Town of Shrewsbury, Vermont
Local Hazard Mitigation Plan

Prepared by the Town of Shrewsbury
With the assistance of
The Rutland Regional Planning Commission

FEMA Approval Pending Adoption Date: September 8th, 2015

Municipal Adoption Date: October 7th, 2015

FEMA Formal Approval Date:

This is a New Single Jurisdictional Local Hazard Mitigation Plan for the Town of Shrewsbury

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1. Introduction

The impact of expected, but unpredictable natural and human-caused events can be reduced through community planning. The goal of this plan is to provide all-hazards local mitigation strategy that makes the Town of Shrewsbury more disaster resistant.

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. FEMA and state agencies have come to recognize that it is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck. This plan recognizes that communities have opportunities to identify mitigation strategies and measures during all of the other phases of Emergency Management – Preparedness, Response and Recovery. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where the hazards are most severe and identify local actions that can be taken to reduce the severity of the hazard.

Additionally, the Disaster Mitigation Act of 2000 establishes a national program for Hazard Mitigation that includes mitigation planning and eligibility requirements for state and local governments. The Act is aimed at reducing loss of life and property, human suffering, economic disruption and disaster costs. High priority should be given to mitigation of hazards at the local level with increased emphasis on assessment and avoidance of identified risks, implementing loss reduction measures for existing exposures and ensuring critical services/facilities survive a disaster.

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 could include projects such as:

- Flood-proofing structures
- Planting stream buffers
- Tying down propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters
- Identifying and modifying high traffic incident locations and routes
- Ensuring adequate water supply
- Elevating structures or utilities above flood levels
- Identifying and upgrading undersized culverts
- Proactive land use planning for floodplains and other flood-prone areas
- Proper road maintenance and construction
- Ensuring critical facilities are safely located
- Buyout and relocation of structures in harm's way
- Establish and enforce appropriate building codes
- Public information

2. Purpose

The purpose of this Hazard Mitigation Plan is to assist the Town of Shrewsbury in identifying all hazards facing the community and identify strategies to begin reducing risks from identified hazards. Once adopted, the local mitigation plan is not legally binding; instead, it outlines goals and actions to prevent future loss of life and property.

Adopting and maintaining this Local Hazard Mitigation Plan will provide the following benefits:

- Make certain funding sources available to complete the identified mitigation initiatives that would not otherwise be available if the plan was not in place.
- Ease the receipt of post-disaster state and federal funding because the list of mitigation initiatives is already identified.
- Support effective pre- and post-disaster decision making efforts.
- Lessen the Town's vulnerability to disasters by focusing limited financial resources to specifically identified initiatives whose importance has been ranked.
- Connect hazard mitigation planning to community planning where possible.

3. Community Background

Land Use and Development Patterns

The Town of Shrewsbury has a unique and special character which is principally derived from the historical rural character of the community and the natural beauty of its mountain setting, containing large areas of wooded and open land, wetlands and other habitat. The town is still relatively undeveloped, with population clusters around one village and three hamlet centers (Shrewsbury Center, Cuttingsville, Northam and Eastham). Cuttingsville, located along Route 103 and adjacent to the railroad is home to the largest concentration of business activity in Town.

Census data shows residential land use is predominantly single-family, both permanent and vacation. Commercial and industrial land use in Shrewsbury is quite limited with most employed persons working in nearby communities such as Rutland and Ludlow. Agricultural land use, excluding kitchen gardens and pasturage for domestic animals, shows a drastic decline since the turn of the century, comparable to the agricultural downtrend in many southern Vermont hill towns. For example, in 1940, Shrewsbury had 64 dairy farms. Currently, there is only one farm that commercially produces milk. With the decline in agriculture-based businesses, the majority of residents working within the town boundaries are employed at the Spring Lake Ranch or in independent home-based businesses.

A major proportion of Shrewsbury's land is forested. Just under a quarter of the town's total acreage consists of woodlands managed by various State and Federal agencies. The Town's woodlands are an important resource for aquifer recharge, plant and wildlife habitat, and recreation, as well as timber production.

Demographics and Growth Potential

According to current census data (2010) Shrewsbury's total population is 1,086 equaling close to 2 percent of the region's overall population and making Shrewsbury the 17th largest town in the region. In the past ten years Shrewsbury's population has only increased by 0.1%. Shrewsbury's population has increased 95% though between 1970 and 2007. Even still, Shrewsbury's population is not expected to increase at a significant rate.

Land Features

Shrewsbury is a hilly and mountainous town. Elevation ranges from about 725 feet on Mill River at the Clarendon Town line to 3,737 feet at Shrewsbury Peak on the Mendon Town line. Much of the geology of these slopes is primarily ancient metamorphic rocks of Precambrian Age (600 million years and older). However, at the same time, much of Shrewsbury has shallow depth to bedrock. This makes the soil cover highly susceptible to erosion and can increase the risk of freezing of sewer and water lines. In particular, slopes greater than 15% and areas at elevation higher than 2000 feet are least able to support development.

Precipitation and Water Features

Precipitation in Shrewsbury ranges from 38 to 44 inches annually. Snowfall varies between 60-80 inches annually. The volume is greater at the higher elevations and in a normal year is fairly evenly distributed throughout the seasons. The mountains feed a number of rivers and springs in the valley areas. Of these, Mill River and Cold River have been designated floodplains by FEMA. In addition, a number of water resources in Shrewsbury have been designated wetlands. These play an important function in water absorption and holding capacity that thereby reduces the hazards of flooding and replenishes the groundwater supplies.

Water Supply

The ability of the aquifers to catch and hold water is vital to water systems affecting the Town and the region. The great majority of homes in Shrewsbury draw their water from springs and drilled wells. The exception to this is the village of Cuttingsville that has the Cuttingsville Water District #1 water company serving 20-25 families. This system consists of two drilled wells and a 16,000 gallon reservoir north of the village. In addition, Spring Lake Ranch (one of the nation's older half-way houses) has a water system that serves approximately 65 people.

Sewer Services

All structures in Shrewsbury are served by private septic systems.

Transportation

Highways US 7 and Vermont State Route 103 provide access into and out of Shrewsbury. The present network of 62 miles of roads in Shrewsbury serves the needs of current residents. The local road network is maintained by the Town Highway Maintenance crew whose garage is located on Mountain School Road. Shrewsbury has a total of 29 bridges, many of which were rebuilt after the flood in 1973. Of this total, 3 bridges are on the state system. Seven of the bridges have a span

of over 20 feet (5 are town owned, 2 are state owned). Under new Federal regulations, any bridge 20 feet or over is eligible for Federal funding assistance.

Emergency Response Resources

Shrewsbury has two fire stations – both of which are operated by a small, totally volunteer department. The town's firefighting equipment resources consist of two pumpers, two tankers, MSA Air Packs, and a cache of communications equipment including alert sirens. It is the intent of the Shrewsbury Firemen's Association to provide the Town with the best level of fire protection that its resources will allow. First it protects lives and then property. It will work with any and all other emergency services in or out of Shrewsbury to mitigate any emergency to which it is called – including through formal mutual aid agreements with Mount Holly, Clarendon and Rutland City.

Law Enforcement in Shrewsbury is provided by the two Town Constables with assistance from the Rutland County Sheriff's Department and Vermont State Police as needed.

The nearest hospital is the Rutland Regional Medical Center. Ambulance service is provided by Rutland Regional Ambulance as needed.

Please refer to the Hazards Analysis map for the locations of Town Emergency Operations Center (EOC) and emergency shelters.

Emergency Management Planning

Shrewsbury has demonstrated a strong commitment to Emergency Management planning. The Town has a 2014 updated Emergency Operations Plan (EOP), formerly Rapid Response Plan, and an Emergency Operations Center (EOC) in the Town Office in North Shrewsbury. The EOP was created by a team of two Emergency Management coordinators with the input and approval of key personnel in the Town.

4. Planning Process

The Rutland Regional Planning Commission (RRPC) and the Town of Shrewsbury coordinated Shrewsbury's Local Hazard Mitigation Plan process. Work on the preparation of this current plan began in July of 2014 and continued until October of 2015.

The Shrewsbury Selectboard identified local officials and stakeholders to serve on a committee to review and prepare the plan. The Selectboard passed a motion in support of updating their Local Hazard Mitigation Plan.

Hazard Mitigation Committee Members

Name	Affiliation
Elliott Stewart	Shrewsbury Emergency Management Director
David Rice	Shrewsbury Emergency Management Coordinator
Steven Nicholson	Shrewsbury Select Board
James Carrara	Shrewsbury Road Commissioner
Russell Carrara	Shrewsbury Fire Chief
David Fretz	Shrewsbury Townsperson-at-large

In addition to the local knowledge of committee members and other stakeholders, the following documents and resources were consulted in the preparation of this plan:

- National Oceanic and Atmospheric (NOAA) National Climatic Data Center's Storm Events Database (http://www.ncdc.noaa.gov/stormevents/)
- National Weather Service (Burlington, VT) Recent Weather Event Summaries (http://www.weather.gov/btv/recentwx)
- Vermont Department of Environmental Conservation Waste Management Interactive Database (http://www.anr.state.vt.us/dec/wastediv/SMS/WMID_Intro.htm)
- FEMA Disaster Declarations for Vermont (http://www.fema.gov/disasters/grid/state-tribal-government/35?field_disaster_type_term_tid_1=All)
- Open FEMA Dataset: Public Assistance Funded Project Summaries for Vermont
- USGS National Water Information System- Stream Gage Data
- United States 2010 Census
- Rutland Herald Archives
- Rutland Region All Hazards Mitigation Plan (2012)
- State of Vermont Hazard Mitigation Plan (2013)
- Shrewsbury Town Plan, Dec. 2013 - Dec. 2018
- Shrewsbury Zoning Regulations 2009
- Shrewsbury Flood Plain Ordinance 2012
- www.floodready.vermont.gov.
- Cold River Phase 2 Stream Geomorphic Assessment
- 8-15-13 Cold River Presentation
- FEA Draft Cold River Corridor 8-9-2013
- EPA Flood Resilience Checklist, July 2014
- EPA Report: Planning for Flood Recovery & Long Term Resilience in Vermont: Smart Growth Approaches for Disaster Resilient Communities, July 2014

Utilizing these resources, a thorough update of data was conducted to take advantage of new data that may not have been available during the development of the previous Annex. The State of Vermont also recently adopted an updated Hazard Mitigation Plan in November of 2013 (Vermont HMP 2013), which

was consulted during this plan preparation. As discussed in the following section, the plan was also restructured to a single jurisdictional format. RRPC staff revised the plan throughout the planning process, circulating multiple draft plans to committee members and others.

The hazard mitigation committee meetings were publicly warned in the following locations: Shrewsbury Town Website, the Official Town Bulletin Boards, and "*The Times of Shrewsbury*." The first committee meeting was held on August 12, 2014 at the Shrewsbury Town Office. Participants discussed the purpose and timeline for updating the plan, other groups/individuals that should be aware of the plan preparation, and damages that occurred in town from Tropical Storm Irene. Town maps were reviewed and the town's hazards were ranked according to their probability, impact, and risk level. The committee discussed high risk hazards in further detail. After this meeting a draft plan was developed and circulated to committee members.

A second committee meeting was held on August 26, 2014 at the Shrewsbury Town Office. The committee reviewed the updated draft plan and made changes as necessary. The committee discussed and agreed upon the town's mitigation goals. Then committee members discussed the status of each mitigation action from the town's last plan, and identified new mitigation actions for the town. After this final committee meeting the draft plan was finalized. The final draft plan was distributed to the entire committee for their review.

A 15 day public comment period was held from September 5, 2014 to September 21, 2014. The comment was warned in the Rutland Herald and by notice at the Shrewsbury town office. The following neighboring communities were notified of the public comment period: Mendon, Killington, Rutland Town, Rutland City, Clarendon, Wallingford, Mount Holly, Bridgewater, Plymouth, and Ludlow. One citizen's comments were received and recommendations were incorporated into the plan.

The draft plan was submitted first to Rutland Regional Planning Commission on September 30, 2014 for review. Then the plan was submitted to the State Hazard Mitigation Committee through the State Hazard Mitigation Officer (SHMO) on October 1, 2014 for review and comment. Required revisions were made and the plan was resubmitted to the SHMO on October 6, 2014.

The plan was then sent to FEMA Region I for review; after receipt of comments from FEMA Region I, changes were made until conditional approval was achieved. The final plan went to the Shrewsbury Selectboard for adoption. The adopted plan was forwarded to FEMA Region I and the State Hazard Mitigation Officer.

4.1 Plan Changes

The Shrewsbury Local Hazard Mitigation Plan was originally adopted by the Town as an Annex to the Rutland Region All Hazards Mitigation Plan in 2004 and received FEMA final approval in 2004. In 2009, RRPC staff worked with the town to update the plan and submitted an updated draft to FEMA; in March of 2011 FEMA returned comments on the plan, revisions were made by RRPC staff and the town, and the plan was resubmitted to FEMA in early August of 2011. FEMA returned comments on the plan in September of 2011.

As noted in the State Hazard Mitigation Plan, regional planning commissions throughout Vermont are now mainly encouraging towns to create local mitigation plans as single jurisdictional documents rather than annexes, due to the issue of plan expiration being based on the first town that is approved in a regional effort. **This plan is a single jurisdictional local hazard mitigation plan.**

The plan has been reorganized from the previous Annex plan with the following sections updated/added during the planning process:

Section of Plan	Changes Made
1. Introduction	Information on the Disaster Mitigation Act added
2. Purpose	Benefits of plan listed
3. Community Background	Census data and other information updated
Community Disaster History	Section deleted and incorporated into Community Hazard Inventory and Risk Assessment section
4. Planning Process	Section moved from end of document, additional details on process including: names of individuals involved, meeting locations and dates, list of sections updated, and table on status of the town's current mitigation actions added
5. Community Hazard Inventory and Risk Assessment	List of hazards was consolidated/changed as necessary, risk assessment table added, organized discussion into high and low risk hazards, hazard information from regional and state hazard mitigation plans added, local hazard information updated, tables added on hazard history and hazard summary for high risk hazards
6. Hazard Mitigation Strategy	Town mitigation goals updated, goals from Regional and State Hazard Mitigation Plans added, additional information on NFIP, mitigation actions and projects reviewed and updated, tables reformatted
7. Plan Maintenance Process	Added details on routine plan maintenance and methods to continue public involvement
Appendices	Maps updated with new data, certificate of adoption added, materials added documenting the planning process

Status of Hazard Mitigation Actions

The following table provides an overview of Shrewsbury's local hazard mitigation actions from the 2004 Annex along with their current status. Note that mitigation actions which are completed have been deleted from the Mitigation Actions & Projects Table in Section 6.5 of this plan.

Mitigation Action	Status
Incorporate proposed strategies into Annual Budget and Capital Improvement Plan	Completed.
Regular inspections and maintenance of ditches.	Completed: Cold River Road, Northham Road, Eastham Road
Reinforce ditches with rip-rap, when required.	Completed: Northham Road, Town Hill Road.
Replacement of culverts, when required.	Completed: Coldham Road, Eastham Road, Lincoln Hill Road.
Inspection of bridges and bridge foundations.	Completed: Cold River Road, Upper Cold River Road, Freeman Brook Road.

5. Community Hazard Inventory and Risk Assessment

What follows is an analysis of local natural hazards and human-caused hazards based upon review of the Hazard Analysis Map produced for the town (see Appendix C), review of existing data, and information provided by local officials and stakeholders. Whenever possible, the issues identified below are represented on the Areas of Local Concern Map (see Appendix D).

The Risk Assessment table below lays out all the hazards identified for the town and covered in this plan. Each hazard was discussed by committee members and ranked in terms of its Probability and Impact, and then given an overall Risk Level (see table footnotes). This assessment resulted in the categorization of High and Low risk level hazards for the town. Following the Risk Assessment table is a brief discussion of Low risk hazards, and then a more detailed discussion of High risk hazards including tables on Hazard History and Hazard Summary.

Risk Assessment

Hazard	Probability[1]	Impact[2]	Risk Level[3]
Continuity of Government/ Record Retention	Low	Moderate	Low
Dam Failure	Low	Major	Medium
Drought	Low	Moderate	Low
Earthquakes	Low	Moderate	Low
Floods, Fluvial Erosion, and Ice Jams	High	Major	**High**
Hazardous Materials, Radiological and Chemical/Biological Incidents	Low	Moderate	Low
Severe Thunderstorms, Hurricanes, and Tornadoes.	High	Moderate	**High**
Landslides and Rockslides	High	Major	**High**
Terrorism	Low	Moderate	Low
Water Supply Contamination	Low	Moderate	Low
Wildfires and Forest Fires	Medium	Moderate	Low
Winter Storms, Ice Storms, and Power Outages	High	Moderate	Low
Aircraft Crashes	Low	Minor	Low
Climate Change	Moderate	Moderate	Medium
Disease Outbreak	Low	Minor	Low
Extreme Temperatures	Low	Minor	Low
Highway and Railroad Accidents	High	Moderate	**High**
Structure Fires	Medium	Moderate	Low

[1] **High** likelihood of happening: Near 100% probability in any given year.
Medium likelihood of happening: 10% to 100% probability in any given year (at least once in the next 10 years).
Low likelihood of happening: 1% to 10% probability in any given year (at least once in the next 100 years).

[2] **Minor** impact: Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries.
Moderate impact: Occurrences of moderate to severe property damage, temporary shutdown of critical facilities, and/or injuries or fatalities.
Major impact**:** Severe property damage on a town-wide scale, shutdown of critical facilities, and/or multiple injuries or fatalities.

[3] Based on Probability and Impact, is the risk level: **High, Medium** or **Low**? Risk is defined as the potential for damage, loss, or other impacts created by the interaction of hazards with community assets.

5.1 Low Risk Hazards

Low risk hazards which are not considered a major threat to the community are not profiled in detail in this plan with history, extent, location information.

Aircraft Crashes

The Southern Vermont Regional Airport (located just south of Rutland City in Clarendon) generates some commercial and private air traffic, primarily jets and small aircraft. These types of aircraft carry small numbers of passengers and are not likely to cause a major catastrophe in the event of a crash, but nonetheless the associated fuel fires are something for which the region needs to be prepared. Also, since statistically speaking most crashes occur upon take-off and approach to an airport, the Rutland State Airport has taken a number of steps to improve visibility and other issues to increase the safety of these maneuvers.

In addition to traffic to and from this airport, there are reports of a number of low-flying, high-speed Air Force jets over parts of the region. There are also helicopters serving the hospital and other major facilities such as Green Mountain Power and VELCO. Again, the casualty count is likely to be low should one of these aircraft crash, but the related fuel fires are the biggest concern.

The Shrewsbury Volunteer Fire Department is available for response to any fire. They could also provide personnel for Search and Rescue. The southwest corner of Shrewsbury is only two miles from the Rutland Airport. To date, 2014, no aircraft have crashed in Shrewsbury.

Continuity of Government/Record Retention

As noted in the Rutland Region All Hazards Mitigation Plan, Vermont is one of three states that keep vital records and property information decentralized in municipalities. These municipal records document ownership of land, land transfers, property taxes, public rights of way, as well as evidence that properties are in compliance with local ordinances and of the owners' fiscal obligations, as well as vital statistics and actions of local boards and town meeting records. Quite simply, securing and preserving town records is essential.

Shrewsbury has a walk-in vault constructed at the town office. It is waterproof and humidity controlled. All significant town records are stored there. All vital records are duplicated at the Vermont Health Department. All land records are microfilmed and stored in the Vermont State Archives.

Hazardous Materials, Radiological and Chemical/Biological Incidents

Hazardous materials accidents can occur anywhere there is a road, rail line, pipeline or fixed facility storing hazardous materials. Almost the entire region is at risk of an unpredictable accident of some type. Most accidents are small spills and leaks, but some result in injuries, property damage, environmental contamination and other consequences. These materials are poisonous, corrosive, flammable, and

radioactive or pose other hazards. Major accidents may result in an off-site release of hazardous or toxic materials. The overall objective of chemical emergency response planning and preparedness is to minimize exposure from a wide range of accidents that could produce off-site levels of contamination in excess of Levels of Concern (LOC) established by the U.S. Environmental Protection Agency. Minimizing this exposure reduces the consequences of an emergency to people in the area near facilities which manufacture, store, and process hazardous materials.

Large volumes of hazardous materials are transported daily to and through the region by railroad and highway. Within Rutland Region, there are a number of public and private fixed facilities that produce or use hazardous materials. These facilities must report annually to the Department of Public Safety under the Community Right-To-Know Program. Some typical examples include diesel fuel, gasoline or propane in quantities larger than 10,000 lbs.; greater than 100 lbs. of oxygen, carbon dioxide, paint, lead, ammonia, chlorine, sawdust, sand, road salt, battery acid, hydraulic oils, cement, pesticides, and fertilizers; and explosives in amounts requiring a license from DPS. A more complete list can be found on the Vermont Emergency Management EPCRA website (http://vem.vermont.gov/programs/epcra).

Coordinating procedures for hazardous materials response are found in the Region's Emergency Operations Plan for Hazardous Materials. (The Region's Emergency Operations Plan for Hazardous Materials is a plan for use in responding to and recovering from a release of hazardous materials or toxic materials. In 2005, the Rutland Region Local Emergency Planning Committee—LEPC #2—expanded the plan into a DRAFT Rutland Region All Hazard Emergency Response Guide dated Dec. 12, 2005; the draft plan is currently in the process of being updated and adopted.) This plan addresses the range of potential emergency situations and the appropriate measures to be implemented to minimize exposure through inhalation, ingestion or direct exposure.

In terms of radiological incidents, mishandling and improper disposal or storage of medical wastes and low-level radioactive products from medical use are also a hazard to the Rutland Region. In addition, parts of the Southeast section of the Rutland Region are within a critical distance of the Vermont Yankee Nuclear Power Station. Specifically, Mount Holly, Mount Tabor, Danby and Wallingford are within a 50-mile radius of Vermont Yankee Nuclear Power Station. At this distance, the towns are considered to be within the "Ingestion Pathway Zone".

Drought

There have been dry spells in Vermont and in the region, though they are commonly moderate or mild. The last protracted drought in Vermont occurred between 1964 and 1966. More recently, two statewide droughts were declared in June and July 1995 due to lack of rainfall. The state also experienced severe drought conditions in the summer of 2003 (State HMP 2013: 4-76). When dry spells occur, individual water wells are often affected and agricultural producers experience the greatest impact. On the whole, these problems have been sufficiently dealt with on a town and individual basis.

With the exception of one small water company in Cuttingsville, all Shrewsbury residents have their own wells.

Earthquakes

Vermont is considered to be an area with low to moderate seismic activity. The two strongest recorded quakes measured in Vermont were of a magnitude 4.1 on the Richter scale. One was centered in Swanton and occurred in 1943, and the second occurred in 1962 at Middlebury. The Swanton quake caused little damage, but the Middlebury quake did result in broken windows, cracked plaster and falling objects. Earthquakes centered outside the state have also affected Vermont. Two quakes of 5.5 magnitude occurred in New Hampshire in 1940. In 1988, an earthquake with a magnitude 6.2 was centered in Saguenay, Quebec and caused shaking in the northern two thirds of Vermont (State HMP 2013: 4-91).

Thrust faults can be found throughout the Rutland Region. These fault lines generally run north/south. On the western side of the region, a fault line cuts through the center of Benson and West Haven. Other fault lines are found in the central part of the region. One runs east/west through Pittsford, West Rutland, Ira, Middletown Springs, Tinmouth and Danby. A third is found that begins in Ira, crosses west to Poultney, and then south through Wells and Pawlet. On the eastern side of the region, two fault lines can be found crossing through the eastern portion of Killington. Despite the presence of these fault lines, there have been no incidences of reported damages due to earthquakes in this region.

Structure Fires

In terms of average annual loss of life and property, structure fires, often referred to as the "universal hazard" because they occur in virtually every community, are the most frequent hazard facing most Rutland Region communities. Less frequent than individual fires are major downtown fires that can destroy town centers and necessitate a large response, often requiring economic aid for recovery. A fire in an unprotected downtown can be devastating. On August 20-21, 2014, Rutland, VT experienced two major fires at the Rutland Plywood Company that caused total loss of the plant. Although there were no injuries, 170 people lost their jobs.

The Shrewsbury Volunteer Fire Department, with stations in both Cuttingsville and North Shrewsbury, both containing a pumper and a tanker, trains throughout the year. In the winter chimney fires and structure fires are a particular hazard. The Fire Department has monthly articles in the *Times of Shrewsbury* educating residents about fire safety.

Temperature Extremes

The Rutland Region's climate ensures a cold winter and a warm summer. The record low temperature for Rutland, as reported by the National Weather Service Burlington Forecast Office, is -36º F. The record high is 98º F. On average, the temperature exceeds 90º F four days each year, and drops below 0º F eighteen days each year. Extreme temperatures increase the risk of temperature-related injuries for those working or traveling outside. High temperatures are particularly threatening to elderly residents without air conditioning. Most Shrewsbury citizens have wood stoves and large woodpiles to provide winter heat. However, extensive power outages in winter could cause furnaces to fail and pipes to freeze.

Terrorism

Terrorism and civil hazards include actions that people *intentionally* do to threaten lives and property. They may range from a single person on a shooting rampage to a cyber-attack that harms computer systems to the organized use of weapons of mass destruction (WMD). According to the State Hazard Mitigation Plan (2013), the most probable (though unlikely) attack is still a conventional bombing, hostage taking, kidnapping or shooting. A WMD attack must still be considered a rare event, but with the potential for catastrophic consequences. The most likely scenario of a WMD event in Vermont would involve the detonation of an improvised explosive device at a chemical facility (such as bulk liquid propane storage or manufacturing facility) near a large population center proximate to the Vermont/Canadian border. Within Shrewsbury, there are no "Tier II" facilities reporting the presence of hazardous materials on-site that hypothetically could be subject to this type of hazard.

Water Supply Contamination

The Vermont Department of Environmental Conservation, through its Water Supply Division, assures compliance with Federal and state regulations to protect public health and the environment. There is no recent record of contamination to public potable water supply in the Rutland Region.

With the exception of one small water company in Cuttingsville, Fire District #1, all Shrewsbury residents have wells.

Winter Storms, Ice Storms, and Power Outages

In the Rutland Region, most winter weather events occur between the months of December and March. Throughout the season, winter weather events can include snowstorms, mixed precipitation events of sleet and freezing rain, blizzards, glaze, extreme cold, and the occasional ice storm or a combination of any of the above. Events can also be associated with high winds or flooding, increasing the potential hazard.

Total regional damages due to winter weather events peak at over $1,000,000 per month in January, February, and March. The costs of these storms come in the form of power outages due to heavy snow or ice accumulations, damaged trees, school closings and traffic accidents. From 2002 to 2010, Rutland County experienced $1.1 million in property and crop damages from winter storms (State HMP 2013). There have only been two winter storm related Federally declared Disasters in the county (the ice storm of January 1998 – DR 1201, and the severe winter storm of December 2000 – DR 1358).

Because of Shrewsbury's elevation, basically 1000 feet above Rutland, winter weather is more severe in Shrewsbury than it is in Rutland. To cope with the snow, the Town invests in excellent trucks and snowplows, an ample supply of sand for the roads, and a highly experienced road crew.

Wildfires and Forest Fires

The Rutland Region is heavily forested, particularly in the mountainous areas. Many towns have reported incidences of forest fires, particularly during periods of dry conditions, but in the last half century no major wildfires/forest fires or damages due to such have been reported in the region. However, drought conditions in 1999, 2000, 2001, 2005, and 2012 led to a statewide burning ban to reduce the risk of fire. The risk of wildfires and forest fires is considered to be statewide, with the exception of built-up areas like Rutland City (State HMP 2013: 4-83). Most recently, the Vermont Wildland Fire Program Annual Report for Calendar Year 2013 showed that statewide 125 fires were reported totaling 273 acres. This included a 22.5 acre woods fire in Pittsford and a 4.5 acre woods fire in Benson, both in April of 2013.

The Shrewsbury Volunteer Fire Department responds to fire calls in Shrewsbury and to mutual aid towns. Forest fire danger is minor in Shrewsbury because of sufficient rain.

5.2 Medium Risk Hazards

Medium risk hazards which are not considered a major threat to the community are not profiled in detail in this plan with history, extent, location information.

Climate Change

According to the Intergovernmental Panel on Climate Change, climate change is “a statistically significant variation in the mean state of the climate or its variability, persisting for an extended period (typically decades or longer)…. caused by natural internal processes or external forcings or by persistent anthropogenic changes in the composition of the atmosphere or land use”. As noted in the State Hazard Mitigation Plan (2013: 4-3), changing regional and global climate conditions have contributed to increasingly frequent and severe natural disasters over recent decades. Several studies have been conducted regarding the likely impacts of climate change in Vermont and the Northeast, with temperature rise projections by the end of the century ranging from 1ºF to 11ºF.

The Town has experienced increasingly severe thunderstorms with high winds, lightning, communications outages, fallen trees and torrential rains during the summer of 2014.

Dam Failure

Dams can fail for various reasons, including structural failure, poor maintenance, overtopping due to flooding, movement of the dam foundation or soil erosion, and intentional acts of destruction (State HMP 2013: 4-95). The Vermont Agency of Natural Resources Dam Safety Section conducts periodic inspections of non-federal dams, categorizing dams based on the potential loss of life and property damage downstream in the event of failure.

Shrewsbury has one small dam which is also a roadway providing access to the Shrewsbury Highway Department and the school. It was strongly rebuilt after Tropical Storm Irene in 2011 when the flood waters overtopped the dam and washed away part of the roadway. The Town will build a second access road to the school and Northam Road in 2015.

5.3 High Risk Hazards

A discussion of each high risk hazard is included in the proceeding subsections, and the Areas of Local Concern map identifies the location of these hazards (see Appendix D). Each high risk hazard below includes a table of the Hazard History which contains information from local records, a narrative description of the hazard, and a comprehensive Hazard Summary table.

Floods, Fluvial Erosion, and Ice Jams

Hazard History

Date	Event	Location	Extent[1]	Impact[2]
July 2014	Severe thunderstorm	Town-wide	High winds and heavy rain	Ditch erosion, roads gully, trees uprooted
August 2011	Tropical Storm Irene	Statewide	4.13" of rain in 24hrs. In the 24 hour period between Aug. 28 and Aug. 29, Otter Creek in Rutland rose from a gauge height of 3.3ft to a gauge height of 17.4ft (flood stage considered to be 8ft).	Cold River Road closed, plus $3,202,816.25 worth of damages. Seven bridges destroyed. (2014: two Federal Land bridges not yet repaired). Brown Covered Bridge road access not yet repaired because of landslide. Homes damaged and Cold River Road landslide. Cold River in Shrewsbury eventually flows into Otter Creek.
September 1999	Tropical Storm Floyd	Statewide	Heavy rain and high wind	Major road damage

[1] **Extent:** The strength, magnitude, or characteristics of the hazard regardless of the people and property affected.

[2] **Impact:** The effect of the hazard on people and property, including infrastructure damaged, fatalities, and dollar value of damage.

Flooding is the overflowing of rivers, streams, drains and lakes due to excessive rain, rapid snow melt or ice as well as overflow of banks caused by sudden high water flow due to breaching of dams (both human-made and natural dams caused by beavers or debris build-up). Flooding of land adjoining the normal course of a stream or river has been a natural occurrence since the beginning of time. If these floodplain areas were left in their natural state, floods would not cause significant damage. Development has increased the potential for flooding because rainfall that used to soak into the ground or take several days to reach a river or a stream via a natural drainage basin now quickly runs off streets, parking lots and rooftops and through human-made channels and pipes.

Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and result in fatalities. People may be stranded in their homes for a time without power or heat or they may be unable to reach their homes. Long-term collateral dangers include the outbreak of disease, loss of livestock, broken sewer lines or wash out of septic systems causing water supply pollution, downed power lines, loss of fuel storage tanks, fires and release of hazardous materials.

While inundation-related flood loss is a significant component of flood disasters, the more common mode of damage is associated with fluvial erosion, streambed and stream bank erosion, often associated with physical adjustment of stream channel dimensions and location during flood events. These dynamic and oftentimes catastrophic adjustments are due to bed and bank erosion, debris and ice jams, or structural failure of or flow diversion by human-made structures. An ice jam occurs when the ice layer on top of a river breaks into large chunks which float downstream and cause obstructions (State HMP 2013). There have been no ice jams in town in recent history.

As noted in the State Hazard Mitigation Plan, "Flooding is the most common recurring hazard event in the State of Vermont" (2013: 4-7). Several major flooding events have affected the state, resulting in multiple Presidential Disaster Declarations. From 2003 to 2010, Rutland County as a whole experienced roughly $1.4 million in property damages due to flood events (State HMP 2013). The worst flooding event in recent years came in August of 2011 from Tropical Storm Irene, which dropped up to 8 inches of rain in some areas of Rutland County (State HMP 2013: 4-61). This caused most streams and rivers to flood in addition to severe fluvial erosion. As of the writing of this plan, the total amount of FEMA Public Assistance funds disbursed throughout Rutland County for Tropical Storm Irene is $11.8 million. FEMA has also disbursed Individual Assistance payments of $1.6 million in home repair assistance, $303,317 in rental assistance, and $155,921 in other needs assistance throughout Rutland County (State HMP 2013).

Fluvial erosion studies have been done in Shrewsbury on Mill River and the Cold River. The studies are posted in the Zoning Section of the Shrewsbury website. The Shrewsbury Historical Society has reported that the only historic town structure that would be impacted by major flooding is the Brown Covered Bridge, located on Cold River at the west end of the Upper Cold River Road.

Because of the significant damages caused by Tropical Storm Irene in August, 2011—in town, in the Rutland Region, and throughout Vermont—the Town of Shrewsbury now places a high priority on flood mitigation. See Section 6.2 for activities that the town has taken to improve flood resilience, and Section 6.5 for flood mitigation projects that the town will pursue in the future.

The Shrewsbury Flood Hazard Regulations, approved by the Selectboard on May 26, 2011, are posted on the Shrewsbury website.

Hazard Summary

Hazard	Location	Vulnerable Assets	Extent[1]	Impact[2]	Probability[3]
Floods, Fluvial Erosion, and Ice Jams	Mill River flood plain in Cuttingsville; Cold River from North Shrewsbury to North Clarendon; Gould Brook along Coldham Rd.; Sargent Brook to Cold River Rd.	Roads, culverts, bridges, U.S. Post Office, Stewart's garage, private homes in Cuttingsville	4+ inches of rain in 24 hrs, 17ft gage height on Otter Creek	$3,202,816.25 million in Tropical Storm Irene in 2011. Severe damage to bridges and roads.	High

[1]**Extent:** The strength, magnitude, or characteristics of the hazard regardless of the people and property affected.

[2]**Impact:** The effect of the hazard on people and property, including infrastructure damaged, fatalities, and dollar value of damage.

[3]**Probability:** Likelihood of hazard occurring based upon past events.
High: Near 100% probability in any given year.
Medium: 10% to 100% probability in any given year (at least once in the next 10 years).
Low: 1% to 10% probability in any given year (at least once in the next 100 years).

Highway and Railroad Accidents

Hazard History

Date	Event	Location	Extent	Impact
2010-2014	Vehicle Accidents	Route 103 Cuttingsville, Cold River Rd., Upper Cold River Rd.	Several motor vehicle accidents of varying severity.	$63,130, 5 crashes, 1 death, 6 injuries.
2009	Green Mountain Railroad: Uncoupled Cars	Mount Holly to Cuttingsville	2 uncoupled cars rolled 5 miles before diverted off track.	Damaged freight car and caboose.

Vt. State Highway 103 passes through the village of Cuttingsville on the south side of Shrewsbury. It is a major connector highway between Bellows Falls and Rutland. Therefore, it sees major motor vehicle traffic, both by cars and trucks. The Shrewsbury Volunteer Fire Department responds to traffic accidents as needed and is trained and equipped to deal with hazardous spills of gasoline and chemicals.

The Rutland Railroad also passes through Cuttingsville. The potential for derailment and spills of hazardous chemicals exists. Again, the Shrewsbury Volunteer Fire Department is trained to respond as needed. Clarendon and Rutland are available for mutual aid as needed.

Hazard Summary

Hazard	Location	Vulnerable Assets	Extent	Impact	Probability
Vehicle Accidents	Route 103; Cold River Rd.	Safety of people, automobiles, roadside structures	Potential for accidents involving multiple motor vehicles.	Potential loss of life, personal injuries, damage to property.	High
Railroad Accidents	RR Crossings with Town Hill Rd. and Rt. 103	Safety of people, automobiles. Railroad equipment.	Uncoupled rail cars.	Potential loss of life, personal injuries, damage to property.	Low

Severe Thunderstorms, Hurricanes, and Tornadoes

Hazard History

Date	Event	Location	Extent	Impact
May 30, 2014	Severe Thunderstorms	Region wide	Heavy Rain and wind	Spring Lake Road closed. Major washout. Major replacement culvert installed.
August, 2011	Tropical Storm Irene	Statewide	4.13" of rain in 24hrs.	7 bridges destroyed, landslides, road washouts, extensive home damage, power outages, telephone service disrupted. $3,202,816.25 in damages.
April 2007	Severe Thunderstorms	Town-wide	Heavy Rain, wind gusts up to 53 mph	Road washouts, downed trees, and power outages.
July 2000	Severe Thunderstorms	Town-wide	Heavy Rain, wind gusts 29 mph	Road Washouts, downed trees, and power outages.

Severe thunderstorms can produce high winds, lightning, flooding, rains, large hail, and even tornadoes (State HMP 2013). Hurricanes, including named tropical storms, also pose high wind hazards. For a discussion of the extensive damages that resulted from Tropical Storm Irene in 2011, see the Floods, Fluvial Erosion, and Ice Jams section. Rutland County experienced severe thunderstorms on May 18, 2004 which included large hail (near one-inch diameter) and damaging winds up to ninety miles per hour

(National Weather Service). From 2004 to 2010, for thunderstorms that caused more than $200,000 in damage, Rutland County experienced nearly $2 million in property damages. The state can also experience tornadoes that are capable of damaging or destroying structures, downing trees and power lines and creating injuries and death from collapsing buildings and flying objects. Tornadoes are less common than hail storms and high winds, but have occurred throughout Vermont. According to the National Climatic Data Center, from 1991 to 2010 Vermont experienced an average of one tornado each year (State HMP 2013: 4-55).

Much of the hail activity in Rutland County is scattered and varies in intensity. Most areas of the region have been affected by a hail event at some point. These events are not associated with any particular area within the county. Reported hail events often accompanied heavy thunderstorms and gusty winds. Property damages reported from the hail incidents have typically been associated with uprooted trees, downed power lines, and crop damages. Historic hail events include huge hailstones accompanying a tornado that passed over Pawlet and Manchester in June of 1782. In 1961 wind and hail hit the Rutland Fairgrounds lifting a cattle barn 50 feet from its foundation. In May, 2014, a major hailstorm passed through Rutland, severely denting cars and trucks and breaking windshields. Fortunately, Shrewsbury received only minor hail in that storm.

Despite the low incidence of tornadoes and hurricanes within the Rutland Region, there have been numerous high wind events in the region, particularly in the towns bordering Lake Bomoseen and the mountain towns of the region. No tornadoes have occurred in Shrewsbury.

Tropical Storm Irene battered Shrewsbury on August 28-29, 2011. Intense rain caused major flooding, disabled seven bridges, washed out many culverts, and washed away parts of the Cold River Road. Damages to infrastructure surpassed $3,000,000. High winds destroyed many trees. In July, 2014, one bridge was still not rebuilt. The bridge is scheduled for 2015. The access road to the Brown Covered Bridge was carried away by a landslide and has not yet been repaired.

Hazard Summary

Hazard	Location	Vulnerable Assets	Extent	Impact	Probability
Severe Thunderstorms, Hurricanes, and Tornadoes	Town-wide	Roads/culverts, bridges, private property, electrical/phone infrastructure.	4+ inches of rain in 24 hrs, winds 50+ mph	Infrastructure damage: bridges, roads, communications, electrical, private property.	High

Landslides and Rockslides

Hazard History

Date	Event	Location	Extent	Impact
April 2014	Landslide	Access road to Brown Bridge	90% of roadway plummeted down embankment into Cold River.	Road closed and traffic rerouted.
March 2014	Landslide	Cold River S. Bank along Cold River Rd.	Erosion of bank beneath culvert.	Road endangered and culvert support damaged. Engineers studying for repair and possible relocation
August 2011	Landslides and Riverbank Washout	Brown Bridge on Cold River, Cold River Rd.	Western access to Brown Bridge 75% eroded.	Closed roads, traffic rerouting, and damaged bridge foundations.

According to USGS maps, the central part of the Rutland Region has a low susceptibility to landslides with less than 1.5% of the mapped area likely to experience one. On the other hand, the eastern and western parts of the region have a high susceptibility to landslide events, and a moderate level of actual occurrences. These higher risk areas coincide with the Green Mountains and parts of the Taconic Mountain ranges. The far western part of the region is characterized by clay soils and the shores of some major lakes. Nothing found through research or interviews indicates a regional significance for this hazard, other than a 1983 landslide event that resulted in $11,300 in damages in Rutland (State HMP 2013: 4-89). Two roads, Cold River Road and Brown Bridge Access Road are seriously damaged by landslides caused by fluvial damage of the Cold River. Shrewsbury has huge gravel deposits left by the melting of the glaciers.

In Shrewsbury landslide potential is severe in the area of the Brown Bridge and the Lower Cold River Road. Steep gravel banks, extending 700 yards and 300 feet high, eroded by the Cold River in Tropical Storm Irene, plunged 300 feet into the Cold River and have destroyed the western approach to the Brown Bridge. In another area, a steep gully 300 feet deep has formed next to the Cold River Road and threatens to take out the road. It is a major hazard and engineers are recommending that the road be moved. Mitigation will probably involve purchase of additional land. In addition, steep gravel banks 200 feet high and extending 1200 yards, form the west bank of Frank Lord Brook. Major erosion occurred in Tropical Storm Irene.

Hazard Summary

Hazard	Location	Vulnerable Assets	Extent	Impact	Probability
Landslides and Rockslides	Cold River and Frank Lord Brook	Roads/culverts, bridges, private property, electrical/phone infrastructure.	Potential for entire bank slide into stream, 10,000+ cubic yards of gravel and sand.	Roads closed, private property damaged.	High

6. Hazard Mitigation Strategy

The town's mitigation strategy outlined in the following pages, along with other relevant information from this plan, will be integrated into the next update of the Shrewsbury Town Plan.

6.1 Mitigation Goals

The Hazard Mitigation Committee discussed mitigation goals, and recognized that due to the significant impacts of Tropical Storm Irene in 2011 the town now puts a higher priority on flood mitigation. The committee identified the following as Shrewsbury's main mitigation goals:

- Reduce the loss of life and injury resulting from all hazards.
- Mitigate financial losses incurred by municipal, residential, industrial, agricultural and commercial establishments due to disasters.
- Reduce the damage to public infrastructure resulting from all hazards, especially flooding and fluvial erosion.
- Encourage hazard mitigation planning as a part of the Municipal Planning Process.
- Encourage the adoption and implementation of existing mitigation resources, such as River Corridor Plans and Fluvial Erosion Hazard Maps, if available.
- Recognize the connections between land use, storm-water road design and maintenance and the effects from disasters.
- Ensure that mitigation measures are sympathetic to the natural features of Community Rivers, streams and other surface waters; historic resources; character of neighborhoods; and the capacity of the community to implement them.

Shrewsbury also strives to align with the overarching priorities of the State of Vermont Hazard Mitigation Plan:

- Local jurisdictions should use the State Hazard Mitigation Plan as a source of information and guidance.
- The state must prepare for the impacts of climate change on natural hazards.
- Private and public sector agencies should partner to mitigate hazards.

6.2 Existing Mitigation Programs, Projects, and Activities

The town's existing and recently completed hazard mitigation programs, projects, and activities are listed below and in the chart outlining policies and plans.

- The town maintains and upgrades culverts and other road infrastructure, when needed.
- New culverts have recently been installed on Coldham Road and Northam Road.
- The town regularly cleans out ditches to help drainage. Some have been armored with crushed rock.
- A culvert inventory has been prepared to identify trouble spots and maintenance needs. Location of culverts by GIS is in process.
- The Tree Warden is studying all trees along the roads. Hazardous trees will be removed.
- A special study is being conducted of potential slide areas along the Cold River Road. A portion of the Cold River Road may need to be moved to avoid landslides.

Flooding Prevention

Recognizing the need to address the issue of flooding and fluvial erosion, the Town adopted a Flood Hazard Ordinance and associated regulations that restrict new development in high-risk areas. In addition, the extensive damage to transportation infrastructure from the 1973 and 2011 floods was impetus for many road and bridge improvements and upgrades. These improvements included replacing blown out culverts with larger, more reinforced culverts, replacing damaged bridges with higher bridges, and ones with longer spans and deeper footings. Some of the replaced bridges were constructed in new locations to avoid repeat flood hazards. Specific projects are listed below:

<u>Bridges that have been replaced with upgrades to handle anticipated water flow:</u>

- Culvert, Old Plymouth Road
- Culvert, Eastham Road by Pierce's Store
- Culvert by Biddle home on Russellville Road
- Frank Lord Road Bridge replaced
- Stout Bridge to Moody Road replaced by owner
- B32—Sargent Brook completed August 2014
- B26—replaced with 8' culvert—should be fine now
- B15 Bailey Rd—bridge replaced, road still washes out
- B23—Russelville
- Freeman Brook Road bridge
- B30—Clements Shelter Rd Bridge: (Currently foot path only) Replacement scheduled for 2015

<u>Actions taken on roads that have washed out in past:</u>

- Keiffer Rd—washes out frequently. Ditches have been rip-rapped, so washouts should be less of a problem.
- Cold River Rd—washed out in Tropical Storm Irene. FEMA funding used to repair. Upgraded many culverts.
- Many other town roads have had culverts replaced, ditches cleaned-out, rip-rap added and been resurfaced.

Fire Prevention

Recognizing the threat of wildfires, the fire department is developing plans to purchase a forest fire truck that would be able to reach a wildfire if one should threaten the town. Also, to help control the potential for wildfires, residents are required to get a burn permit from the fire department to burn open-air fires. The hydrant by the Mountain School has been repaired. A new fire pond was constructed at the east end of the Upper Cold River Road with the dry hydrant at the edge of the road.

Recreational Safety

The Appalachian Trail goes through town. Although the Trail is Federal property, volunteer organizations are responsible for upkeep. In the event of major blowdowns along the trail, the clearing of the trail may be a high priority for through hikers or federal resource managers, but not for the town of Shrewsbury. The Town is aware of this, and believes these levels of prioritization should be discussed further.

Emergency Management Planning
Efforts in town include participation in the Rutland Region Local Emergency Planning Committee (LEPC #2) and coordination with the local elementary school to test evacuation and other emergency response procedures. The Shrewsbury Emergency Management Committee is active in emergency management planning. For example, notification of new FEMA regulations were sent out to all residents. Emergency Management notices printed in *Times of Shrewsbury*; example: winter advisory tips.

Protection of Town Records
The town office has a room-sized, fire-proof, humidity-controlled vault to protect town records from damage or theft / vandalism. A risk assessment of the town office has been performed to identify other risks to the structure and the records held there. The town office has an automatic generator. The Vermont Department of Health has copies of Shrewsbury's vital records. The Vermont State Archives have copies of Shrewsbury land records.

River/Stream Corridor planning
SGAs and corridor plans are followed to reduce the risk of fluvial erosion and flood damage. River studies are posted on the Shrewsbury website.

Town Policies and Plans that Mitigate Hazards

Existing Policies/Plans	Description	Gaps in Existing Policies/Plans
Town Plan	Policies and Vision for future land use. Updated in 2013	Ensure that hazard mitigation information and projects are incorporated into the next town plan update.
Zoning Ordinance	Land Use Regulation: Updated in July, 2009.	No improvement needed at this time.
School Emergency Response Plan	Emergency Procedures Guide adopted in 2003. Practiced annually and reviewed and updated Annually	No improvement needed at this time.
Local Emergency Operations Plan	Based on State Model, most recently adopted April 16, 2015. Reviewed and updated annually based on events such as Hurricane Irene in 2011. The 2015 LEOP posted on the Town website.	Review and update annually by May 1st.
Fire Mutual Aid	Mutual Aid agreements with Mt. Holly, Clarendon, and Rutland.	No improvement needed at this time.
Maintenance Programs	All existing policies and plans reviewed annually for possible updates.	No improvement needed at this time.
Subdivision Regulations	Currently being reviewed and updated by the Planning Commission. Will eventually be combined in Zoning Ordinance.	No improvement needed at this time.
Emergency Shelters	Large sites for housing in the event of an evacuation or long-term power outage. Three Red Cross approved shelters in town. Town Office Shelter stocked.	Stocking of shelters in school and church.

Existing Policies/Plans	Description	Gaps in Existing Policies/Plans
Floodplain Ordinance	Ordinance adopted in 2011	Should consider adopting river corridor protection that limits development in fluvial erosion hazard areas.
Road and Bridge Standards	In compliance with 2014-2016 State Standards. Road Crew constantly inspects culverts and bridges.	Adopt new state standards when next released.
Source Protection Plans	ANR requirements for protection of drinking water	Most water in town comes from wells
Protection of Town Records	Room-sized safe for protection of records.	Current vault has a four-hour fire rating

6.3 Changes in Development

According to the 2010 Census Date, Shrewsbury's population is 1,108. Shrewsbury has changed from a farming to a commuting community, with most people working in Rutland or Ludlow. The Town has increased by 0.1% in the past ten years. No change in development has occurred nor is expected.

6.4 National Flood Insurance Program Compliance

The National Flood Insurance Program (NFIP) is a voluntary program organized by FEMA that includes participation from 20,000 communities nationwide and 231 Vermont towns and cities. Combined with floodplain mapping and floodplain management at the municipal level, the NFIP participation makes affordable flood insurance available to all homeowners, renters, and businesses, regardless of whether they are located in a floodplain.

The NFIP was instituted in 1968 to make flood insurance available in those communities agreeing to regulate future floodplain development. As a participant in the NFIP, a community must adopt regulations that: 1) require any new residential construction within the 100 year floodplain to have the lowest floor, including the basement, elevated above the 100 year flood elevation; 2) allow non-residential structures to be elevated or dry flood proofed (the flood proofing must be certified by a registered professional engineer or architect); 3) require anchoring of manufactured homes in flood prone areas. The community must also maintain a record of all lowest floor elevations or the elevations to which buildings in flood hazard areas have been flood proofed.

In return for adopting floodplain management regulations, the federal government makes flood insurance available to the citizens of the community. In 1973, the NFIP was amended to mandate the purchase of flood insurance as a condition of any federally regulated, supervised or insured loan on any construction or building within the 100-year floodplain. In 2012, Congress passed the Biggert-Waters Flood Insurance Reform Act to reduce subsidies for structures built before the NFIP was instituted (called pre-FIRM structures). Over 50 percent of Vermont’s NFIP policies are pre-FIRM, which means that flood insurance premiums for many will increase over the ensuing years.

While the NFIP floodplain management criteria are administered by States and communities through their floodplain management regulations, FEMA's role is to provide technical assistance and to monitor communities for compliance with the minimum NFIP criteria.

Shrewsbury has participated in the NFIP since 1980, and its current effective map date is August 28, 2008. The Town's Flood Hazard Area Regulations, adopted in May, 2011, are part of its Zoning Regulations and development is restricted in Zone A. The Town has no repetitive loss properties.

For Shrewsbury continued compliance with NFIP requirements, the following actions will be taken:

- Attend regular training sessions on flood plain management and flood regulation administration
- Examine current Town Plan, By-Laws, and development regulations to ensure that identified hazard areas are addressed.
- Distribute FEMA brochures and guidebooks to general public and local zoning officials.

These NFIP compliance actions are also included in the Mitigation Actions and Projects table with prioritization scores.

6.5 Mitigation Actions and Projects

The Shrewsbury Hazard Mitigation Committee discussed each mitigation strategy and reviewed the town Action Evaluation and Prioritization Matrix (See Appendix E). The committee found that certain projects, such as landslides, are causing new hazards. In some cases, strategies were left in place because of their cyclic nature.

General Mitigation Strategies for Consideration:

- Building Design/Codes/Use Regulations
- Community Preparedness Activities
- Financial & Tax Incentives
- Hazard Control & Protective Works
- Insurance Programs
- Land Use Planning/Management
- Science & Technology
- Hazard Mitigation Committee
- Protection/Retrofit of Infrastructure & Essential Facilities
- Public Awareness/Training & Education
- Public Health/Emergency Medical Care/Education
- Public Protection
- Laws/Ordinances/Inspections
- Annual update of Shrewsbury Hazard Mitigation Plan

The following identified programs, projects and activities are future mitigation strategies for the Town of Shrewsbury. These mitigation strategies have been chosen by the town as the most appropriate policies and programs to lessen the impacts of potential hazards. Using the Action Evaluation and Prioritization Matrix (see Appendix E), each potential project was scored and ranked according to priority. The scoring matrix includes STAPLEE criteria, which includes benefit-cost considerations. Mitigation actions and projects proposed in this plan should undergo more rigorous benefit-cost analysis by the town before action is taken.

Mitigation Actions and Projects

Priority Score	Vulnerability Mitigated	Mitigation Action	Local Leadership	Funding Resources	Target Start	Target End
36	Spring Lake Ranch Road flooding	Install larger culvert to carry storm level waters	Road Commissioner and Selectboard	AOT, HMGP, Town budget	September 2015	June 2017
35	Road collapse, Cold River Rd. by Adams home	Purchase land and rebuild road on stable ground; bank stabilized	Selectboard and Road Commissioner	HRRA, AOT, HRRR	January 2016	June 2018
35	Northham Rd. flooding by Johnson Pond Beaver dam	Install larger culvert to carry storm level waters	Road Commissioner	HRRR	September 2015	June 2017
35	Landslide, southwest end of access road to Brown Covered Bridge	Stabilize landslide, reinforce banks and reconstruct road	Selectboard and Road Commissioner	HRRR, AOT, BBR	October 2015	October 2018

Preparedness Actions and Projects

Priority Score	Vulnerability Mitigated	Preparedness Action	Local Leadership	Funding Resources	Target Start	Target End
36	Inadequate water supply for fire fighting	Replace water supply hose	Fire Chief	AFG, Town budget	June 2015	March 2016
36	Loss of egress to school and highway department on School Street	Build second road access to school and highway department	Selectboard and Road Commissioner	HMGP, Town budget	June 2016	August 2016

Acronyms

AFG Assistance to Firefighters Grant
AOT Vermont Agency of Transportation
BBR Vermont Better Back Roads Program
HMGP Hazard Mitigation Grant Program
HRRR High Risk Rural Roads Program
RC&D Resource Conservation and Development

7. Plan Maintenance Process

7.1 Routine Plan Maintenance

The Hazard Mitigation Plan is dynamic. To ensure that the plan remains current and relevant, it is important that it be updated periodically. The plan will be reviewed annually at an April Selectboard meeting along with the review of the town's Local Emergency Operations Plan (LEOP). This meeting will allow town officials and the public to discuss the town's progress in implementing mitigation actions, identify future activities, and revise the plan as needed.

The plan will be thoroughly updated at a minimum every five years in accordance with the following procedure:

1. The Shrewsbury Selectboard will appoint a team to convene a meeting of the hazard mitigation committee.

2. Steven Nicholson, Selectman, will be in charge of maintaining hazard mitigation plan and coordinating updates. The town's Emergency Management Director will chair the committee, and other members should include local officials such as Selectboard members, fire chief, zoning , constable/police chief, road commissioner, Planning Commission members, health officer, and townsperson-at- large.

3. The committee will discuss the process to determine if the evaluation criteria is still appropriate or modifications or additions are needed due to changing conditions since the last update. Data needs will be reviewed, data sources identified and responsibility for collecting information will be assigned to members. The committee will also discuss incorporating mitigation requirements into other planning mechanisms, such as comprehensive or capital improvement plans.

4. A draft report will be prepared by the committee based on the following evaluation criteria and in conformance with the FEMA Region 1 *Local Hazard Mitigation Plan Review Crosswalk* document.
    a. Changes in community and government processes, which are hazard-related and have occurred since the last review.
    b. Progress in implementation of plan initiatives and projects.
    c. Effectiveness of previously implemented initiatives and projects.
    d. Evaluation of unanticipated challenges or opportunities that may have occurred between the date of adoption and the date of the report.
    e. Evaluation of hazard-related public policies, initiatives and projects.
    f. Review and discussion of the effectiveness of public and private sector coordination and cooperation.

5. The Selectboard will review the draft report. Consensus will be reached on changes to the draft.

6. Changes will be incorporated into the Plan. The draft Plan will be made available for public comment, by posting at the town office and on the town website. Any public feedback received will be addressed appropriately in the Plan.

7. The Plan will be reviewed by the State Hazard Mitigation Officer (SHMO), and any SHMO comments will be addressed in the Plan.

8. The plan will be reviewed by FEMA Region 1, and FEMA comments will be addressed in plan until FEMA Approval-Pending-Adoption (APA) is achieved.

9. The Selectboard will notify and schedule a public meeting and the hazard mitigation committee will prepare a presentation.

10. A public meeting will be held where the public will review the Plan update.

11. The Selectboard will adopt the Plan and distribute to interested parties.

12. The final adopted plan (with adoption certificate) will be submitted to FEMA Region 1 through the State Hazard Mitigation Officer, for final approval.

7.2 Post-Disaster Review Procedures

Should a declared disaster occur, a special review will occur in accordance with the following procedures:

1. Within six months of a declared emergency event, the town will initiate a post disaster review and assessment. Members of the State Hazard Mitigation Committee will be notified that the assessment process has commenced.

2. This post disaster review and assessment will document the facts of the event and assess whether existing Hazard Mitigation Plans effectively addressed the hazard.

3. A draft After Action Report of the review and assessment will be distributed to the hazard mitigation committee.

4. A meeting of the committee will be convened by the Selectboard to make a determination of whether the plan needs to be amended. If the committee determines that NO modification of the plan is needed, then the report is distributed to local communities.

5. If the committee determines that modification of the plan IS needed, then the committee drafts an amended plan based on the recommendations and forwards to the Selectboard for public input.

6. The Selectboard adopts the amended plan after receiving approval-pending-adoption notification from FEMA.

7.3 Continued Public Participation

Maintenance of this plan and implementation of the mitigation strategy will require the continued participation of local citizens, agencies, and other organizations. To keep the public aware of and involved in local hazard mitigation efforts, the town will take the following measures:

- Provide hazard mitigation information at Town Meeting
- Post the hazard mitigation plan on the town website
- Selectboard will review past hazard mitigation committee members and consider whether new members should be added. Representatives of local businesses, nonprofits, academia, etc. should especially be considered
- Notify the public of committee meetings through town bulletin boards, newsletter, and, town website.

APPENDIX A: CERTIFICATE OF ADOPTION

APPENDIX A: CERTIFICATE OF ADOPTION

Selectboard
Town of Shrewsbury
Shrewsbury, Vermont

A Resolution Adopting the Town of Shrewsbury, Vermont Local Hazard Mitigation Plan

WHEREAS, the Town of Shrewsbury has worked with the Rutland Regional Planning Commission to identify natural and human-caused hazards, analyze past and potential future damages due to disasters, and identify strategies for mitigation of future damages; and

WHEREAS, the Town of Shrewsbury, Vermont Local Hazard Mitigation Plan analyzes hazards and assesses risks within the community; and

WHEREAS, the Town of Shrewsbury, Vermont Local Hazard Mitigation Plan recommends the implementation of actions specific to the community to mitigate against damage from hazard events; and

NOW, THEREFORE BE IT RESOLVED that the Town of Shrewsbury adopts the Town of Shrewsbury, Vermont Local Hazard Mitigation Plan.

Duly adopted this *7th day of October, 2015*

Bert Potter
Chair of Selectboard

Aaron Korzun
Member of Selectboard

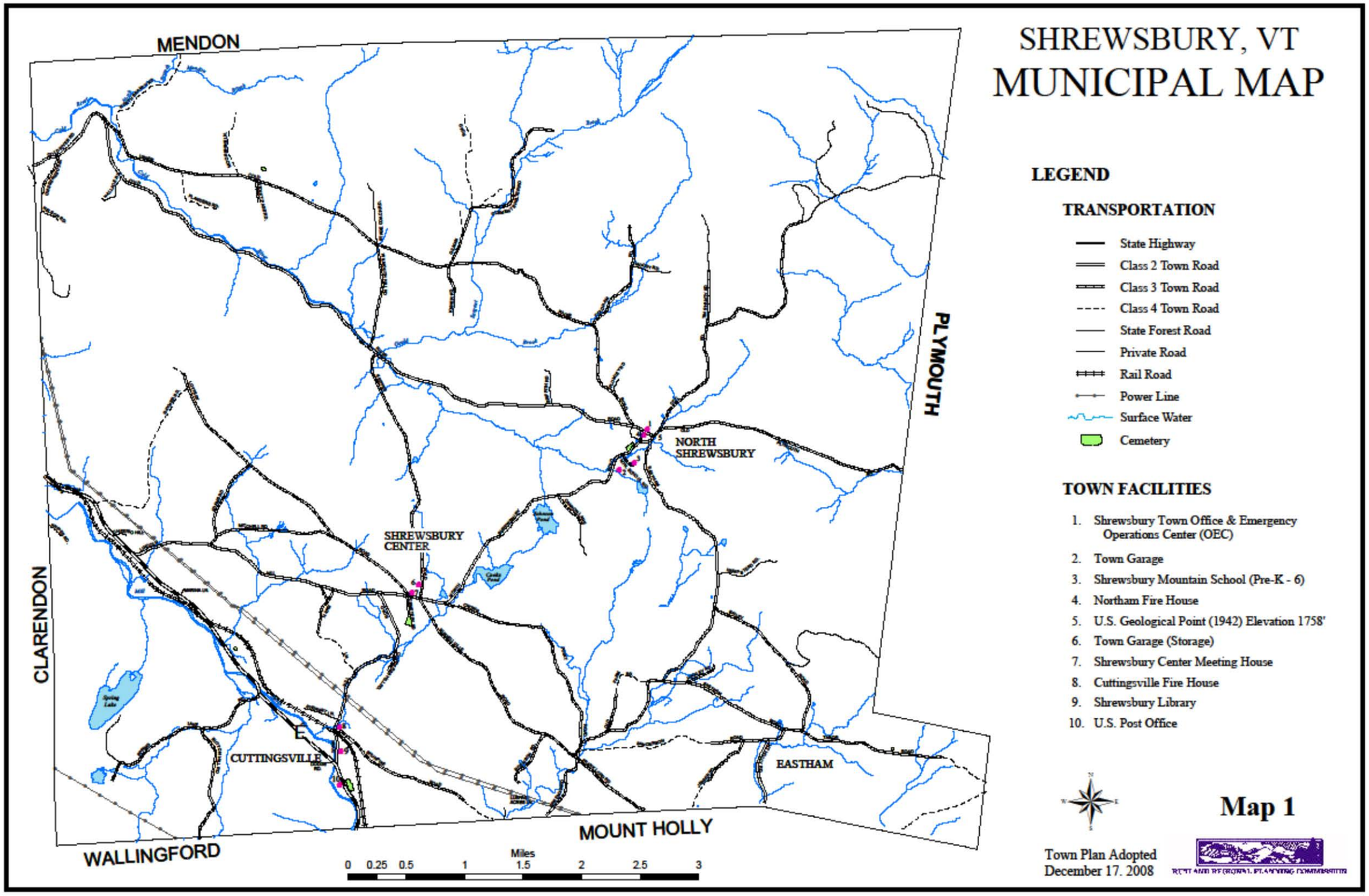
Steven Nicolson
Member of Selectboard

ATTEST:

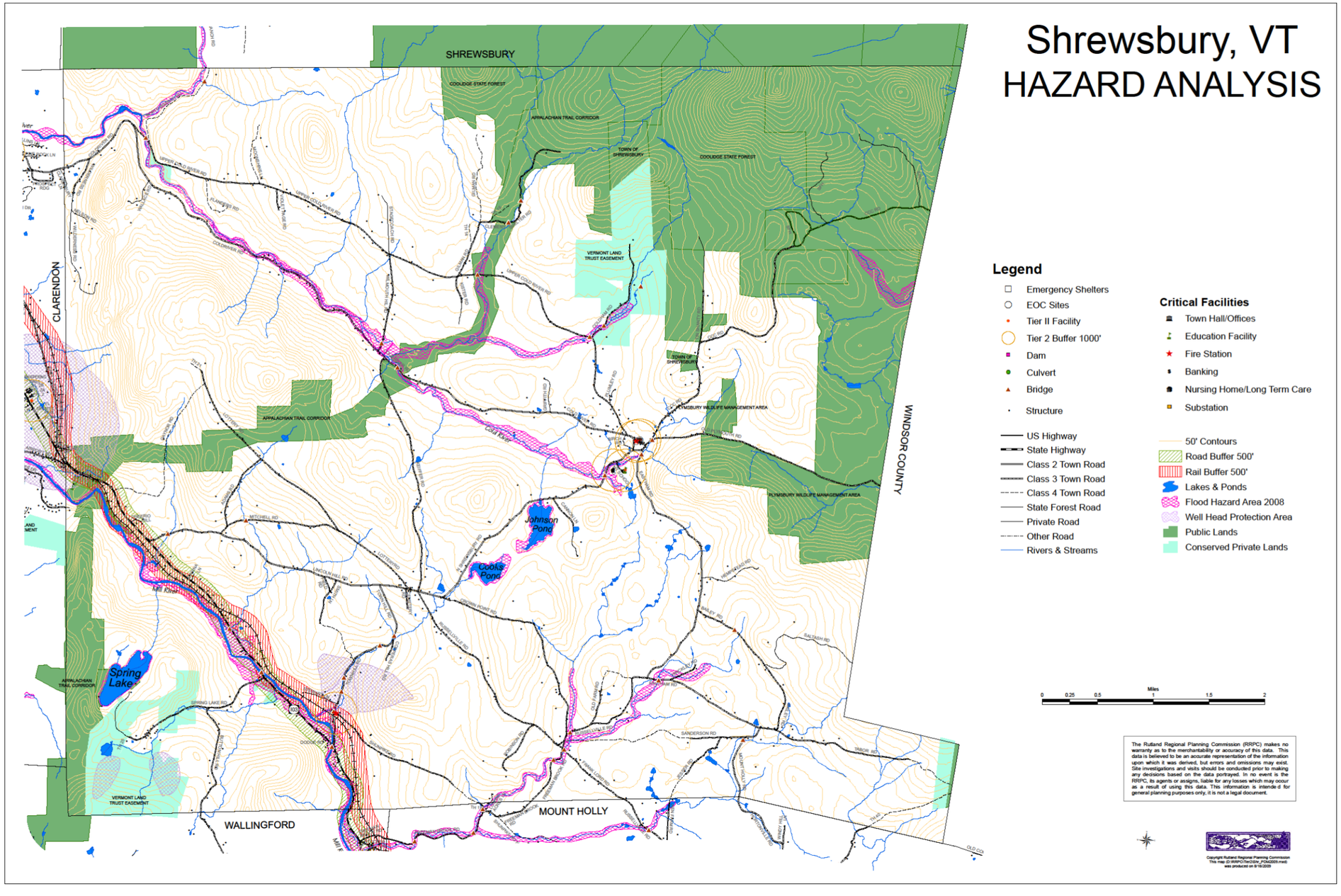
Mark Goodwin
Town Clerk

Date 10/7/2015

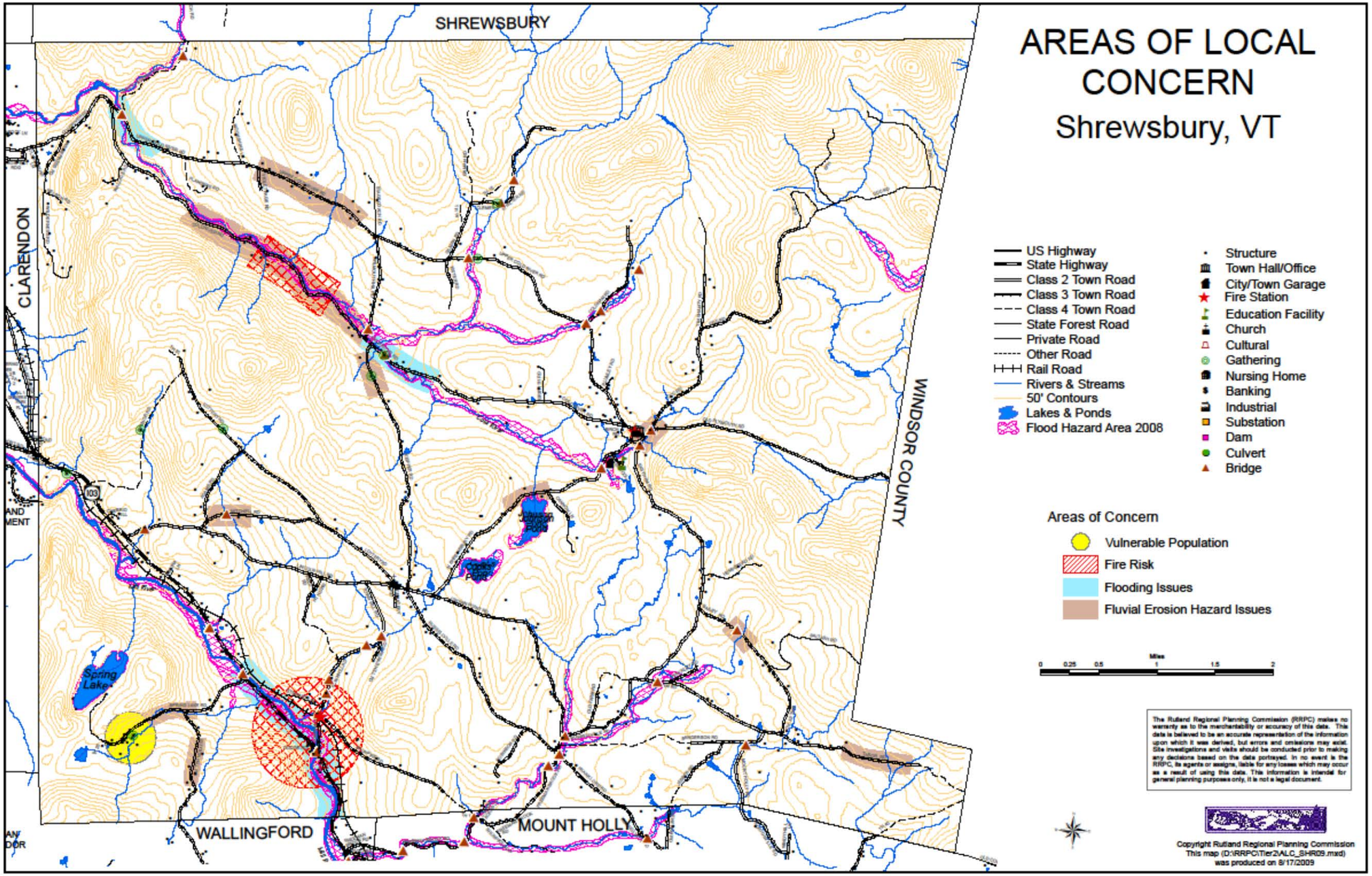
APPENDIX B: Town Map



APPENDIX C: Hazard Analysis Map



APPENDIX D: Areas of Local Concern Map



APPENDIX E: Action Evaluation and Prioritization Matrix

New local hazard mitigation strategies were prioritized using the following scoring system: list documents the questions (criteria) considered in establishing an order of priority. Each of the following criteria was rated according to a numeric score of "1" (indicating poor), "2" (indicating average) and "3" (indicating 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 economic benefits compared to its cost of implementation?
- Is the action environmentally sound?

Mitigation Action	Reduce damage	Contribute to town objectives	Meet Regulations	Protect Sensitive Structures	Implemented Quickly	Socially acceptable	Technically feasible	Administratively Realistic	Politically Acceptable	Legal	Reasonable cost to benefit	Environmentally sound	Total Score
Repair Cold River Rd. collapse near Adams	3	3	3	3	2	3	3	3	3	3	3	3	35
Foot of Spring Lake Rd. Wash-out, install larger culvert.	3	3	3	3	3	3	3	3	3	3	3	3	36
Northham Rd. by Johnson Pond Wash-out, install larger culvert	3	3	3	2	3	3	3	3	3	3	3	3	35
Build second egress road to Highway Dept. and to school	3	3	3	3	3	3	3	3	3	3	3	3	36
School St. dam and causeway wash-out, install larger culvert	3	3	3	3	2	3	3	3	3	3	3	3	35
Brown Bridge access landslide, restore access road	2	3	3	3	1	3	2	3	3	3	1	2	28
Failure of Fire Dept. water supply capability	3	3	3	3	3	3	3	3	3	3	3	3	36

3 = good 2 = average 1 = poor

APPENDIX F: Documentation of the Planning Process

OFFICE OF EMERGENCY MANAGEMENT
TOWN OF SHREWSBURY
SHREWSBURY, VT 05738

July 18, 2014

From: David Rice, Assistant Emergency Management Coordinator

To: Steve Nicholson, Shrewsbury Select Board
Eliot Stewart. Director, Shrewsbury Office of Emergency Management
James Carrara, Shrewsbury Road Commissioner
Russell Carrara, Chief, Shrewsbury Fire Department
David Fretz, Shrewsbury Representative-at Large for Emergency Management

Subj: Creation of Single Jurisdictional Local Hazard Mitigation Plan for Shrewsbury, VT and **Appointment of the Ad Hoc Mitigation Plan Committee**.

Attachment: (1) July 17, 2014 Letter explaining the steps in creating the Local Hazard Mitigation Plan for Shrewsbury

1. The Selectboard has requested the Shrewsbury Office of Emergency Management to prepare the Local Hazard Mitigation Plan for Shrewsbury. To achieve this plan, the Town must have an **Ad Hoc Mitigation Plan Committee.**

2. Because of your individual responsibilities in the Town, I am asking each of you please to serve on the **Shrewsbury Ad Hoc Mitigation Plan Committee**. If you cannot serve on the Ad Hoc Committee, please notify me immediately.

3. Fortunately, much of the preliminary planning is completed, as outlined in Attachment 1. The details of the planning are contained in the following document: **Town of Shrewsbury,VT. Hazard Mitigation Plan 2014** which is **Annex U** of the Rutland Regional Planning Commission(RRPC) Hazard Mitigation Plan. Our responsibility is to make Annex U a single jurisdictional document and submit it to the RRPC for submission to the State of Vermont and to FEMA.

4. I will deliver a copy of Annex U to each of you within the next week so you may review it prior to our meeting on August 12. Please make corrections as needed and bring your copy to the meeting.

5. If you have questions, please telephone me at 942-3488.

David Rice
Assistant Emergency Management Coordinator

OFFICIAL TOWN NOTICE OF PLANNING MEETING

OFFICE OF EMERGENCY MANAGEMENT
TOWN OF SHREWSBURY
SHREWSBURY, VT 05738

MEETING OF

THE AD HOC MITIGATION PLAN COMMITTEE

TUESDAY, AUGUST 12, 2014

AT TOWN OFFICE

AT 7:00 PM

TO PREPARE THE

2014 LOCAL HAZARD MITIGATION PLAN

AGENDA

1.INTRODUCTIONS
2. REVIEW OF ANNEX U (SHREWSBURY) OF THE RUTLAND REGIONAL PLANNING COMMISSION HAZARD MITIGATION PLAN
3. IDENTIFICATION OF ADDITIONAL HAZARDS
4. ADJOURNMENT

ALL SHREWSBURY RESIDENTS ARE WELCOME TO ATTEND

NOTICE POSTED JULY 21, 2014

TOWN OF SHREWSBURY
SHREWSBURY, VT 05738

Shrewsbury Hazard Mitigation Committee Meeting
August 12, 2014

Town: Shrewsbury, VT Group: Hazard Mitigation Committee Meeting

Meeting Location: Shrewsbury Town Office Meeting Date: Aug 12, 2014

Meeting Time: 7:00 pm

Name:	Affiliation	email or phone	Mileage
Elliott Stewart	Emergency Director	estewart5@aim.com	10 miles
Steven Nicholson	Selectboard	senick62@sover.net	
DAVID TRETZ	[illegible]	[illegible]@GMAIL.COM	10 MILES
James Cannon	Road Commissioner	[illegible]@yahoo.com	
David Rice	Emergency Management Coordinator	dricevt@Aol.com	2 miles

HAZARD MITIGATION PLANNING COMMITTEE
TOWN OF SHREWSBURY
SHREWSBURY, VT 05738

MINUTES OF AUGUST 12, 2014 MEETING.

1. The meeting came to order at 7:00P.M.

2. Attending were: Elliott Stewart, David Rice, Stephen Nicholson, Jamie Carrara, and David Fretz. Russell Carrara was absent.

3. There were no minutes because this was the first meeting of the committee.

4. Introductions were made of individuals who had not met each other.

5. New Business:

a. David Rice, Committee Chair, distributed notebooks containing a rough draft of the proposed Shrewsbury Hazard Mitigation Plan 2014. Members had seen the text previously by email. David explained that each town now needed to have its own Hazard Mitigation Plan.

b. Steve Nicholson had brought a list of edits which he recommended be made in the plan. They will be incorporated in the next draft.

c. The committee focused primarily on the major mitigation problems faced by the Town at this time. The major problems include the following:

1. Brown Bridge Access Road.
2. Cold River Road potential collapse near Adams House.
3. Northam Road near Johnson Pond. Beaver Dam potential collapse.
4. Creation of second access road to Town Garage and School.
5. School Street Dam and Access Road.

d. Jamie Carrara, Road Commissioner, reported that he now stocks extra road material at the Town Garage so that it is immediately available in the case of an emergency.

6. The committee will meet next on Aug. 26, 2014, at 7 PM at the Town Office to review an updated version of the plan including all their recommendations. The meeting adjourned at 8:30 PM.

Respectfully submitted:

David Rice, Chairman

OFFICIAL TOWN NOTICE OF PLANNING MEETING

OFFICE OF EMERGENCY MANAGEMENT
TOWN OF SHREWSBURY
SHREWSBURY, VT 05738

MEETING OF
THE HAZARD MITIGATION PLANNING COMMITTEE
TUESDAY, AUGUST 26, 2014
AT TOWN OFFICE
AT 7:00 P.M.

AGENDA:
REVIEW OF CURRENT DRAFT
OF SHREWSBURY HAZARD
MITIGATION PLAN 2014

FOR INFORMATION CALL DAVID RICE AT 492-3488
ALL SHREWSBURY RESIDENTS
ARE WELCOME TO ATTEND

TOWN OF SHREWSBURY
SHREWSBURY, VT 05738

Shrewsbury Hazard Mitigation Committee Meeting
August [redacted], 2014
26

Town: Shrewsbury, VT Group: Hazard Mitigation Committee Meeting

Meeting Location: Shrewsbury Town Office Meeting Date: Aug [redacted] 26, 2014

Meeting Time: 7:00 PM

Name:	Affiliation	email or phone	Mileage
David Rice	Emergency Management	drice vt@ AOL.com	2 miles
Elliott Stewart	Emergency Management	Estew55@aim.com	7 miles
Steven Nicholson	Selectboard	semck62 @ sover.net	5
Jamie Carrara	Road Commissioner	freemanbrookroad@yahoo.com	½ mile

HAZARD MITIGATION PLANNING COMMITTEE
TOWN OF SHREWSBURY
SHREWSBURY, VT 05738

MINUTES OF AUGUST 26, 2014 MEETING.

1. The meeting came to order at 7:00P.M.

2. Attending were: Elliott Stewart, David Rice, Stephen Nicholson, and Jamie Carrara. David Fretz and Russell Carrara were absent.

3. Reading of the Minutes of the Aug. 12, 2014, was waved.

4. New Business:

a. David Rice, Committee Chair, distributed copies of the Aug. 23, 2014 draft Hazard Mitigation Plan. Track Changes from Laura Keir of the Rutland Regional Planning Committee (RRPC) had been added to the draft. They focused primarily on the requirement for Hazard Histories and Hazard Summaries. The Committee reviewed the updates and approved.

b. Steve Nicholson brought a list of edits which he recommended be made in the plan. They will be incorporated in the final draft.

c. The committee focused primarily on the major mitigation problems faced by the Town at this time. The major problems include the following:

1. Brown Bridge Access Road.
2. Cold River Road potential collapse near Adams House.
3. Northam Road near Johnson Pond. Beaver Dam potential collapse.

d. Jamie Carrara, Road Commissioner, reported on the installation of Gov. Clement Road Bridge. The bridge uses an experimental new span design to facilitate bridge repairs in times of major disasters when many bridges need to be fixed rapidly. The spans of the Gov. Clement Road Bridge are 80' long.

e. David Rice moved, seconded by Elliott Stewart, that the draft plan be approved by the Hazard Mitigation Planning Committee in its present form with corrections and forwarded to the Select Board as the Shrewsbury Hazard Mitigation Plan 2014. Vote unanimous.

5. David Rice will forward the Shrewsbury Hazard Mitigation Plan to the Shrewsbury Select Board for review and discussion. He will also forward the Plan

to Laura Keir at the Rutland Regional Planning Commission for their review prior to their forwarding the plan to the State of Vermont Department of Emergency Management for review.

6. The next meeting of the Committee will be in mid-October.

7. The meeting adjourned at 8:00 P.M.

Respectfully submitted:

David Rice,
Chairman