

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

**LUDLOW, VT  
ANNEX E**

*Draft Submitted for Review*

**September 12<sup>th</sup>, 2013**

## **INTRODUCTION**

### **PURPOSE**

This appendix, when used with the appropriate sections of the SWCRPC Multi-Jurisdictional Plan, is an All-Hazard Mitigation Plan for the Town and Village of Ludlow. The purpose of this plan is to assist the town in identifying potential hazards and in developing strategies to reduce the threats and impacts of those identified hazards. Throughout the plan, the 'Town' will refer to both the Town and Village of Ludlow.

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 including 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 to 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, avert 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 can include projects such as:

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

### **TOWN PROFILE**

#### **A. Community Background<sup>1</sup>**

Ludlow is located in the southwestern part of Windsor County at the crossroads of VT Routes 100 and 103 (Calvin Coolidge Memorial Highway). It is bounded on the north by Plymouth, on the east by Chester and Cavendish, on the south by Weston and Andover, and in the west by Mount Holly. The Black River runs through the center of town.

The town is located on the eastern side of the Green Mountains and located at its western border is Ludlow Mountain, whose summit rises about 2,400 feet above Main Street and 3,344 feet above sea level.

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<sup>1</sup> Adapted from the Municipal Development Plan, 2010

The incorporated Village of Ludlow is a regional growth center and is located near the base of Okemo Mountain Resort, a popular ski area. The lakes in the northern section of town are popular summer tourist destinations.

Major areas of development and transportation routes are concentrated in the relatively flat stable areas along streams and in the Black River valley. The Village exhibits relatively dense development patterns with mixed land uses. Concentrations of seasonal residential development predominate in the areas surrounding the Okemo Mountain Resort as well as Lake Rescue and Lake Pauline. Okemo State Forest, consisting of approximately 2,000 acres along Ludlow's western border, is primarily used for outdoor recreation and forestry.

Lands served by municipal water and sewer services or those with few natural restraints are likely to receive the most development pressure. Being a popular tourist destination, seasonal residential development is likely to continue. The majority of land in the Town of Ludlow is forested.

As in the rest of Vermont, the climate is generally temperate with moderately cool summers and cold winters. Average annual precipitation is around 40 inches, and snowfall can be as much as 200 inches in a single winter. The weather is unpredictable, and large variations in temperature, precipitation, and other conditions may occur both within and between seasons.

Major transportation routes include VT Routes 100 and 103 as well as the Green Mountain Railroad. VT Route 103 is a designated State Truck Route as well as serving as a primary travel corridor for skiers destined for the Okemo and Killington resorts.

The Town of Ludlow is uniquely divided with two governing bodies within the town. From the 2013, Ludlow Municipal Plan:

*"A municipal manager administers the affairs for the Town and Village of Ludlow. This position broadens the scope of community services and helps toward implementation of municipal goals and objectives. At the annual Town Meeting, members are elected to serve staggered terms on the five-member Board of Selectmen representing the legislative body. These Selectmen provide legislative direction for the Town. The Village District is an incorporated area of the Town, independently directed by a three-member Board of Trustees. An annual meeting is held to transact business pertaining directly to the legislative affairs of the Village."*

## **B. Development Trends**

After a decade of a growth, Ludlow's population experienced a period of decline between the years 2000 and 2010<sup>2</sup>. The decline from 2,449 in 2000 to 1,963 in 2010 equates to a loss of 19.8%. While it is too early to identify the definitive cause of the sudden decline, it may be attributed to the large number of second home owners. Future development that may occur is limited due to the adopted regulatory tools in Ludlow including subdivision, zoning, and flood hazard regulations.

Seasonal population growth in the past two decades has increased dramatically, largely due to growth at the Okemo Mountain Resort. The ski resort has increased the annual number of visitors to the mountain from approximately 95,000 in the winter of 1982 to nearly 600,000 in the winter of 2000. Associated with this increase has been the development of nearly 800 on-mountain dwellings over the

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<sup>2</sup> 2010 Census Bureau Statistics

same period, in addition to the development of approximately 400 off-mountain seasonal dwelling units. The peak population of these seasonal units occurs on a number of winter weekends and vacation weeks over the course of a year. Although an increase in development has occurred, mitigation priorities remain unchanged.

### **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 is outlined in Chapter Two of the Regional Plan and was developed utilizing guidance issued by FEMA and Vermont Division of Emergency Management and Homeland Security (DEMHS).

Throughout 2010 and early 2011, SWCRPC staff reviewed and edited the previously adopted Ludlow Hazard Mitigation Plan to begin the revision and update process. This included updating population statistics with new 2010 U.S. Census information and incorporating hazard events that have occurred since the last plan adoption into the hazard analysis including Tropical Storm Irene.

Following the draft edits completed by SWCRPC staff, a publicly noticed meeting was held at the Ludlow town office on November 18<sup>th</sup>, 2010. A copy of the meeting minutes, with attendees, is included at the end of this plan. Representatives from the Ludlow Planning Commission, Ludlow town staff, and the general public were in attendance. The meeting agenda included a section by section review of the previous version of the plan with an emphasis on identifying hazards and mitigation actions specific to the town. Changes in priorities, development, and local mitigation efforts were also considered in this revision process. Following the meeting, SWCRPC staff made the revisions proposed by the committee and drafted a new, updated plan. The Purpose and Community Background sections were the only portions of the plan that have not been updated during this revision process. In addition to the above meeting, the Ludlow Hazard Mitigation Plan was discussed through email and personal discussions on several occasions with the Ludlow Town Manager and Fire Chief. These discussions focused on hazard mitigation goals and objectives in the revision process.

The November 18<sup>th</sup> meeting began with an overview of hazard mitigation and its role in reducing risk and future costs to the town with a clear distinction placed on the difference between mitigation and preparedness. Copies of the 2006 Ludlow Hazard Mitigation Plan and the SWCRPC Multi-Jurisdictional Hazard Mitigation Plan were provided as examples of mitigation plans to assist in facilitating the discussion of highest hazards and threats facing the town. Meeting attendees reviewed the hazard vulnerability analysis seen in the Hazard Identification (Table 2) section of this plan and, where appropriate, revised the likelihood and hazard extent. Ludlow Planning Commission members at the meeting also discussed areas of town most likely to be affected by these hazards along with identifying future goals and mitigation strategies that may be undertaken to reduce the risk of future harm and cost to the town. Throughout the entire revision process, changes in town priorities, development patterns, and current mitigation efforts were considered. The meeting minutes are attached at the end of this document. 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 Ludlow town office, posted on the SWCRPC website ([www.swcrpc.org](http://www.swcrpc.org)) and Facebook page.

Since the meeting in 2010, SWCRPC staff and the Town of Ludlow have continued to revise the Town of Ludlow All Hazard Mitigation Plan to reflect and incorporate new data on hazard analysis, vulnerability, and new mitigation strategies. Another meeting between the Ludlow Planning Commission, public (including the Ludlow Emergency Management Director), Okemo Mountain Resort, and SWCRPC was

held on June 18<sup>th</sup>, 2013. During this meeting, the requested FEMA revisions were discussed in detail along with the proposed mitigation actions included in Table 15 of this plan; a copy of the meeting minutes is included at the end of this plan. In addition to SWCRPC and Town involvement, the plan was shared with representatives from Okemo Mountain Resort and the Windsor County forester, representing the Okemo State Forest. A letter from the Vermont Department of Forest Parks & Recreation is included at the end of this plan. An email exchange was held with representatives from Okemo Mountain Resort indicating their willingness to continue in identifying and mitigating hazards within the Town of Ludlow which may affect the mountain operations, included in this is the Okemo snowmaking pond.

This plan has also been updated to include insight and recommendations provided by the above referenced non-town entities along with hazard information from the most recent presidentially declared disasters within Vermont, including the Lake Champlain flooding of 2011 and Tropical Storm Irene, also in 2011.

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

**Table 1: Mitigation Actions and Status from the 2006 Ludlow Hazard Mitigation Plan**

<b>2006 Plan – Mitigation Action</b>	<b>Progress and Implementation</b>
Upgrade culverts on Parker Avenue and Wright Road	The town maintains and annual culvert replacement program
School equipment purchases/security upgrades	Remains a priority in this revision
Review and update town land use regulations	Town Plan Updated in 2009
Develop a school crisis plan	Utilizing state template
Update RSMS and bridge and culvert inventory	Bridge and culvert inventory has been updated, RSMS has not been
Public education/outreach	NFIP outreach remains a priority
Staff training	Hazmat training remains a priority
Training for teachers	Overly ambiguous, removed from this update
Coordination on departmental protocol updates	Remains a priority in this revision
Regular equipment replacement programs	Ongoing through town budget
Rehabilitation of Walker bridge	Engineering study has been completed

Several of the actions from the previous iteration of this plan remain priorities for the town and have been included in the final section of this updated plan. These actions and projects remain uncompleted due to a lack of funding, grant opportunities, and town capacity rather than a change in priorities. Actions that were overly vague such as “staff training” have either been removed from the plan or strengthened to be more specific and are included in the implementation schedule in the final section of this plan. In addition to the above table and actions, a Hazardous Materials Commodity Flow Study and river corridor assessment work have been completed in Ludlow that will aid in the identification of future mitigation actions.

In addition to local town review and input, the Local Emergency Planning Committee (LEPC) #3, a regional volunteer organization comprised of first responders departments, state and local officials, and other interested parties including the public, reviewed the hazard analysis and mitigation strategies. 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.”* During the February 10<sup>th</sup>, 2010 meeting held at the Windsor Fire Department, hazard mitigation planning process and updates were discussed. The group reviewed the highest hazard analysis along with discussing additional potential mitigation projects. Following this meeting, SWCRPC staff incorporated the recommendations of the committee into the Ludlow All Hazard Mitigation Plan.

The following people represented Ludlow and the surrounding towns (LEPC 3) during the revision process:

- Ludlow Planning Commission membership
- Rose Goings, Ludlow Director of Planning and Zoning
- Frank Heald, Ludlow Municipal Manager
- Ron Bixby, Ludlow Emergency Management Director
- Ludlow Public Works staff
- SWCRPC staff
- Membership of Local Emergency Planning Committee 3, including:
  - Andrea Hatch, Vermont Homeland Security Unit
  - Jim Tonkovich, VT 211
  - Mark Kirko, Windsor Fire Department
  - Jack Schonberg, Central Vermont / New Hampshire Valley American Red Cross
  - Rick Hopkins, Vermont State Police
  - Becky Thomas, Vermont Department of Health
  - Beth Gould, Mt Ascutney Hospital and Health Center
  - Mike Chamberlain, Windsor County Sheriff

The Ludlow All Hazard Mitigation Plan along with the 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 State 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 plan have been updated including the hazard analysis and planning process sections. When available, greater historical data was given along with detailed information on hazard vulnerability and location. The planning process has also been revised to describe a more holistic approach and narrative to include specific opportunities for public and stakeholder involvement.

The future method for monitoring and evaluating the Ludlow All Hazards Mitigation Plan includes annual meetings of a hazard mitigation review committee. The purpose of these meetings will be to continue to identify hazards within the town and to develop and review strategies to alleviate the impacts of those hazards on the community through mitigation actions. This committee will meet on a yearly schedule to monitor and evaluate the plan in an effort to keep the plan current. The committee will consist of town government officials, members of the Ludlow first response community as well as interested members of the public. An effort will be made to include additional community stakeholders, including the public, 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 revision process previously. The Town of Ludlow and SWCRPC recognize the importance of public participation in hazard mitigation planning especially since

the devastating effects of Tropical Storm Irene in the summer of 2011. Efforts will be made to provide ample opportunity for review and comment including, providing draft plans at the town office for review, ensuring their availability during large town events such as town meeting, and possibly the development of a survey prior to the next full plan update.

The hazard mitigation 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 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 one year prior to the approved plan expiration and will begin with a publicly noticed meeting of the hazard mitigation review committee. All meetings will be duly warned following town protocols, including a public 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 made 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 July 2016 in which any substantive 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 Ludlow 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 Ludlow are in many instances similar or identical to the hazards identified in Chapter 3 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 of the 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 shown:

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

Additionally considered are seasonal patterns that may exist, what areas are likely to be affected most, the 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**

Possible Hazard	Likelihood	Impact	Community Vulnerability	Most Vulnerable Facilities and Populations
Tornado	P	L	LOW	Village area, visitors at Jackson Gore / Okemo Mountain
Flood	HL	N	MODERATE	Dug Road, VT 103 south/trailer park
100-year flood	P	L	LOW	1973 floods before flood-control dams resulted in flooding in 100-yr floodplain, 1 death
Flash flood	HL	N	MODERATE	Wright Road, Parker Avenue
Hazardous materials	P	L-CR	MODERATE	Route 100 south in vicinity of drinking water sources
Radiological Incident	U	CR	LOW	Village areas (depends largely on prevailing wind direction and speed)
Structure Fire	HL	N	MODERATE	Residential homes
Power Failure	HL	N	MODERATE	Elderly, medically dependent on electricity
Winter & Ice Storm	HL	N	MODERATE	Electric utilities, town roads, elderly and those with medical needs, population needing shelter, Okemo Mountain Ski Area
High Wind	P	N	LOW	Ski equipment, electric utilities, town roads
Air crash	P	CR	LOW	2 private, grass airstrips
Water Supply Contamination	P	CA	MODERATE	Spring-fed, deep well, stored in tank
Hurricane	P	L	LOW	1927 hurricane resulted in significant flooding in low-lying areas (500-yr floodplain)
Earthquake	P	N	LOW	Ludlow village area, Jackson Gore multi-unit housing, Okemo Mountain Resort condominiums
Dam Failures	P	CR	LOW	West Hill Dam, Okemo snowmaking pond
Drought	U	N	LOW	Farms, shallow well owners
Highway Accidents	HL	L	MODERATE	VT 103, VT 100, motoring public
Bus Accidents	P	CR	MODERATE	Travelers to Okemo Mountain Resort
Wildfire	P	N	LOW	Okemo State Forest
Landslide	U	N	LOW	Structures along steep slopes
School Safety Issues	HL	L	MODERATE	Black River High School, Black River Middle School, Ludlow Elementary

### **DETAILED HAZARD ANALYSIS AND POTENTIAL LOSS ESTIMATES: 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

#### **A. FIRE**

**Structure fires** were specifically 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<sup>3</sup>. These fires resulted in 4 civilian deaths and amounted to over 18.5 million dollars in estimated property losses in 2010 alone. With an average housing unit value of \$249,100<sup>4</sup>, damage from structural fires could result in significant costs to the town.

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

- 2007 – 1 structure fire
- 2008 – 9 structure fires
- 2009 – 13 structure fires
- 2010 – 9 structure fires
- 2011 – 10 structure fires

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<sup>3</sup> 2010 Annual Report of the State Fire Marshal Report

<sup>4</sup> American Community Survey data

**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. Historic data for the Town of Ludlow is listed below:

- 2007 – 0 reported wildland fires
- 2008 – 3 wildland fires
- 2009 – 0 reported wildland fires
- 2010 – 0 reported wildland fires
- 2011 – 2 wildland fires

Although this is only the best available town specific data for both structure and wildland fires at this time, it does reflect the hazard that 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 functioning smoke detector in the sleeping area of residential structures. Fires can be caused by improperly disposing of ashes with live coals from wood stoves or by faulty electrical wiring.

The future plan update process as outlined in the Planning Process section at the beginning of this plan calls for additional local meetings and input during the next plan revision. During these meetings, SWCRPC staff, the Town of Ludlow, and the Ludlow Volunteer Fire Department will collaborate to develop a more comprehensive history of fire events. Additional data resources, including the Vermont State Archivist, Ludlow Historical Society, and local town knowledge will be utilized to ensure the comprehensiveness of historical data.

Firewise, a community outreach program through the National Fire Protection Association, provides guidance, resources, and training on protecting homes and property from wildfire hazards. The Firewise program “teaches people how to adapt to living with wildfire and encourage neighbors to work together and take action now to prevent losses.” The Firewise website ([www.firewise.org](http://www.firewise.org)) is an excellent resource for literature and community mitigation actions to follow.

**Table 3: Vermont Fire Statistics for 2010<sup>5</sup>**

COUNTY	2010		2009		2008		2007		2006	
	#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
<b>TOTALS</b>	<b>88</b>	<b>83.83</b>	<b>95</b>	<b>164</b>	<b>115</b>	<b>138.19</b>	<b>81</b>	<b>179.79</b>	<b>118</b>	<b>254.2</b>

**B. FLOODING**

Flooding is a significant hazard that threatens the entire Town of Ludlow, including 1% chance flood events, seasonal flooding in the lakes region, and flash flooding. The Federal Emergency Management Agency (FEMA) has designated floodplain areas along the Black River main stem, Branch Brook and surrounding Lake Rescue. The town is currently a non-sanctioned and participating member of the National Flood Insurance Program. The SWCRPC Multi-Jurisdictional All Hazard Mitigation Plan provides a detailed history of past flooding events and maps of known flood hazard areas (“Water Resources” map). The following tables display FEMA disaster declaration for the Town of Ludlow, including Tropical Storm Irene in 2011.

The SWCRPC Region, including Ludlow, was not impacted by the severe storms and flooding that occurred throughout the northern counties of Vermont in Spring 2011.

**Table 4: FEMA Major Disaster Declarations for Windsor County, Flooding**

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>
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 areas of high population concentration and services, namely the Village of Ludlow, are either within or surrounded by floodplains. Smaller seasonal flooding events occur annually in Ludlow resulting in only minor damage to culverts, drainage ditches, and roads. No structures in Ludlow are listed as repetitive loss properties. Dug Road and VT Route 103, south of the village and between Village Pizza and the Timber Inn, experience minor annually recurring flooding.

A significant flood event in designated floodplain areas would disrupt evacuation routes and may impact residential structures, commercial structures, industry, hazardous materials storage and “at-risk” populations. Damage from a **100-year flood** event would be influenced by the following factors unique to the Town of Ludlow:

- Estimated number of residential buildings in the 100-year flood zone: 137 structures in town are within the 100-year floodplain as mapped by FEMA of which 25 are located within the floodway.

- Estimated number of commercial buildings in the 100-year flood zone: 39 structures in town are within the 100-year floodplain as mapped by FEMA of which 13 are located within the floodway.
- Estimated number of bridges and culverts within Ludlow from the Vermont Online Bridge and Culvert Inventory Tool is 541 (27 bridges, 514 culverts); last inventoried in 2010.
- The 2009 assessed value of all residential and commercial property is \$408,561,000

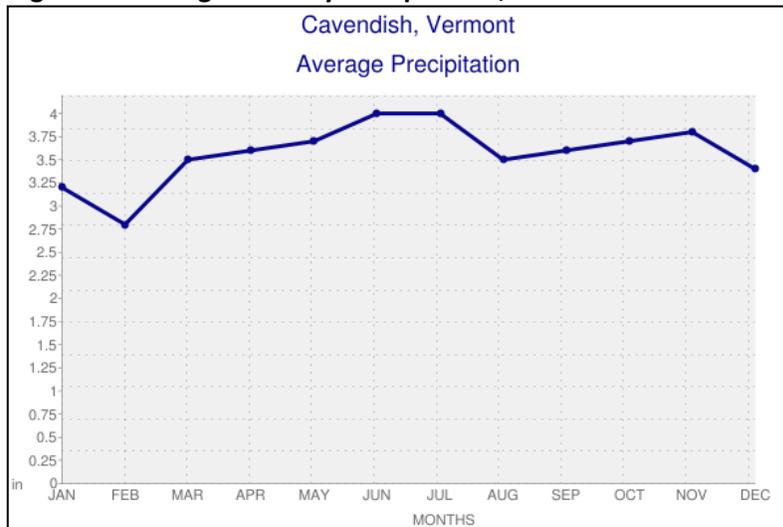
Damage from spring runoff and **100-year flooding** events can vary greatly depending upon the influence of ground saturation, snow cover, spring snow melt and topography. A flood is defined by the National Oceanic and Atmospheric Administration (NOAA) as:

**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 long term event than flash flooding: it may last days or weeks.

No source of historical flood and precipitation data could be identified for the Town of Ludlow, however the Town of Cavendish, located directly east of Ludlow has historical precipitation data for the last 100 years. Given the close proximity of the towns, this data can be used to gain an understanding of the potential impacts these hazards pose to the Town of Ludlow.

The graph below 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 with the highest precipitation totals (March and April) coincide with the months during which the winter snow cover typically melts. This further increases the water load in local streams, rivers and lakes.

**Figure 1: Average Monthly Precipitation, Cavendish Vermont**



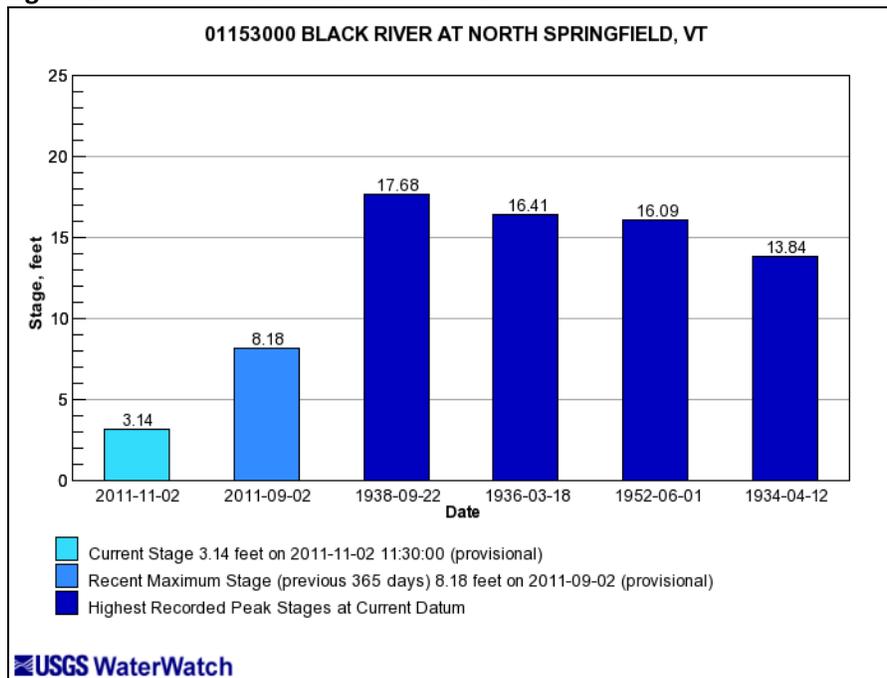
The following table displays flood events recorded by the National Oceanic and Atmospheric Administration. These flood events occurred within Windsor County, with many floods affecting the county region-wide, including the Town of Ludlow. This represents the best available data at this time. The Town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

**Table 5: NOAA Flood Events in Windsor County<sup>5</sup>**

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

The graph below displays historical data of river depth for the Black River in the Town of Springfield, southeast of Ludlow.

**Figure 2: Historical River Levels for the Black River**



<sup>5</sup> NOAA National Climatic Data Center 1996-2011: <http://www4.ncdc.noaa.gov/cgi-win/wwcgl.dll?wwevent~storms>

**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 Black River in Ludlow for the years 1976-2011 recorded by the US Army Corps of Engineers, Cold Regions Research and Engineering Laboratory (CCREL). Many additional ice jams have occurred in town historically but have not been recorded.

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 including the many bridges within the town. 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.

The following **ice jam** events in the SWCRPC Region have been recorded by the U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory (CRREL):

01/1990	Chester	Williams River
03/1992	West Windsor	Mill Brook
03/1992	Windsor	Mill Brook
03/1992	Windsor	Connecticut River
01/1996	Chester	Williams River
01/1996	Cavendish	Black River
01/1996	Springfield	Black River
01/1999	Chester	Williams River
12/2000	Windsor	Connecticut River
12/2000	Chester	Williams River (2 ice jams)
01/2001	Windsor	Connecticut River
12/2003	Springfield	Connecticut River

**Flash Floods** are identified in Table 2 above as a natural hazard to which the Town of Ludlow is vulnerable with moderate community vulnerability. Flash floods typically occur in high elevation drainage areas during summer when a large thunderstorm or a series of rain storms result in high volumes of rain over a short period of time. 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 event if no rain has fallen, for instance a levee or dam has failed, or after a sudden release of water by a debris or ice jam.”*

Infrastructure and structures along higher elevation streams and drainage areas are often the most vulnerable to damage from flash flooding. Damage from flash floods is difficult to predict because flash flood areas are not mapped at this time, however, Wright Road and Parker Avenue are known areas of concern. The town has adopted Vermont Local Roads Standards and anticipates upgrading small culverts in these and other locations. Problem culverts have been identified town wide by the Highway Department, and replacement estimates calculated in 2006 were approximately \$150,000.

Fluvial erosion hazards and related flooding concerns exist throughout Ludlow from the lakes region to the Black River on the eastern side of town. Stream Geomorphic Assessments have been completed along 6.02 river miles of the Black River main stem and major tributaries including Buffalo Brook and Jewell Brook. The fluvial erosion study found that areas of Ludlow including the Village Center are “highly susceptible to catastrophic erosion in future high flow events upstream from the Mill Street Bridge<sup>6</sup>”. There are several other areas of “very high” and “extreme” sensitivity to future flooding events in the town that also require attention to avoid the threat of future flood events.

The worst flash flooding that can be anticipated is reflected by recent events during Tropical Storm Irene when flash flooding inundated the downtown area with up to seven feet of water causing extensive damage throughout the downtown. The 2011 Ludlow Annual Report states:

*“On August 28, 2011, “Irene” wreaked havoc on Ludlow roads, residential properties and area businesses. The Water/Wastewater Treatment Facility and Little League Fields were also severely impacted. Nearly every road in Ludlow sustained significant damage, as did the East Lake/Route 100 Bridge, Mill Street Bridge, Pleasant Street Extension Bridge and large culverts on Trailside Road and East Lake Road. The total damage from the storm is currently estimated at \$2.5 to \$3 million. The Town & Village is expected to cover 10% of the total cost.*

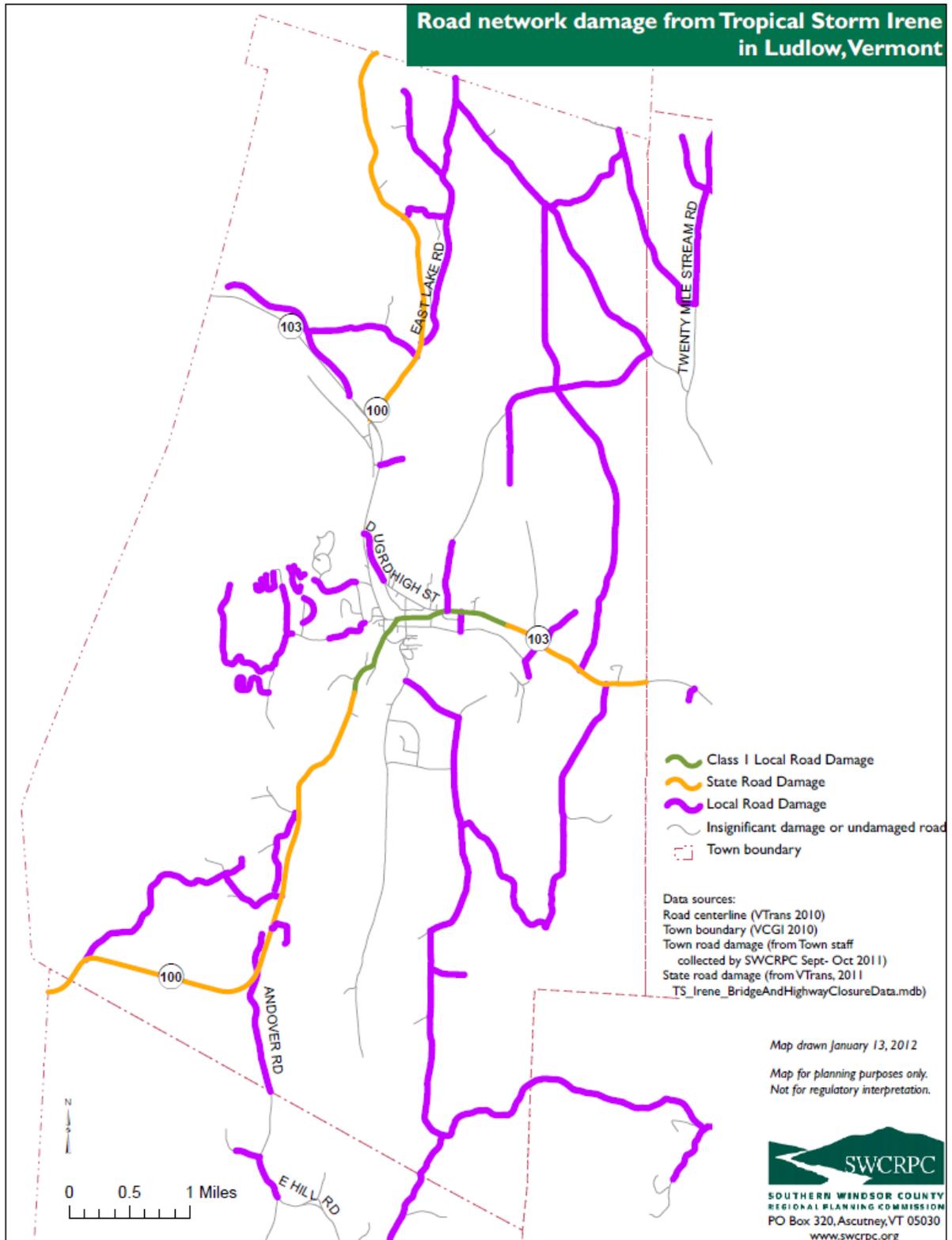
*FHWA Emergency Relief Program will reimburse the Village for the cost of repairs to Andover Street and Route 103 South/Main Street.*

*The Village’s insurance through the Vermont League of Cities & Towns will cover much of the damage sustained at the Water and Wastewater Treatment Facility.”*

A map of damaged roads during Tropical Storm Irene is below.

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<sup>6</sup> Black River Corridor Management Plan 2011



The National Oceanic and Atmospheric Administration has the best available source of localized flash flooding data and reports that there have been 16 flash flooding events in Windsor County since 1950, totaling over three million in damages countywide.

**Table 6: NOAA Flash Flood Events in Windsor County<sup>7</sup>**

Date	Time	Type	Property Damage
6/12/1996	5:05 PM	Flash Flood	250K
6/13/1996	3:15 PM	Flash Flood	15K
6/13/1996	3:21 PM	Flash Flood	15K
6/27/1998	2:20 AM	Flash Flood	1.0M
3/28/2000	10:40 AM	Flash Flood	5K
7/16/2000	9:15 PM	Flash Flood	500K
7/31/2000	10:00 AM	Flash Flood	10K
7/24/2003	10:50 AM	Flash Flood	10K
8/12/2003	3:00 PM	Flash Flood	10K
8/29/2005	4:00 PM	Flash Flood	50K
7/11/2007	14:00 PM	Flash Flood	750K
7/11/2007	14:00 PM	Flash Flood	250K
8/6/2008	9:00 AM	Flash Flood	50K
8/7/2008	14:10 PM	Flash Flood	10K
8/7/2008	18:30 PM	Flash Flood	25K
8/28/2011	10:30 AM	Flash Flood	100.0M

Again, this represents the best available data at this time. The Town of Ludlow and SWCRPC will continue to search out more accurate and detailed historical data for this and other highest hazards. During the next plan revision process, additional historical data on all flood types will be developed. The National Weather Service, Ludlow Historical Society, historical documents and local knowledge collected during hazard mitigation meetings will be used to build upon the historical flooding dataset.

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 along the Black River,

The Federal Emergency Management Agency has designated floodplain areas throughout Ludlow including areas along the Black River main stem and the Ludlow lakes region and floodplain use is regulated through the Town of Ludlow Flood Plain Development Regulations. A significant flood occurred in 1973 resulting in at least 1 death, however, no significant inundation flooding has occurred since the flood control dams were constructed in the mid-1970s. However, as shown by Tropical Storm Irene, the downtown area and the low-lying areas within the identified floodplain are susceptible to high water from flash flooding.

**Dam Failure** was classified by the Hazard Mitigation Committee as a low threat to the town with critical severity to the town. The table below represents the dams that are both currently operational as well as those that have been breached. The Vermont Agency of Natural Resources Dam Safety Program monitors these sites for continued safety. The dams are inspected by a state representative on a rotating basis and are not considered to be in danger of failing.

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<sup>7</sup> NOAA National Climatic Data Center 1996-2011 <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

**Table 7: Dams on Rivers and Streams in Basin 10 (Ottauquechee & Black Rivers)<sup>8</sup>**

Dam Name	Stream	Town	Status	Use	Built	Rebuilt
Jewel Brook Site No. 1	Jewell Brook	Ludlow	In Service	C	1969	N/A
Jewel Brook Site No. 2	Grant Brook	Ludlow	In Service	C	1969	N/A
Jewel Brook Site No. 3	Parker Brook	Ludlow	In Service	CR	1970	N/A
Jewel Brook Site No. 4	Jewell Brook	Ludlow	In Service	CR	1970	N/A
Jewel Brook Site No. 5	Sanders Brook	Ludlow	In Service	C	1972	N/A
Okemo Snow Pond	Black River - OS	Ludlow	In Service	R	1994	N/A
Lake Rescue	Black River	Ludlow	In Service	RS	1978	N/A
Lake Pauline	Black River	Ludlow	In Service	R		N/A
Village	Black River	Ludlow	Breached			
Verd Mont Mills	Black River	Ludlow	Breached			
American Woolen Co.	Black River	Ludlow	Breached			
Smithville	Black River	Ludlow	Breached			

NOTES: \* H = hydroelectric, R = recreation, C = flood control, S= water supply, O = other

**C. SEVERE WINTER WEATHER**

Winter storms and blizzards with snow, ice, and freezing temperatures are fairly commonplace in Ludlow and generally 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.

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 deaths, or
- An ice/glaze storm which causes property damages, injuries, or death.

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

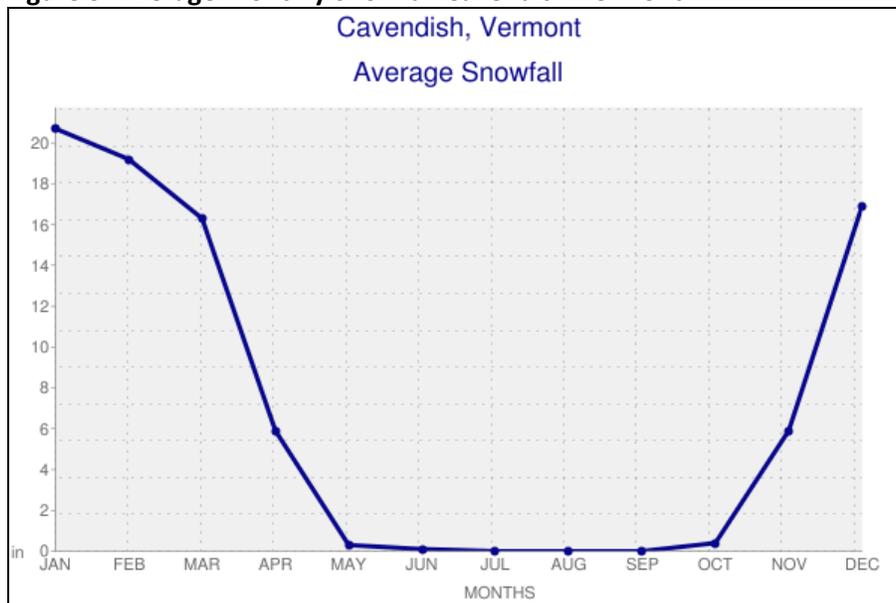
<sup>8</sup> Basin 10 Black River and Ottauquechee River Watersheds Water Quality and Aquatic Habitat Assessment Report (VT Water Quality Division, DEC, ANR; June 2000); Ludlow Water Department

**Table 8: The Dolan-Davis Nor'easter Classification Scale**

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

**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 more<sup>9</sup>.” Damage from blizzards, snow, and ice storms can vary depending upon wind speeds, snow or ice accumulation, storm duration, and structural conditions (such as heavy snow and ice accumulation on large, flat roofed structures). The following shows average snowfall for the nearby Town of Cavendish.

**Figure 3: Average Monthly Snowfall Cavendish Vermont**

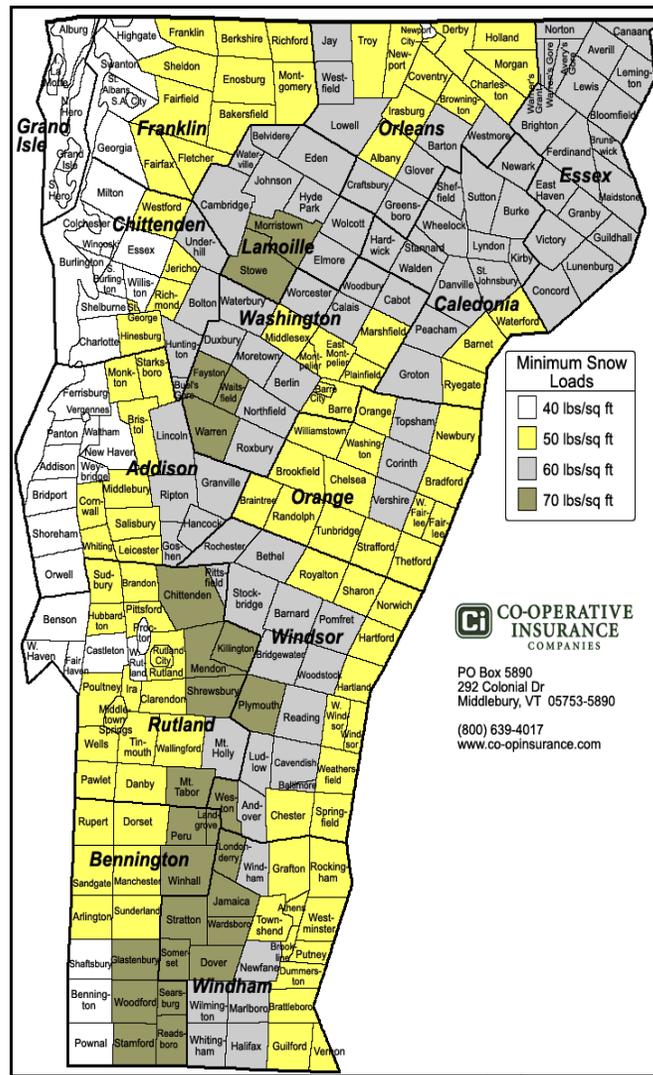


The assessed value of all residential and commercial property in Ludlow is \$408,561,000<sup>10</sup>. Assuming a range of town-wide damage of 1% to 5%, a heavy snow or ice storm could result in \$4.1 million to \$20.4 million in total damage. The following figure displays average minimum snow loads for the state of Vermont. Ludlow residents can expect at least 60 pounds of weight per square foot on their infrastructure during winter months.

<sup>9</sup> National Weather Service Glossary

<sup>10</sup> Vermont Department of Taxes 2010

Figure 4: Expected Snow Loads for Vermont Towns<sup>11</sup>



**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.<sup>12</sup>” 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 Ludlow and can occur anywhere in the town. Power failures are typically a secondary hazard caused by severe winter weather and was identified in the hazard vulnerability analysis as a “moderate” hazard to Ludlow due to 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.

<sup>11</sup> Vermont State Hazard Mitigation Plan

<sup>12</sup> National Weather Service Glossary

Potential loss estimates are difficult to predict for power failures, which typically are isolated in geographic area and short in duration. Therefore, they often have only minimal impact to people and property. Power failures usually result minor inconveniences to residents, however, longer duration events might result in the loss of home heating, freezing of water supply pipes and the resulting structural water damage. Elderly or homebound residents who may require electricity for medical equipment are particularly at risk.

The following tables display a full historical record of winter storm events and federally declared disasters for Windsor County. Although this data is not specific to the Town of Ludlow, it represents the best available data at this time and reveals that severe winter weather is common in the SWCRPC Region and damage from those storms has amounted to over 12 million in costs over the past twenty years.

**Table 9: Major Disaster Declarations for Windsor County: Winter Weather<sup>13</sup>**

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

**Table 10: Winter Storm Events Windsor County 1993-2011<sup>14</sup>**

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

<sup>13</sup>FEMA Vermont Disaster History [http://www.fema.gov/news/disasters\\_state.fema?id=50](http://www.fema.gov/news/disasters_state.fema?id=50)

<sup>14</sup> NOAA National Climatic Data Center 1996-2011 <http://www4.ncdc.noaa.gov/cgi-win/wwcgui.dll?wwevent~storms>

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1/6/1995	2100	Snow Freezing Rain	50K
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

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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

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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

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

This data represents the most town specific data available at this time. Similar to other hazards, more detailed information will be sought during future meetings of the Ludlow Hazard Mitigation Committee. Additionally, town archives, local interviews, libraries, and the historical documents will be utilized to build a comprehensive dataset of previous winter storm occurrences.

**D. TRANSPORTATION INCIDENTS OR DISRUPTION**

Transportation incidents have the potential to impact the Town of Ludlow. Highway accidents can result in short term disruption of important local and regional travel corridors and transportation routes may be disabled. Major disaster level incidents involving our highways, trains, and airways, although infrequent can occur at any time of year. Adverse weather conditions can be a catalyst for traffic accidents.

**Highway accidents** are a particular concern given the high traffic and truck volumes on VT Route 103. According to VT Agency of Transportation data, 74 accidents occurred on the state highways between 1998 and 2002, resulting in 40 injuries but no deaths. Three deaths occurred between the years of 2005 and 2009.

**Table 11: Highway Accidents 2005-2009**

Route/Highway	# of Accidents	# of Injuries	# of Fatalities
VT-100	56	20	0
VT-103	149	46	3
Okemo Mtn. Rd.	3	1	0

A significant threat to the town posed by transportation incidents is the potential for releasing hazardous materials into the surrounding area. A significant portion of Hazardous Material incidents are instigated by transportation incidents.

There are no records of **bus accidents** in Ludlow; however, they are a significant local concern. Busses carrying skiers to Okemo Mountain Resort are common, and have the potential to be critical in terms of deaths or bodily injuries. There was a recent ski bus accident in Brattleboro. The steep grades along the Okemo Mountain Road are of concern due to potential icy conditions; however, sand and salt applied seasonally have been very effective. The intersection of Routes 103 and 100 remains a concern.

**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.

Tier II facilities located within the Town of Ludlow:

- Johnson & Dix – Bulk oil/kerosene storage
- Ludlow Plaza – Propane tanks located in the rear of the building
- Okemo Plaza – Propane tanks located in the rear of the building

The major Hazardous Materials trucking route in Ludlow is VT Route 103, but Hazardous Material traffic is also common along Route 100 and the Green Mountain Railroad. An accident resulting in hazardous materials release within the village could be devastating. A spill along Route 100 south of the village may threaten water quality as municipal drinking water sources are close to the highway.

VT Route 103 is a major hazardous material transportation corridor and runs through the Village of Ludlow and near the base of Okemo Mountain Resort. The railroad also parallels Route 103. Within the Village, significant densities of residential and commercial structures are within close proximity to the highway. VT Route 100 parallels Lakes Pauline and Rescue. A chemical spill on Route 100 would likely impact water quality. There are a number of critical facilities near these primary hazardous materials routes, including:

- Ludlow Elementary School
- Black River Union Middle and High Schools
- Gill Home – Assisted living facility
- Ludlow Health Center
- Ludlow Town Hall
- Ludlow Ambulance

#### F. HIGH WIND EVENTS

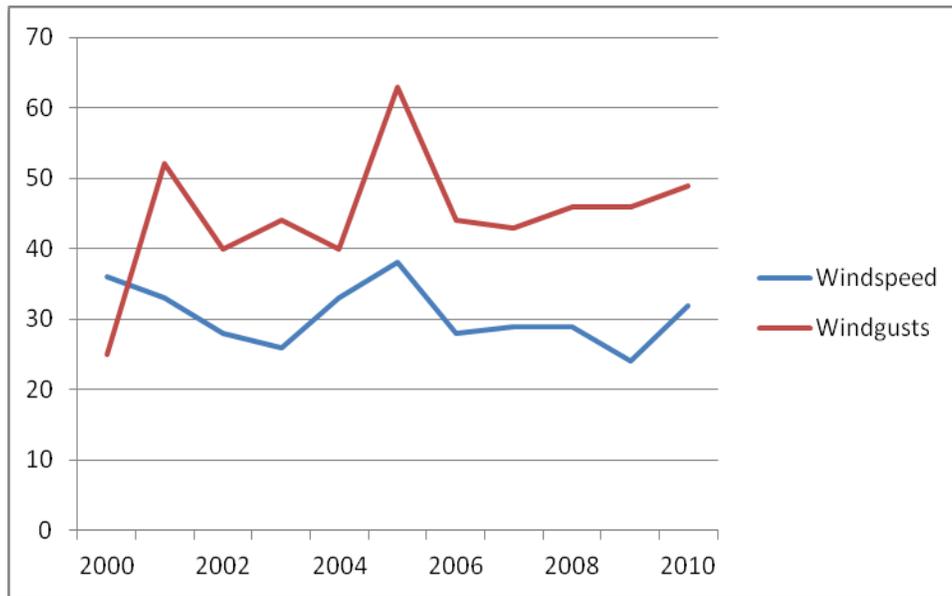
**High winds** can result from hurricanes, tropical storms, summer thunderstorms, and tornadoes. The State of Vermont Emergency Operations Plan states that hurricanes and tropical storms are rare events in the region and that high winds are most commonly the result of severe summer thunderstorms. Damage 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 12: 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 Town of Cavendish, Vermont located directly east of Ludlow. This is currently the most detailed information available for wind speed in the Ludlow area. Over the past decade, the highest recorded wind speed approached 40 miles per hour with gusts of wind topping 60 miles per hour.

**Figure 5: Maximum Windspeed (mph) Cavendish Vermont 2000-2010<sup>15</sup>**



**Tornadoes** have the potential to cause significant damage but occur rarely in our area and their effects, although severe, are very local 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 for tornado frequency<sup>16</sup>.” The largest tornado that has occurred within 50 miles of the Town of Ludlow occurred in 1998 and registered as an F3 tornado, with wind speeds over 158 miles per hour<sup>17</sup>. 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. Cost estimates for high wind events are difficult to predict due to the large range of impacts they can have upon an area.

**Hurricanes** are an infrequent event in Ludlow. The Vermont State Hazard Mitigation Plan states that “the last major windstorm disaster in Vermont was the 1938 hurricane<sup>18</sup>.” 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 as a large segment of its population lives in remote locations and is dependent upon long extensions of the power grid.

<sup>15</sup>Historical windspeed data from Wunderground: <http://www.wunderground.com/>

<sup>16</sup> Vermont State Hazard Mitigation Plan

<sup>17</sup> <http://www.homefacts.com/tornadoes/Vermont/Windsor-County/Windsor.html>

<sup>18</sup> Vermont State Hazard Mitigation Plan

**Power Failures** often occur as the result of high wind events. Two power companies provide electric service to Ludlow. Ludlow Electric, a municipal power company, provides unusually reliable service to the Village area, Okemo, and other areas in town including the neighboring village of Proctorsville. Central Vermont Public Service provides electricity in the rural out-lying areas of Ludlow. Power failure is a common and annual event in the rural distribution areas of Ludlow. Power failures within Ludlow Electric’s jurisdiction are not common. 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 August 2003. Dead or dying trees in close proximity to power lines pose a particular threat for power failure.

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. 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 are determined by the use of scales like the Richter Scale and the Mercalli Scale.

**Table 13: 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.

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 western quakes when they occur.

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 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<sup>19</sup>.” 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<sup>20</sup>.” 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<sup>21</sup>.”

Earthquakes pose a hazard to the Town of Ludlow due to the historical nature of residential and commercial buildings in the town. The historic nature of buildings throughout the town 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 \$58,000 and \$164,000 dollars in structural damage town wide during a 500 year earthquake, predicted to have a magnitude between 5.7 and 6.6.

#### **H. WATER SUPPLY CONTAMINATION**

Municipal water service is provided by the Ludlow Water Department. The primary service area is the incorporated Village. The primary water source is the protected aquifer located in the southwest part of town. The municipal water facility is fairly contained, however, contamination is possible. Water supply protection measures are in place, including an ordinance restricting development within the aquifer protection district and a written, wellhead protection plan.

The potential contamination of the municipal water supply could have devastating impacts on human health and result in widespread deaths. Approximately 640 residential users and 100 commercial users are currently served by the municipal water system.

#### **I. SCHOOL SAFETY ISSUES**

There are no reported significant school safety incidents in Ludlow, but there is always a potential for a variety of crisis situations. The schools in Ludlow are in the process of developing a school crisis plan to improve preparedness for any type of emergency event. Preparedness of school officials and municipal emergency service personnel is the best course of action for this event type.

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<sup>19</sup> State of Vermont Emergency Operations Plan

<sup>20</sup> State of Vermont Emergency Operations Plan

<sup>21</sup> State of Vermont Emergency Operations Plan

**MITIGATION STRATEGY**

**EXISTING HAZARD MITIGATION AUTHORITIES, POLICIES, PROGRAMS, AND RESOURCES**

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

The Town of Ludlow currently participates in the National Flood Insurance Program and will continue to regulate floodplain use through the Town and Village Zoning and Flood Hazard Regulations. The town regulations were last amended and adopted on December 2, 2007 while the village regulations were last amended and adopted on September 6, 2006. The FEMA floodplain maps, last amended in 2007 are one tool that exists within the floodplain regulations to help prevent and limit development in known hazard areas.

To ensure continued NFIP compliance, the town and the Administrative Officer will continue to enforce these regulations. In addition to enforcement, the Administrative Officer is charged with advising residents on floodplain development. No structures within Ludlow have been identified as repetitive loss properties by FEMA, there are 101 NFIP insurance policy holders within the Town of Ludlow, 85 of which are located in the 100 year flood zone. Thirty three claims have been filed since 1978, totaling \$3,251 dollars in payouts.

The programs in the table below reduce the effects of hazards to 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 Hazard Mitigation Committee analyzed these programs for their effectiveness and noted any improvements that may be needed.

**Table 14: Existing Resources for Mitigating Hazards: Authorities, Policies, and Programs**

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness
Municipal Plan	Plan for coordinated town-wide planning for land use, municipal facilities, water supply, etc.	Effective; revised and readopted in 2009	Plan is updated on a five year cycle, the next revision could be strengthened to improve effectiveness in hazard mitigation
Basic Emergency Operations Plan	Basic procedures for emergency response	Outlines procedures for call-outs, evacuations, etc.; last updated in 2010	Plan is reviewed every year following town meeting; statewide template can restrict additional functionality
School Emergency Response Plan	School procedures for emergency response	Utilizes template provided by state, provides a checklist for school administrators and first responders for use in an emergency situation	Coordinating response procedures among planning tools may improve effectiveness

Ludlow All-Hazard Mitigation Plan

LEPC 3 All Hazards Resource Guide	Outlines resources available to Ludlow in emergency situations	Effective through providing data and resources to town first responders	Should be revised to include resources specific to Ludlow and Ludlow Village
Mutual Aid – Emergency Services	Agreement for regional coordinated emergency services	Effective in providing additional emergency support during atypical events	Mutual aid agreements should be formalized
Mutual Aid – Public Works	Agreement for regional coordinated emergency highway maintenance services	Effective in providing additional highway support and resources during atypical events	Mutual aid agreements should be formalized
Road Standards	Design and construction standards for roads and drainage systems	Effective through continued use	Continued implementation of road standards is critical to effectiveness
Subdivision Regulations	Regulates the division of land, provides standards for site access and utilities	Effective through continued implementation	Continued updates and enforcement are important for continued effectiveness
Zoning Regulations	Regulates development in and out of hazard areas	Effective through limiting development in known hazard locations	Continued updates and enforcement are critical for continued effectiveness
Site Plan Review	Reviews plans for development and issues recommendations	Effective in limiting development in hazard areas	Continued use of this tool will help prevent additional hazards
National Flood Insurance Program (NFIP)	Provides ability for residents to acquire flood insurance	Effective, Ludlow is compliant with the NFIP program	Flood maps should be updated when possible, town may pursue CRS rating
Maintenance Programs	Bridge and culvert inventory	Effective at tracking and planning infrastructure upgrades	Inventories should be updated when possible
Access permits	Regulates driveway access along town maintained roads	Effective in limiting the number of road cuts, thereby reducing the potential for traffic incidents	Continued enforcement of access permit regulations are important for maintaining effectiveness
Local Emergency Planning Committee 3	Volunteer organization involved in regional hazard mitigation efforts	Effective and important contributor in the hazard mitigation process	Greater participation from Ludlow at the regional level would be beneficial
Southern Windsor County RPC	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 for historical hazard data

## **HAZARD MITIGATION GOALS, ACTIONS, AND PROJECTS**

The following sections detail the mitigation goals and potential mitigation actions that the town has created 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.
- Provide high quality municipal police, fire, and ambulance services to ensure the protection of public health and safety.
- Support measures to reduce the time needed by health and safety services for responding to calls for assistance.
- Evaluate emergency communications facilities to ensure sufficient capacity to support police and ambulance service.

## **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:

- Reduce the likelihood and impact of structure and forest fires within the town.
- Promote the long-term productivity and renewal of forest resources through use of the Accepted Management Practices.
- Improve inter-departmental coordination in ongoing maintenance of department emergency protocols

#### Recommended Actions and Projects:

- Continue to fund regular, semi-annual equipment replacement per departmental needs.
- Continue public education initiatives, such as providing school children with tours of the Fire Department, in order to better inform residents about hazards the community is vulnerable to, available emergency services and how to access those services.

### **B. FLOODING**

#### Goals:

- Encourage the use of proper techniques for the construction and maintenance of public and private roads, buildings, paved areas, and other types of development.
- Reduce the impacts of flooding events upon the town

#### Recommended Actions and Projects:

- Maintain current NFIP status
- Update land use regulations to be consistent with revised State legislation and to better address hazard mitigation
- Update road surface management system (RSMS) and bridge and culvert inventory to assist in identifying problem infrastructure and prioritize improvements/upgrades.
- Upgrade undersized culverts that experience repeat flood damage.

### **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:

- Develop plans and procedures for relocations of critical operations and personnel to an alternate facility.
- Develop procedures for pre-winter preparations.

### **D. TRANSPORTATION INCIDENTS OR DISRUPTION**

#### Goals:

- Minimize disruption to road network

- Improve safety, minimize traffic delays and improve access along VT Routes, 103 and 100. The Town and Village encourage developers to share parking areas and to avoid creating unnecessary road intersections and curb cuts
- Encourage expansion of train and bus service in Ludlow.
- Explore, promote and develop expanded use of passenger and freight rail service both within the community (to Luzenac America and the Dean Brown Jr. Industrial Park) and between nearby communities (Amtrak service to Windsor, Bellows Falls and Rutland).

Recommended Actions and Projects:

- Continue to implement the special peak seasonal traffic management program in the Village, and continue to explore other traffic management alternatives.
- Implement and seek funding for an ongoing traffic count program on all four ingress and egress travel corridors.
- Develop and maintain ongoing origin and destination studies to determine current and future seasonal traffic trends.
- Continue to monitor State and Federal funding efforts for studying the transportation network including such alternatives as railroad track upgrades for the Green Mountain Railroad, signalization improvements, and locally acceptable traffic routing options.
- Develop a standard policy for municipal acquisition of new roadways. Adopt standards for construction of all roadways that serve more than two primary structures in separate ownership.
- Identify unsafe or congested municipal roads, bridges, and intersections and prioritize needs. Encourage the study, engineering, and construction of municipal transportation infrastructure, including bicycle and pedestrian pathway pursuing appropriate funding sources.
- Continue to explore locally acceptable alternative through-traffic routes to alleviate seasonal congestion.

## **E. HAZARDOUS MATERIALS**

Goals:

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

Recommended Actions and Projects:

- Improve inter-departmental coordination in ongoing maintenance of department emergency protocols

## **F. HIGH WIND EVENTS**

Goals:

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

Recommended Actions and Projects:

- Develop review criteria to future building placement, siting, landscaping, etc. for wind protection.
- Continue to evaluate the placement of electric lines and facilities for health, safety, and aesthetic concerns.
- Encourage the use of existing infrastructure and services.

## **G. EARTHQUAKE**

**Goals:**

- Minimize the extent of damage and loss of life from future earthquake events.
- Minimize the effects of atypical events to town residents.

**Recommended Actions and Projects:**

- Develop procedures for both sheltering in place and relocating critical operational services to an alternate site.
- Develop an 'At Needs' registry of town residents.

**H. WATER SUPPLY CONTAMINATION**

**Goals:**

- Encourage means to adequately protect sources of drinking water for individual homes and the town and village as a whole.
- Continue to provide safe drinking water and sanitary sewage disposal efficiently within the existing service areas.
- Ensure that development in the watershed areas of Lake Rescue and Lake Pauline does not adversely affect water quality and the scenic value of these lakes.
- Protect shorelines and stream banks from surface runoff that could lead to excessive erosion, sedimentation, and/or other pollution of surface waters.
- Ensure that the Ludlow Wastewater Treatment Plant is adequate to service the community and that all state regulations are met regarding discharge.

**Recommended Actions and Projects:**

- Promote development of adequate regulations to ensure proper septic system and wastewater handling design and operation.
- Protect the aquifer district from high-density development that can lead to detrimental effects on the water supply.

**J. SCHOOL SAFETY**

**Goals:**

- Provide a safe school environment for Ludlow students

**Recommended Actions and Projects:**

- Develop a school crisis plan for Black River Union Middle and High Schools and Ludlow Elementary
- Purchase equipment to upgrade security at the Black River Union Middle and High Schools and Ludlow Elementary. Equipment to include portable radios, system intercom system, security cameras and other security improvements.
- Continue to schedule periodic/annual table-top exercises or similar training sessions to further the cross-training of town and school staff.
- Improve town-school coordination in educational programs for staff, including in-service programs for teachers.

## **ADDITIONAL GOALS AND RECOMMENDED ACTIONS**

The following additional goals and recommendations can be found in Ludlow 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:

### ***Natural Resources***

#### Forest Resource Goals:

- Preserve and protect Ludlow's forest resources to ensure continuation of their environmental, aesthetic, and economic values.
- Promote measures that encourage owners of large forested tracts of land to avoid fragmentation or subdivision of forested areas.
- Support local, State, and federal programs and funding that will encourage landowners to retain managed forestlands.
- Promote the reestablishment of tree cover in the Village area.
- Encourage compatible uses of forestlands for recreation, tourism and economic benefit where such uses will not impair forest quality or wildlife and/or forest habitat.

#### Earth Mineral Resource Goals:

- Manage earth mineral resources such that land areas disturbed by earth mineral extraction are restored and that the extraction methods used will not result in significant degradation to the environmental, aesthetic, or economic values of surrounding areas.
- Ensure that uncontrolled active extraction of mineral resources shall not lead to premature resource depletion, inadequate time for environmental restoration and recovery, or obnoxious effects such as noise, dust, or visual degradation of the site and surrounding neighborhood.
- Ensure that abandoned and un-reclaimed extraction sites do not present an unsightly appearance, pose health and safety hazards, reduce the property value of abutting land, and require expensive reclamation efforts.

### ***Water Resources***

#### Goals:

- Develop appropriate measures to protect or improve water quality in Ludlow's lakes, ponds, rivers, streams, and wetlands. Measures should include requirements for adequate vegetative buffers and standards for development to control density, soil erosion, sedimentation, and pollution.
- Work cooperatively with the Connecticut River Joint Commissions, the Black River Watershed Association, the Lake Association and others involved in water quality issues.
- Encourage compatible uses of surface waters for recreation, tourism, and economic benefit where such uses will not impair water quality, or wildlife and/or aquatic habitat.

#### Wildlife Resource Goals:

- Control development in environmentally sensitive areas.

- Ensure that methods of waste disposal, construction, road paving or maintenance; or disturbance of habitat, and other human activities do not lead to pollution or destruction of wildlife habitats.

Recommended Actions and Projects:

- Ensure bylaws encourage appropriate use and preservation of important resources, including large tracts of forested land, fresh water resources, mineral deposits, wildlife habitats, agricultural lands and environmentally sensitive and scenic resources.
- Incorporate State, Federal and local educational measures, funding or incentives to encourage land owners to protect and preserve natural resources
- Work with local, regional, State and Federal agencies to promote appropriate use, preservation, and protection of important resources.
- Develop an inventory of natural, environmentally sensitive, and scenic resources to be used in protecting and preserving these features.

***Water and Sewer Services***

Goals:

- Ensure that the provision of infrastructure and municipal services will not generate an undue burden on community taxpayers.
- Promote expansion of municipal service in land use areas defined by the municipality as desirable for growth and development.
- Promote proper installation of properly designed, appropriate onsite systems for development occurring beyond the municipal service area.
- Encourage owners of parcels with existing onsite systems within the municipal water and sewer service areas, to obtain municipal service before system failure.
- Ensure that development within municipal service areas is constructed for municipal service.
- Provide a municipal solid waste disposal service that is safe, efficient, and both financially and environmentally cost effective.
- Support efforts to educate owners concerning proper maintenance of onsite systems.

Recommended Actions and Projects:

- Expand existing municipal water and sewer service areas to include those areas where future land use growth and development are desirable and anticipated.
- Expand sewer service to include parcels contiguous with the existing service area, when hazardous onsite problems have been identified or where soils are unsuitable for onsite systems.
- Within the service area, supply municipal service to new development and to owners of existing failed or failing septic systems.
- Encourage maintenance and upgrading of onsite systems to prevent well contamination, pollution or other problems associated with improperly installed or failed systems.

***Electrical Services***

Goals:

- Ensure a supply of safe, sufficient, electricity to meet the needs of residents, businesses, industries, and visitors at a reasonable cost.

- Support efforts to educate users concerning the conservation of electric energy. Ensure that emergency electricity will be available in case of a major power outage.

Recommended Actions and Projects:

- Locate and schedule expansion of utilities facilities and services to coincide with the need for desired development.

***Communication Service***

Goals:

- Secure desirable communications services that will best serve Ludlow's citizens.
- To the extent possible, develop criteria for evaluating the health, safety, and aesthetic aspects for placement of proposed communications devices and facilities.
- Encourage combined usage of existing utility rights-of-way for communication facilities and devices, where possible.

Recommended Actions and Projects:

- New telecommunications towers and facilities should be sited and constructed only as required to meet the Region's changing needs.
- New telecommunications towers and facilities should not be sited or constructed when a practicable alternative exists. Those wishing to construct new facilities should utilize existing space whenever possible, and those owning or operating existing facilities should facilitate the sharing of that space to the fullest extent possible.
- Those building new telecommunication towers and facilities shall not prohibit the sharing of a facility by other users for reasons other than avoiding demonstrated risk to public health. The use of existing structures, such as water towers and buildings, to support telecommunications broadcast equipment is encouraged wherever appropriate.
- The Town will work with adjacent communities and State and Federal regulatory agencies to ensure that telecommunications projects in surrounding communities do not negatively impact aesthetics, the provision of public and emergency services, and public health concerns in Ludlow.

***Health and Safety Services***

Goals:

- Provide high quality municipal police, fire, and ambulance services to ensure the protection of public health and safety.
- Support measures to reduce the response time by health and safety services to calls for assistance.
- Evaluate emergency communications facilities to ensure sufficient capacity to support police and ambulance service.

Recommended Actions and Projects:

- Ensure that new development includes sufficient accessibility for emergency vehicles.

***Land Use***

Goals:

- Encourage development to locate in areas already served by existing roads, utility lines, and services.
- Support the use of compact development techniques throughout Ludlow to encourage easier and less expensive municipal service, energy efficiency, and the preservation of open space.

- Ensure the timely provision of adequate municipal services and infrastructure to support desirable commercial and industrial growth.
- To the extent possible, resolve transportation conflicts associated with land uses (access, traffic circulation, parking, and pedestrian/vehicle conflicts).

Recommended Actions and Projects:

- Develop only those land use regulations necessary to protect and preserve the health, safety, and welfare of residents and visitors, Ludlow's economic viability, important natural resources and to effectively reduce municipal costs to support development.
- Ensure that all local regulations are supported by and compatible with the goals and objectives of the Municipal Development Plan.
- Establish methods for working with developers to ensure land use compatibility before construction.
- Within the Village, encourage development proposals to include provisions for landscaping and preservation of the tree canopy. Establish an equitable mix of affordable residential land uses.
- Develop zoning regulations to support the Land Use goals stated in the previous section.

**IMPLEMENTATION SCHEDULE FOR PRIORITIZED MITIGATION PROJECTS<sup>22</sup>**

The following implementation schedule was developed by the Ludlow Hazard Mitigation Committee. Mitigation actions are ranked in priority order, with the most critical needs being 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 15: Implementation Schedule for Prioritized Mitigation Actions**

MITIGATION ACTION	TYPE OF ACTION	HAZARD ADDRESSED	RESPONSIBLE PARTY	TIME FRAME	FUNDING SOURCE	PRIORITY
Trim identified hazard trees along power lines in coordination with electric providers	Mitigation	High Wind Events, Power Loss, Severe Winter Weather	Highway Foreman, Selectboard	2012-2014	No cost to town	22
Maintain compliance with all NFIP requirements	Mitigation	Flooding	Zoning Administrator, Planning Commission	Ongoing	No cost to town	26
Retrofit existing drainage system to allow for greater water passage at Commonwealth Ave. intersection	Mitigation	Flooding	Selectboard	2013-2015	HMGP grant	31
Provide Firewise ‘Be Firewise Around Your	Mitigation	Structure Fire, Wildfire	Fire Department, Emergency Management	Ongoing	No cost to town	24

<sup>22</sup> Adapted from Rutland Regional Pre-Disaster Mitigation Plan

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Home' information to property owners			Director			
In coordination with VT Forest Parks & Recreation, install wood roads to create fire breaks in Okemo State Forest	Mitigation	Fire (specifically wild fire)	Fire Chief, Emergency Management Director	2013 – 2014	No initial cost, future cost may be split between VT FP&R and Town	21
Complete property acquisitions in Smithville along Route 103 South	Mitigation	Flood	Town Manager, Planning Director	2014 – 2016	HMGP grants with matching town funds	25
Install redundant power supply at Ludlow Community Center / Town American Red Cross Shelter	Mitigation	Severe Winter Weather	Town Manager, Selectboard	2013 – 2014	DEMHS Generator grant; when available	28
Upgrade Walker Bridge	Mitigation	Transportation Incident	Town Manager, Road Foreman	2014 – 2015	Vtrans grant	29
Install Left Turn Lane at Entrance to Jackson Gore	Mitigation	Transportation Incident	Town Manager for oversight, Okemo Mountain Resort		Private funding	27
Encourage all new development located on Okemo Mountain to create set-backs to forest canopy	Mitigation	Fire	Planning Commission, Fire Department	Ongoing	No cost to town	25
Update fire department pre-planning process and large business site visits	Preparedness, Mitigation	Fire	Fire Department, Emergency Management Director	Ongoing	No cost to town	26
Revise current zoning regulations to require all new mobile homes be properly anchored	Mitigation	High Wind Events	Planning Director, SWCRPC	2013 – 2014	No cost to town	24
Provide community outreach and literature on the	Mitigation	Earthquake	Planning Director, SWCRPC, Ludlow Development	Ongoing, beginning in 2013	No cost to town	29

Ludlow All-Hazard Mitigation Plan

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risks of earthquakes			Review Board			
Implement a Ludlow water system leak analysis program	Mitigation	Earthquake	Town Manager, Public Works Director	2014 – 2016	Town Capital Budget, HMGP 5% funding	25
Study the vulnerability of the Ludlow wastewater facility and other municipal buildings to earthquake	Mitigation	Earthquake	Town Manager, Selectboard	2014 – 2016	Town Capital Budget, FEMA HMGP grants	20

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.

**PLANNING COMMISSION  
PRELIMINARY MINUTES**

**REGULAR MEETING**

November 18, 2010

**MEMBERS PRESENT:**

Fred Glover  
Terry Carter

Alan Couch  
Christine Fuller

Steve Stengel  
Norman Vanasse

**OTHERS PRESENT:**

Rose Goings  
Brian Shupe

Jason Rasmussen

Michelle Stinson – LPC-TV  
Lisha Klaiber, Recorder

**1. Call to Order**

- A. Fred Glover called the meeting to order at 5:30 p.m.

**2. Roll Call by Recording Secretary**

- A. All members present. Alan Couch arrived at 5:34 p.m.

**3. Approve Minutes**

- A. The minutes to be approved are from the meeting of October 19, 2010.  
B. **MOTION by Christine Fuller and seconded by Norman Vanasse to approve the minutes from October 19, 2010 as presented. Motion passed unanimously.**

**4. Comments from Citizens**

- A. There were none.

**5. Town Plan Updating – Brian Shupe to discuss the Energy Section, Chapter 8**

- A. Jason Rasmussen introduced Brian Shupe to the board, advised that Brian Shupe is on the Vermont Natural Resource Council and is working on the Municipal Energy Plan manual.  
B. Brian Shupe had a power point presentation. He explained that he is working on a Community Energy Planning and Implementation Manual and hopes to have it published by the end of the year and will send a copy to the board when it is complete. He said that he reviewed the draft of the Energy Section of the town plan and said that there are things that might be integrated into the Land Use and Transportation sections that are related to the Energy section. He advised that some towns have an energy committee to help implement the goals of the energy section of the town plans. He advised that applications for a Municipal Planning grant are due soon. He said that energy plans have been required in town plans since the late 1980's and must include:  
i. Analysis of Resources, Needs, Scarcities, costs and problems – this includes energy use with documented trends, projected future demand from both governmental and community entities, availability of energy resources, including local sources and potential renewable energy sources,

- fiscal impact of energy consumption for local government and community facilities based on current and projected costs, current or future problems or scarcities.
- ii. Statement of Policy on Conservation of Energy, including energy efficiency for buildings, possible retrofit of street lights and lighting to LEDs.
  - iii. Statement of policy on development of renewable energy resources. Net metered solar panels and wind turbines are exempt from local zoning and controlled by the Public Service Board. The town plan needs to develop plans for location of renewable energy equipment. He continued, saying that the guidebook with emphasize what other towns have done and are going to do. Some towns are converting to biomass in public schools.
  - iv. Statement of policy on patterns and densities of land use likely to result in conservation of energy. This ties into the Land Use chapter and may include promoting smart growth and compact development and density bonuses for developers that build energy efficient buildings. The state statutes have changed to encourage energy efficiency in new buildings. You may want to include energy efficiency standards. Also, if you are going to refer to reducing energy consumption, you need to know what the current consumption is. You may want to encourage pedestrians in the town center.
- C. Fred Glover noted that Ludlow has had a problem with parking and they put in the crosswalks to try to make the downtown more pedestrian-friendly.
  - D. Brian Shupe said that you could suggest that local businesses have their employees park in the municipal lot and not on the streets.
  - E. Alan Couch commented on replacing streetlights with LEDs and wondered what the Return on Investment would be.
  - F. Brian Shupe said that Efficiency Vermont has a website with a lot of information, and listings of programs and workshops.
  - G. Alan Couch noted that the new CFLs contain mercury and must be disposed of properly. He wondered about the cost of disposing them in the future.
  - H. Jason Rasmussen said that over the long term, you would save a lot of money on them. He has data in his office to explain this. He added that 90% of VTRANS' lights are LEDs.
  - I. Steve Stengel asked where towns would get the funding to changeover.
  - J. Brian Shupe said that different towns have different ways. Some towns have energy committees responsible for raising funds and getting possible grants. Some towns hire energy coordinators responsible for raising money.
  - K. Terry Carter said that Ludlow has a lot of recent retirees who might want to get involved. She added that Streetscapes or the Black River Academy Museum might want to work on it.
  - L. Christine Fuller said that she would like to see a Button Up Vermont workshop in Ludlow.
  - M. Jason Rasmussen said that the Regional Planning Commission is attempting to put together a baseline energy study for the towns in the region. Ludlow is challenging.
  - N. Fred Glover asked if the energy standards are addressed in Act 250.
  - O. Brian Shupe said that there are state standards now, but that they are weaker than they were in the past. They do include energy star rated homes and density bonuses. Your policy or program could enforce these standards.
  - P. Jason Rasmussen said that Ludlow is pursuing a village center designation.
  - Q. Brian Shupe said they could have a transportation center. Transportation is a huge challenge in Stowe, pretty much reliable in the winter, less so in the summer because people want to drive around. They have bike paths and sidewalks and had satellite parking.
  - R. Fred Glover said that Ludlow tried to do a bike path, but it was unsuccessful.
  - S. Rose Goings said it was stopped due to floodway issues.
  - T. Terry Carter said there were also problems with owner agreements.
  - U. Brian Shupe said that some towns mow and use VAST trails and bridges.
  - V. Jason Rasmussen said the Ludlow bike path project was funded, but it would have had to have crossed the river and it was not allowed to be built.

- W. Fred Glover said that the VAST approach is interesting and something for Ludlow to look at in the future.
- X. Rose Goings said that Springfield has a 6-mile round trip bike path by the river.
- Y. Terry Carter said that some equestrian groups pair with VAST for summer use.
- Z. Christine Fuller asked Brian Shupe if he had any specific recommendations for the draft of the energy section.
- AA. Brian Shupe said that it lacked background and was not specific enough. It needs to include current energy usage.
- BB. Christine Fuller said that an energy audit is very expensive.
- CC. Brian Shupe said Efficiency Vermont will help recoup the costs if you implement their programs. He said there are a lot of small steps that you can do yourself.
- DD. Christine Fuller said that, properly supported and advertised, they could probably get a good attendance at a Button Up Vermont workshop.
- EE. Jason Rasmussen said that he would put together what various data he can and start a draft for the next meeting that includes data and some of the suggestions Brian Shupe mentioned.

**6. Other Business**

**A. Agenda for Next Meeting**

- i. Fred Glover asked what chapters needed to be looked at again.
- ii. Jason Rasmussen said that Scenic Use (Chapter 3A) and Local Economy. He said that everything else is pretty much done.
- iii. Rose Goings said that they need to look at Housing and Definitions, also.
- iv. Steve Stengel asked if they voted on Utilities.
- v. Rose Goings said that chapters 2, 3, 4, 5, 7, and 3A has not been finalized.
- vi. Christine Fuller suggested going chapter by chapter to vote on finalizing them.
- vii. Rose Goings said they may want to incorporate some of tonight's information into Natural Resources, Local Economy, Housing, Transportation and the Energy sections.
- viii. Fred Glover said that they should encourage the DRB to include energy standards in their requirements.
- ix. Jason Rasmussen said they may want to consider including density bonuses for energy star rated buildings. He asked the board if they want him to incorporate the information from tonight's meeting into the respective chapters.
- x. Fred Glover asked which chapters might be modified?
- xi. Rose Goings said all but Community Profile.
- xii. Jason Rasmussen said that he needs to review tonight's information and see where it would fit into the town plan. He added that he can pull data from the Energy Atlas website. He added that most of what Brian Shupe mentioned could be dealt with in the Energy, Land Use and Transportation sections. He would email draft to the board.
- xiii. Board discussed the date of the next meeting and noted that December 21<sup>st</sup> would not be good. Next meeting is scheduled for **WEDNESDAY December 15, 2010 at 5:30 p.m.**
- xiv. Fred Glover said that the board would review suggestions from Jason Rasmussen about tonight's presentation and how it affects other sections of the town plan.
- xv. Jason Rasmussen said that Chapters 2, 3, 3A, 4, 5, 6, and 7 have not been finalized.
- xvi. Fred Glover said they could vote on Chapters 2, 3, 3A, 4, 5, and 7 at the next meeting.
- xvii. Jason Rasmussen said that he is still waiting from the schools for information and will send another email reminder. He said they could look at Energy and Scenic Resources at the next meeting.

**B. Predisaster Mitigation Plan**

- i. Jason Rasmussen said that Ludlow has had a Predisaster Mitigation Plan since 2006. The purpose of a plan is to reduce a threat before it actually happens. He has been speaking with

- Chief Kolenda. Some of the things that are considered are flooding, structure fires and bus crashes. Certain parts of the town are subject to flooding, like Commonwealth Avenue. Possibly that road could be stabilized.
- ii. Christine Fuller asked Jason Rasmussen if he has spoken with Frank Heald. She added that Mill Street was also flooded last year.
  - iii. Rose Goings said that Rublee Lane (the road leading into Black River Overlook) also floods and that there is an emergency entrance to it. She added that the entrance to Jackson Gore poses traffic hazards and also the intersection of Routes 100 and 103.
  - iv. Christine Fuller asked if there have been any changes since the last plan.
  - v. Jason Rasmussen said that some of the culverts have been replaced.
  - vi. Christine Fuller said that another dangerous place is the curve coming into the village from Route 100S – Andover Street. It is where two houses were hit by trucks on two separate occasions.
  - vii. Jason Rasmussen said that sprinkler systems are required for certain buildings to help prevent major structural fires.
  - viii. Rose Goings said that is covered by Fire and Safety. She mentioned the bridge by Dorsey Park at Andover Street.
  - ix. Fred Glover said the road by Benson's and West Hill could also be looked at for traffic hazards.

7. **Adjourn**

- A. **MOTION by Christine Fuller and seconded by Steve Stengel to adjourn the meeting. Motion passed unanimously.**
- B. Meeting adjourned at 7:22 p.m.

Respectfully submitted,

Lisha Klaiber

\_\_\_\_\_  
Fred Glover, Chairman

\_\_\_\_\_  
Christine Fuller

\_\_\_\_\_  
Terry Carter

\_\_\_\_\_  
Steve Stengel

\_\_\_\_\_  
Alan Couch

\_\_\_\_\_  
Norman Vanasse



**State of Vermont**  
**Department of Forests, Parks & Recreation**  
100 Mineral Street, Suite 304 [phone] 802-885-8855  
Springfield, VT 05156-3168 [fax] 802-885-8890  
[www.vtfpr.org](http://www.vtfpr.org) [tdd] 802-253-0191

*Agency of Natural Resources*  
[direct line] 802-885-8820  
[jay.maciejowski@state.vt.us](mailto:jay.maciejowski@state.vt.us)

July 15, 2013

John Broker-Campbell  
Southern Windsor County Regional Planning Commission  
Ascutney Professional Building Route 5  
Ascutney, VT 05030

RECEIVED  
JUL 17 2013

BY: \_\_\_\_\_

**RE: Ludlow All-Hazard Mitigation Plan**

Dear John,

Thank you for the opportunity to review the Ludlow All-Hazard Mitigation Plan. As you are aware, 3,184 acres of Okemo State Forest are located in the Town of Ludlow.

As part of the Okemo State Forest Long Range Management Plan (LRMP), the state monitors forest fire activity on a seasonal basis each year. Although wildfires are relatively uncommon in Vermont, there has been an increase in the number of houses built within private forest land adjacent to the state forest creating a higher potential for property damage should a wildfire occur.

The Department of Forests, Parks and Recreation is very supportive of the community outreach program mentioned in the plan known as "Firewise" and finds it to be an excellent resource for encouraging residents to work together to take actions to prevent losses from wildfire.

A portion of the aquifer for the village water supply is located within Okemo State Forest along the eastern ridge between Ludlow and Terrible Mountains. Protection of this aquifer will continue to be an important goal for managing that part of Okemo State Forest so that the village will continue to have a stable and sustainable water supply into the future.

Thanks again for allowing the state to comment on the All-Hazard Mitigation Plan.

Sincerely,

  
Jay Maciejowski  
Forestry District Manager



**PLANNING COMMISSION  
PRELIMINARY MINUTES**

**REGULAR MEETING**

June 18, 2013

**MEMBERS PRESENT:**

Alan Couch, Chair	Logan Nicoll
Terry Carter	Norman Vanasse

**OTHERS PRESENT:**

Ron Bixby	Rose Goings	Lisha Klaiber, Recorder
John Broker-Campbell	Jason Rasmussen	Vincent Guerrero – LPC-TV
Mike Doran	Ted Reeves	

**1. CALL TO ORDER**

A. Alan Couch called the meeting to order at 5:59 p.m.

**2. ROLL CALL BY RECORDING SECRETARY**

A. All members Planning Commission members present.

**3. APPROVE MINUTES**

- A. The minutes to be approved are from the meeting of May 21, 2013.  
B. **MOTION by Norman Vanasse and seconded by Logan Nicoll to approve the minutes from May 21, 2013 as presented. Motion passed unanimously.**

**4. COMMENTS FROM CITIZENS**

A. There were none.

**5. ALL HAZARD MITIGATION PLAN – JOHN BROKER-CAMPBELL, SWCRPC**

A. John Broker-Campbell advised that he works in the Emergency Management Planning area of Regional Planning and that the town had previously submitted its AHMP to FEMA. In May, we were notified that the plan had not been approved as a tool for emergency preparedness. FEMA send a list of items that they want included in the plan. The list included clarification on Town and Village separation of authority. More input from the public including fire and police departments, residents and Okemo. They want more current public hearings. John Broker-Campbell said that he would come to the July meeting and it should be warned as a public hearing. The bulk of the plan is to address the public process. Items C4 and C5 on the list refer to the previously submitted plans table on page 42. According to FEMA, the items listed as mitigation on that table, were

not mitigation, but response actions. FEMA provided some suggestions. He will work with Rose Goings to draft a revised plan. He hopes to have the new plan submitted in late July or August.

- B. Ron Bixby said that he will work with them on the plan.
- C. Rose Goings said that she will publish the agenda for the July meeting in the papers and on the website. She noted that is very hard to get people to come to the meetings.
- D. John Broker-Campbell said he would also post it on Regional's website.
- E. Alan Couch asked if this is an annual process.
- F. John Broker-Campbell said no, an approved plan is valid for 5 years, but you need to start the update process early. He thinks that if this revised plan is accepted, they should start to work on the new plan next winter. It may take 2-3 years to complete.
- G. Ron Bixby asked if FEMA is the only body to approve the plan.
- H. John Broker-Campbell said first the plan is submitted to the state for approval. If the state approves it, it goes to FEMA. If FEMA approves it, it goes to the Select Board and then is returned to FEMA. The Select Board can be included at any point in the process. FEMA also wants to see Okemo included in the process.
- I. Ted Reeves said that Okemo will work with them on the plan.
- J. John Broker-Campbell asked board members that if they have any comments, questions or suggestions to please send them to Rose Goings and she will get them to him.

#### 6. ZONING BYLAW AMENDMENTS

- A. Jason Rasmussen said that he had emailed a rough draft to members and has a rough draft markup of the map, showing possible zoning areas. He referred to the areas marked State Forest and said that there is no corresponding zoning district.
- B. Alan Couch asked if there is any development in that area.
- C. Ted Reeves said the area cannot be developed. There are also some areas of bear habitat. He recommends that they leave the area alone.
- D. Jason Rasmussen pointed out areas on the map referred to as Municipal Conservation District and they are town owned.
- E. Rose Goings said she would like to have those areas color-coded the same as the State Forest areas.
- F. Terry Carter said that the Aquifer Protection District on the map would be changed to coincide with the area designated by ANR.
- G. Jason Rasmussen asked about previous discussions regarding creation of new RC2 district in addition to the existing RC (which would then be RC1) district. He pointed to areas discussed for this including Rod and Gun Club Road. He also indicated areas that may be changed to Residential.
- H. Logan Nicoll said that he likes the list of permitted and Conditional Uses suggested for the RC districts.
- I. Terry Carter suggested inviting the residents of the areas affected to come to a meeting.
- J. Jason Rasmussen said the Route 100N corridor may be RC2. It would have a lesser degree of commercial conditional uses. He suggested Route 100 north of Clear Lake Furniture and maybe to allow outdoor events.
- K. Rose Goings suggested concerts, festivals as a conditional use on Rod and Gun Club Road.
- L. Jason Rasmussen said that making it a conditional use would establish a process to have these events with DRB conditions.
- M. Rose Goings said these events are not mentioned in the Zoning Regulations.

- N. Ted Reeves said that the town does have an Entertainment Permit process. He was concerned that if they put this into the zoning regulations, would Okemo or others, have to come to the DRB for each event they want to have.
- O. Rose Goings said that there is currently a court case going on for someone who wanted to run events and it was not in zoning.
- P. Alan Couch said if it is in zoning and approved as a conditional use permit, what if it gets out of control, what recourse we have.
- Q. Terry Carter said the DRB would make conditions.
- R. Rose Goings said it is hard to say what conditions would be imposed. She added that you would not have to come back to each event. Possibly yearly.
- S. Terry Carter said maybe they would only have to come back if they wanted to change the conditions of the permit.
- T. Ted Reeves said they would need a strong definition of “Outdoor Event” and how it is dovetailed into different districts. He added that Okemo has not had any big problems with Festovol.
- U. Jason Rasmussen agreed that they would need a definition first and said he would have that for the next meeting.
- V. Jason Rasmussen referred to list of uses for RC districts and said that the state regulations state that if a district has Single Family Residence as a permitted use, it must also include Two-Family Residence as a permitted use. He said that the list of conditional uses in RC2 is smaller.
- W. Terry Carter said that she likes the idea of 2 separate RC districts. She added that the idea of having Outdoor Events is making her nervous. She was considering the residents in the areas.
- X. Logan Nicoll suggested adding it as a Conditional Use in the Mountain Recreation District.
- Y. Rose Goings said this is just a working session and she and Jason Rasmussen would continue working on it.
- Z. Terry Carter said that she wants to vote on adding an RC2 district.
- AA. Rose Goings said they need to talk about lot sizes.
- BB. Jason Rasmussen said he made RC1 and RC2 the same size lots as the existing RC district sizes. He suggested adding the area by the end of Pleasant Street Extension up to the Industrial Park. He asked about changing some to Residential only. He suggested leaving the area by LaValleys as is and asked about the area by Jeld Wen.
- CC. Alan Couch said that he sees no benefits either way by changing some to Residential only.
- DD. Jason Rasmussen said that Jeld Wen is RC.
- EE. Logan Nicoll asked about Industrial.
- FF. Terry Carter said they should leave some flexibility.
- GG. Ron Bixby said that his suggestion is to leave that as it is.
- HH. Terry Carter said that for the areas where there are only houses, they should change them to Residential only.
- II. **MOTION by Terry Carter and seconded by Logan Nicoll to change the area where there is just residential homes, east of Pleasant Street Extension to the ball fields with the river on the North, between the railroad tracks on the south, as indicated on the map to Residential. Motion passed. Alan Couch opposed.**
- JJ. Rose Goings asked Alan Couch why he is opposed.
- KK. Alan Couch said that for the people who own property there, currently RC, by changing it to Residential, we are limiting the uses of those properties.
- LL. Rose Goings said they would notify the people and have they come to a meeting to discuss this.

- MM. Alan Couch said that he sees no reason to limit those peoples' abilities to use their property as they want.
- NN. Jason Rasmussen said they would be limiting the conditional uses of the properties involved.
- OO. Rose Goings said they could consider RC2, where there would be more limited commercial uses.
- PP. Alan Couch said that if that area changes, the board should then also change other areas in town equitably.
- QQ. Jason Rasmussen moved on to the Jackson Gore District.
- RR. Ted Reeves said they do have outdoor events there. He referred to the land use matrix provided by Jason Rasmussen and said that he has some comments that he would scan and send to Jason Rasmussen. He is concerned about how changes in language would affect Jackson Gore and Mountain Recreation Districts. He noted Real Estate offices.
- SS. Jason Rasmussen said he may have missed some uses in the matrix.
- TT. Ted Reeves asked if they wanted to change an existing Real Estate office to a retail store, would they have to go to the DRB.
- UU. Rose Goings said it would be a change of use and yes, they would have to go to the DRB.
- VV. Ted Reeves voiced concern about having to go to the DRB for every outdoor event they hold.
- WW. Jason Rasmussen said that was not the intent. He said that for a new business it would be a one-time permit.
- XX. Mike Doran said they need to get definitions.
- YY. Alan Couch said the town needs something to address this issue.
- ZZ. Rose Goings said that the definition of Outdoor Recreation does not include concerts. They are trying to add something to address this. She added that this issue did not arise because of Okemo, but another property.
- AAA. Jason Rasmussen said he would get better definitions. He noted that he had added 2-family homes to Jackson Gore permitted uses, along with accessory apartments, group homes, Home Child Care, Home Occupations, et al.
- BBB. Rose Goings advised that the Jackson Gore District was voted on by the residents of Ludlow and she does not know if it should be changed. Those items are not included in the purpose of the district.
- CCC. Jason Rasmussen said state law requires them, but we should check with legal.
- DDD. Ted Reeves advised that there are no single family homes in Jackson Gore. They are not allowed and there are no permanent residences. The district was developed and defined within an envelope.
- EEE. Alan Couch asked about condominium documents. He also asked about the other Okemo developments.
- FFF. Ted Reeves said that Jackson Gore documents state no permanent residences. In the other developments, there can be permanent residences. He said that Jackson Gore is condominiums. People may own full shares, but no permanent residence. The HOA documents also preclude that.
- GGG. Jason Rasmussen said he would get a legal opinion.
- HHH. Ted Reeves said that Jackson Gore falls into a unique crack because of the way it was designed.
- III. Alan Couch noted that they may need to correct the existing wording in the description of Jackson Gore. He pointed out some wording that did not make sense.
- JJJ. Ted Reeves said he would check into it.
- KKK. Jason Rasmussen moved to the Industrial District and said they need to clarify conditional uses of Temporary Crushing and Temporary Storage.
- LLL. Terry Carter said they should check on houses in that district.

- MMM. Jason Rasmussen said they would clean it up.
- NNN. Terry Carter asked about helipads and runways.
- OOO. Jason Rasmussen said that Cavendish just passed an ordinance to deal with that.
- PPP. Ted Reeves said that Jackson Gore is a designated helipad location for emergency use, primarily DART.
- QQQ. Ron Bixby said the Fire Department has 4 designated landing zones.
- RRR. Jason Rasmussen said there is probably a distinction between emergency non-emergency uses. He said there are some ordinances out there. He said that he would get together drafts for RC1 and RC2 and a definition of Outdoor Events for the next meeting.

7. **OTHER BUSINESS**

- A. Next meeting July 16, 2013 at 6:00 p.m.

8. **ADJOURN**

- A. **MOTION by Norman Vanasse and seconded by Logan Nicoll to adjourn this meeting. Motion passed unanimously.**
- B. Meeting adjourned at 7:25 p.m.

Respectfully submitted,

Lisha Klaiber

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Alan Couch, Chairman

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Logan Nicoll

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Terry Carter

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Norman Vanasse

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