiveness
Site Plan Review	Reviews plans for development	Effective in addressing drainage and impervious surface area	Continued use of this mechanism will help prevent additional hazards
National Flood Insurance Program (NFIP)	Provides ability for residents to acquire flood insurance	Effective, Chester is compliant with the NFIP program	Flood maps should be updates, town may pursue CRS rating
Maintenance Programs	Bridge & Culvert Inventory	Effective at tracking and planning infrastructure upgrades	Inventories should be kept current when possible
Access Permits	Regulates driveway access along town-maintained roads	Effective in limiting the number of road cuts, thereby reducing the potential for transportation issues	Continued enforcement of permit regulations will maintain effectiveness
Entertainment Permits	Addresses fire safety and public occupancy issues	Effective cooperation with VT Labor and Industry	Continued enforcement will maintain effectiveness
Local Emergency Planning Committee 3	Volunteer organization involved in regional hazard mitigation efforts	Effective and important contributor in hazard mitigation planning	Greater town participation at the regional meetings would be beneficial
Southern Windsor County Regional Planning Commission	Regional organization working to further emergency management and hazard mitigation goals	Effective in assisting towns in the adoption of new/updated regulations and the revision of planning tools	The RPC should focus on improving the planning process and investigate additional sources of historical data on hazards

HAZARD MITIGATION GOALS, ACTIONS, AND PROJECTS

The following sections detail the mitigation goals and potential mitigation actions that the town has identified to aid in the reduction of threats posed by recognized hazards. The implementation schedule that follows this section is a table of actions that the town has targeted for implementation during the five year cycle of this plan.

- *Currently incorporated in Town Planning Documents*
- *Recommended for inclusion in future Planning Documents/Policies*

UNIVERSAL HAZARD MITIGATION GOALS

The following general goals were identified by the Hazard Mitigation Committee to reduce or avoid long term vulnerabilities to identified hazards:

- 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 to 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, All-Hazards Emergency Operation Plan, Capital Improvement Plan, Basic Emergency Operations Plan and School Crisis Plan.
- Ensure that members of the general public continue to be part of the hazard mitigation planning process.

MITIGATION GOALS, ACTIONS, AND PROJECTS FOR HIGHEST HAZARDS

The following goals, actions, and projects have been identified for the highest hazards facing the town:

A. FIRE

Goals:

- Personnel are well-trained at present time – Strive to maintain this same level of competency into the future by continuing to pay for transportation and tuition costs for staff training activities.
- Reduce the likelihood and impact of structure and forest fires within the town.

Recommended Actions and Projects:

- New emergency services facility to accommodate expansion needs per growing tourist and residential demands.
- Continue to replace equipment on a rotating basis through the Capital Budget in order to ensure the town has sufficient equipment for emergency response.
- Utilize Village Center designation to make building owners eligible for tax credits for code improvements (i.e. sprinklers).

B. FLOODING

Goals:

- Reduce the impacts of flooding events upon the town.

Recommended Actions and Projects:

- Potentially purchase repetitive loss properties within Chester.
- Stabilize the unstable river banks on the Middle Branch of the Williams River.
- Additional stream geomorphic assessment work on the Williams River and significant tributaries.
- Encourage FEMA to update flood zone map.
- Annual programs to upgrade drainage ditches and culverts.
- Maintain up-to-date town wide culvert and bridge inventory.

C. SEVERE WINTER WEATHER

Goals:

- Reduce the impact of severe winter weather on the town, as well as the additional hazards that result from storm events such as loss of power and communication abilities.

Recommended Actions and Projects:

- Continue to replace equipment on a rotating basis through the Capital Budget in order to ensure the town has sufficient equipment for emergency response.
- Install redundant power systems at critical facilities.
- Develop procedures and plans for the safe relocation of at needs populations during emergency events.
- Conduct engineering study to assess the vulnerability of critical facilities to severe winter weather events.

D. TRANSPORTATION INCIDENTS OR DISRUPTION

Goals:

- Provide a safe and reliable transportation network.
- Minimize the threats of hazard events on the transportation network.

Recommended Actions and Projects:

- Maintain up-to-date town wide culvert and bridge inventory.
- Maintain annual programs to upgrade drainage ditches and culverts.
- Increase enforcement of current regulations and laws to reduce speeding, thereby reducing the likelihood and/or severity of transportation incidents.

E. HAZARDOUS MATERIALS

Goals:

- Reduce the impacts of hazardous material incidents on the town.

Recommended Actions and Projects:

- Continue to replace equipment on a rotating basis through the Capital Budget in order to ensure the town has sufficient equipment for emergency response.
- Increase enforcement of current regulations and laws to reduce speeding, thereby reducing the likelihood and/or severity of transportation incidents.
- Continue to encourage hazardous materials training and response capability within Chester first response agencies.

F. HIGH WIND EVENTS

Goals:

- Reduce the likelihood and impact of power loss caused by high wind events

Recommended Actions and Projects:

- Purchase emergency power generators for the Town Hall and Treatment Plant, as well as a smaller mobile generator.
- Conduct engineering study to assess the vulnerability of critical facilities to high wind events.
- Develop and implement procedures for hardening critical facilities to damage from high wind events.

G. EARTHQUAKE

Goals:

- Minimize the extent of damage and loss of life from future earthquake events.

Recommended Actions and Projects:

- Conduct studies to inform town departments and first response agencies on the storage of hazardous materials that are vulnerable to earthquake events.
- Develop an earthquake response annex to include in the Chester Basic Emergency Operations Plan.
- Conduct engineering study to assess the vulnerability of critical facilities to high wind events.

ADDITIONAL GOALS AND RECOMMENDED ACTIONS

The following additional goals and recommendations can be found in Chester Planning Documents in support of emergency management goals. These goals and recommendations address hazards that are not classified as significant risks to the town or that the town did not feel they were particularly vulnerable to. Many of these goals and actions address emergency preparedness in addition to hazard mitigation, but are included in this plan due to the integral nature of preparedness as part of any hazard mitigation planning process:

Land Use

Goals:

- To preserve the historical development pattern or mixed-use village areas surrounded by open land, agriculture, forest, and low-density residential use.
- To direct growth and development in Town where it will be most effective and efficient to provide the necessary public infrastructure and services.
- To achieve the concentration of infrastructure development within the village area and areas identified in this chapter as areas desirable for growth.
- To establish land uses and land use patterns that protect and enhance the values defined in this chapter.
- To provide a Town highway system that encourages and complements historic land use patterns.

Policies:

- Maintaining the density pattern for residential development to protect or enhance the existing settlement patterns and resources is encouraged.
- In order to maintain the existing settlement patterns, higher density residential, commercial, and industrial development should be located in the village areas of the Town, and within walking distance of most of the residents of the village.
- Necessary transportation improvements, especially road and bridge maintenance, public transit options, car and van pooling, or other techniques to utilize existing infrastructure should be supported.
- Residential and mixed use development tailored to the tourist and ski industries should be sited and designed to protect the settlement patterns, commercial development and natural resources of the Town.
- Development adjacent to significant natural resources (waterways, large forested areas, wildlife habitat, etc) should be compatible with the value of those resources. Wherever possible, negative impacts on the natural resource should be mitigated with buffer strips or visual screening, wherever this is a potentially effective mitigation option.
- The elimination or mitigation of the adverse effects of development on the natural resources that extend beyond Town borders or which are regionally significant should be considered and is encouraged.
- Any proposed development should not place an undue burden upon Town facilities or services.

Recommendations:

- Develop effective land use regulations that are consistent with the purpose and intent of this Town Plan.

- Evaluate proposed development projects for possible adverse effects to important natural resources, both within and beyond town borders.
- Develop effective bylaws, including zoning and subdivision regulations that are consistent with the purpose and intent of this Town Plan and the needs and plans of abutting Towns and the Region.
- Consider zoning provisions, such as access management, cluster development, planned unit developments and/or transfer of development rights, to better implement the vision established in this Town Plan.
- Continue the development of the VT Route 103 Corridor Management Plan and incorporate the findings into the Town Plan.

Transportation

Goals:

- Ensure that future development of transportation related facilities in the town of Chester are designed to maintain the beauty, integrity and rural characteristics of the town.
- Keep the existing transportation network in good repair to avoid costly replacement in the future.
- Reduce the impact of truck traffic on the village center.
- Reduce the adverse impacts of current peak traffic volumes.
- Expand the use of public and rail transportation as an alternative to automobile and truck traffic on Route 103.
- Limit access points (curb cuts) wherever possible to discourage sprawl and maintain safe travel conditions for all roadway users.
- Widen and realign the intersection of Routes 103/11 and Maple to accommodate the turning radius of trucks and busses.

Policies:

- Work with Green Mountain Railroad to expand the capabilities of its rail corridor.
- Maintain ongoing communication and coordination with the regional planning commission concerning state and federal funding opportunities to expand bicycle and pedestrian facilities and other enhancements to Chester's transportation network.
- Work with other towns along the Route 103 corridor to coordinate mitigation efforts aimed at alleviating the effects of truck and peak ski/tourist traffic.
- Obtain the property necessary to widen the intersection of Routes 103/11 and Maple Street to provide adequate, or better, turning radius for commercial vehicles.
- Promote access management techniques along VT Route 103 south in order to balance growth with highway mobility.

Recommendations:

- Work with the regional planning commission to develop the capabilities to monitor traffic volumes/patterns on an internal basis.
- At the intersection of Routes 11/103 and Maple St., acquire the parcel on the northeasterly corner for widening and realignment of the intersection.

- Continue working with SWCRPC, VTrans and other partners to develop the VT Route 103 Corridor Management Plan. Consider incorporating the Corridor Management Plan, or portions of it, as a component of the Town Plan.
- Examine options to address potential access management problems along VT Route 103 South and allow growth that does not detract visually or economically from the Village.

Emergency Services

Policies:

- Provide the residents of Chester the best possible Ambulance, Fire and Police service by supporting improvements to these services that are prudent and necessary.
- Any housing development in Chester should contain provisions for adequate fire protection.
- Support the continued cross training of police officers as Emergency Medical Technicians.

Recommendations:

- Provide for a new facility for housing the Chester Ambulance Service, Chester Fire Department and the Chester Police Department.
- Support continued cooperation with the Vermont State Police and Springfield Dispatch Center.

Water System

Policies:

- Provide the Chester Village water customers with a pure, clean water supply.

Recommendations:

- Upgrade public water system as needed to maintain quality, efficiency and environmental soundness.
- Purchase and install a reserve tank to be located on the Town of Chester property behind the Green Mountain Union High School.
- Upgrade the public water system to meet future State and Federal water quality requirements.

Sewage System

Policies:

- Provide the Chester Village residents with a safe and efficient sewage treatment system.

Recommendations:

- Design a storm drainage system for the area of the Town of Chester serviced by the Sewer Plant in order to properly dispose of ground and surface water.

Forest Land

Policies:

- Maintain the 550 acres of Town Forest as a managed forest and continue access to it for field studies, fishing and hunting.

Recommendations:

- Maintain the reservoir as a backup potable water source for the town.
- Maintain the town forest to protect water quality in that watershed.

Electric Utilities

Policies:

- Provide residents with safe, effective and efficient utility service.
- Utility lines should be placed in areas designated for growth.
- New utility lines should be placed along existing corridors whenever possible; multipurpose use of utility corridors is encouraged.
- Aesthetic and natural resource impacts should be considered when placing utility lines.
- Encourage common use of utility poles for telephone, electric, cable and fiber optic lines whenever possible.
- Promote underground electric lines where possible and practical.

Recommendations:

- Encourage the utility to move the power poles and service in the area of Main Street and the Town Green underground.

Telecommunications

Goal:

- Provide residents with the benefits of an integrated and modern telecommunications network while minimizing the economic, aesthetic and cultural costs of its development.
- Support the enhancement of integrated and modern wireless communications networks when such facilities do not have significant adverse environmental, health or aesthetic impacts.
- Enable new economic opportunities through the use of wireless communications technology.

Policies:

- Existing tower space and supporting infrastructure on, and at the site of, the Town wireless communications facility on the Pinnacle should be utilized to the fullest extent possible.
- There is an Act 250 permit for the construction and use of the Town tower on the Pinnacle. Those installing new transmission facilities on that tower shall comply with that permit.
- Siting and design of new communications towers and facilities (including any support and maintenance structures, necessary access corridors and utility lines) shall minimize impacts on natural, scenic, wildlife habitats and corridors and aesthetic resources. The use of the ridges for communications towers and related facilities needs to be undertaken in a manner that will neither unduly detract from nor adversely affect Chester's scenic values.
- An applicant for installation of new transmission facilities shall demonstrate that public exposure to Radio Frequency (RF) radiation will not exceed the applicable FCC standards for human exposure. Assessment of possible health effects shall be based on the cumulative effects of all RF emissions at any given location, and should include both preconstruction and post-construction monitoring.
- In the event that use of a tower is discontinued, the site should be restored to its natural condition, or to the condition that existed prior to construction, as appropriate. The developer of a new tower should provide the Town of Chester with a site restoration and reclamation plan at the time of application for the new tower site in the event the tower and accessory facilities are abandoned in the future. This site restoration and reclamation plan should include provisions for removal of the tower and

accessory facilities, regrading, revegetation, a time frame for accomplishing the site restoration, and adequate security, such as a letter of credit or a performance bond, including anticipated inflation, to provide funds necessary for completing the site restoration and reclamation plan.

Earth Resources

Goals:

- To promote the continued use of agricultural and forested lands in a manner which helps to maintain or preserve the natural beauty, function and productivity of the lands.
- To encourage sustainable uses of Chester's marketable natural resources.
- To encourage the extraction and processing of mineral resources in a manner that is appropriate and consistent with Chester's rural character.

Policies:

- All logging and forest-related activity should be done in accordance with Best Management Practices (BMP) and Acceptable Management Practices (AMP) as established by the Vermont Agency of Natural Resources (ANR).
- The extraction of any earth resource shall be permitted only when the present and future effects of such extractions or related processing are not unreasonably damaging to the surrounding properties, essential wildlife habitat, and the environment.
- Special interests shall not override the health and integrity of the entire environment.
- Require that earth resource extraction activities do not adversely affect surrounding properties and mitigate adverse impacts on essential wildlife habitat, and that extraction sites be restored to viable condition in a timely manner.
- Roads and driveways shall meet town standards and shall provide adequate, safe emergency vehicle access.

Recommendations:

- Promote, through education, the correct management practices for agriculture and forest-related activities by using the expertise of professionals.
- Review local and state regulations to assure that the public interest is protected. Amend local regulations to conform to any revised state regulations.
- Consider land use regulations to restrict developments in steep slope areas

Water Resources

Goals:

- Maintain or enhance the integrity and functions of Chester's surface waters and wetlands.
- Protect the quality and quantity of groundwater for Chester residents.

Policies:

- Continuous areas of undisturbed vegetation along rivers and streams should be encouraged, thereby protecting shorelines, wildlife habitat and scenic quality.
- New development adjacent to streams or rivers must be designed to cause minimal damage to the stream environment. Any such development should be planned so that surface waters do not become silted, contaminated or otherwise degraded.

- Natural vegetated buffer strips between development and surface waters should be maintained.
- Any storing or transporting of chemicals or other hazardous material should be done in such a manner so as to have no adverse effects on streams or other sources of water.
- The use of road salts and other chemicals adjacent to sensitive areas such as wetlands, stream crossings, and steep slopes should be minimized.
- Any alterations to ponds and wetlands must be in compliance with local zoning and all State and Federal laws.
- Restrict development within the aquifer protection districts in order to protect the public drinking water.

Recommendations:

- Review zoning regulations to protect rivers and streams, ponds and wetlands not already protected under state law.
- Include high elevation streams and buffer areas in a plan for open space conservation.
- Consider conducting an inventory of class 3 wetlands and/or vernal pools.

IMPLEMENTATION SCHEDULE FOR PRIORITIZED MITIGATION PROJECTS²⁸

The following implementation schedule was developed by the Chester Hazard Mitigation Committee. Mitigation actions are listed in priority order, with the most critical needs listed first. 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?

Table#12: Implementation Schedule for Prioritized Mitigation and Preparedness Projects and Actions

ACTION	TYPE OF ACTION	HAZARD ADDRESSED	RESPONSIBLE PARTY	TIME FRAME	FUNDING SOURCE	PRIORITY
Stabilize river banks on Williams River	Mitigation	Flooding, Fluvial Erosion	Public Works Director, Selectboard, Town Manager	2012-2015	HMGP grant, town budget	27
Upgrade drainage ditches and culverts	Mitigation	Flooding, Transportation Disruption	Public Works Director	Annual	Town budget, Vtrans structures grants	27
Keep culvert/bridge inventory updated	Mitigation	Flooding, Transportation Disruption	Public Works Director, SWCRPC	Annually	No cost to town	31
Purchase three emergency generators	Preparedness	High Winds, Severe Winter Weather	Selectboard, Fire Department, Police Department	2012-2016	VEM Generator Grants, HMGP grant	23

²⁸ Adapted from Rutland Regional Pre-Disaster Mitigation Plan

Capital program for equipment replacement	Preparedness	All Hazards	Selectboard	Annual	Town budget	21
New emergency services facility	Preparedness	Fire, Transportation Incidents, Hazardous Materials, Severe Winter Weather	Selectboard, Town Manager, Police Department, Fire Department	2015-2016	Town budget (needs voter approval)	21
Develop EOP	Mitigation, Preparedness	All Hazards	Police Department, Fire Department, Selectboard	2012 then annual updates	No cost to town, SWCRPC EMPG funding	19
Investigate the purchase of the town's repetitive loss property	Mitigation	Flooding	Town Manager, Selectboard	2012-2013	FEMA HMGP, FMA grants	19
Develop and implement procedures for hardening critical facilities to damage from high wind events.	Mitigation	High Wind Events	Fire Department, Planning Commission	2013-2015	No cost to town	15
Conduct additional stream geomorphic assessment work on the Williams River and significant tributaries.	Mitigation	Flooding, Fluvial Erosion	SWCRPC, Planning Commission	2013-2015	PDM-C grant, HMGP grant, Clean & Clear program	25
Conduct engineering study to assess vulnerability of critical facilities to earthquake, high wind, and winter storm events	Mitigation	Earthquake, High Wind Events, Severe Winter Weather	Planning Commission, Selectboard	2014-2016	HMGP grant	18
Increase enforcement of current regulations to reduce speeding, and reduce the likelihood/severity of transportation incidents.	Mitigation	Transportation Incident, Hazardous Materials	Police Department, Selectboard	Ongoing	No cost to town	22

Continue to encourage hazardous materials training and response capability within Chester first response agencies.	Mitigation, Preparedness	Hazardous Materials	Fire Department, Police Department	Ongoing	No cost to town	24
Installation of redundant power systems at critical facilities.	Mitigation, Preparedness	High Wind Events, Severe Winter Weather	Selectboard, Fire Department	2014-2016	Town budget	20
Develop procedures and plans for the safe relocation of at needs populations as needed.	Mitigation, Preparedness	Severe Winter Weather, Fire, High Wind Events, Hazardous Materials Incident, Earthquake	Fire Department, Emergency Management Director, Town Manager	2012-2013	No cost to town	23
Utilize Village Center designation to make building owners eligible for tax credits for code improvements (i.e. sprinklers)	Mitigation	Fire	Planning Commission, Town Manager	2014-2015	No cost to town	23
Encourage the installation of adequate fire suppression into new construction	Mitigation	Fire	Planning Commission, Fire Chief	Ongoing	No cost to town	26

The Hazard Mitigation Review Committee will meet on an annual basis to review the proposed mitigation actions and identify opportunities for their implementation and inclusion into other town planning mechanisms such as the Town Plan and Town Budget. After the annual review of the Hazard Mitigation Plan, the Review Committee will inform appropriate town staff of opportunities to include mitigation actions into town planning and regulatory mechanisms on a yearly basis. Regional Planning Commission staff will be involved in the annual review process to provide information and assistance in the procurement of funds for the implementation of the above mitigation actions.

**Local Emergency Planning Committee #3 (LEPC)
Wednesday February 10, 2010 at 6:00pm**

Windsor Fire Department
147 Main St. Windsor, VT 05089

AGENDA

1. Welcome and Introductions
2. Approval of Agenda
3. Pre Disaster Mitigation Plan update
4. All Hazards Mitigation Plan
 - a. Planning Committee
5. CERT Update
 - a. Directorship discussion
6. Financial
 - a. Financial Report
7. Next meeting is scheduled for March 10, 2010
8. Other Business – 5 minutes each
 - a. New EMDs
 - b. March BEOP workshop
 - c. ICS 200 training
 - d. RACES seminar
9. Adjournment at 7:30 or earlier

Food and Drinks will be provided

