Town Of Cabot, VT
Local Hazard Mitigation Plan Update
January 2012
Prepared by the Town of Cabot and CVPRC

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 an all-hazards local mitigation strategy that makes the communities of Central Vermont 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. Based on the results of previous Project Impact efforts, FEMA and State agencies have come to recognize that it is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck. This Plan recognizes that communities have opportunities to identify mitigation strategies and measures during all of the other phases of emergency management – preparedness, response, and recovery. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where the hazards are most severe and identify local actions that can be taken to reduce the severity of the hazard.

Hazard mitigation strategies and measures alter the hazard by eliminating or reducing the frequency of occurrence, 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.

2. Purpose

The purpose of this Local Hazard Mitigation Plan is to assist Cabot in recognizing hazards facing the region and their community and identify strategies to begin reducing risks from acknowledged hazards.

Cabot strives to be in accordance the strategies, goals and objectives of the State Hazard Mitigation Plan, including an emphasis on proactive pre-disaster flood mitigation for public infrastructure, good floodplain and river management practices, and fluvial erosion risk assessment initiatives.

The 2012 Cabot Local Hazard Mitigation Plan is an update of the 2009 plan. The plan has been reorganized and new sections have been added regarding:

- Plan Update Process
- Plan Maintenance
- Updates of worst and moderate threat hazards
- Updates of Local Areas of Concern Map
- Status update of 2005 mitigation strategies
- Identification of new mitigation strategies

3. Community Profile

The Town of Cabot is located in the Northeastern corner of Washington County, and approximately 20 miles from the Cities of Barre and Montpelier. According to the 2010 US Census, Cabot has a total population of 1,433 people living in 570 housing units. The population has increased by 18% from the 2000 Census, while the number of occupied housing units has increased by 26%. Approximately 31% of Cabot's workforce is employed within the Town with the remaining 69% working outside of the community.

The Town's major thoroughfare is U.S. Route 2 which traverses 6.7 miles through the Southern and Eastern sections of the Town. Housing within the Town is widely dispersed both within rural locations and the Village, culminating in a total of 85% of the dwellings identified as owner occupied. The Town's limited Commercial development is focused in the village, which is representative of current zoning regulations. Residential growth continues to be scattered through the Town.

In Cabot, electricity is provided by Green Mountain Power to those residents who are situated along U.S. Route 2 and Vermont Route 215. Residents in the hills and along the back-roads are served primarily by the Washington Electric Cooperative. The Cabot community is completely dependent upon groundwater for domestic water supply and industrial uses. Cabot Village is served by a wastewater treatment facility while the remaining portions of the Town are served by on-site septic systems.

The Cabot Fire Department provides fire protection to the Town. Cabot is a member of the Capital Fire Mutual Aid System which includes all of the Towns in Washington County and some surrounding communities. Cabot has automatic response agreements with the surrounding Towns of Marshfield, Plainfield, and Walden. The Report of the Fire Marshal indicates that there were five structural and chimney fires reported in 2010. Also housed within the Cabot Fire Department is the Town's independent non-profit ambulance service, Cabot Emergency Ambulance Services, Inc. According to the 2010 Town Report, the Ambulance service responded to 99 calls within Cabot.

Law enforcement support is contracted with the Vermont State Police. In addition, the Washington County Sheriff's Department is periodically engaged to monitor the local roadways.

The Town of Cabot has an approved Emergency Operations Plan, dated 1997, and a Rapid Response Plan that was adopted in 2004.

The Town Plan includes goals and objectives in regards to flood plains, steep slope development, transportation, and public services. The Zoning Regulations include a stream protection section which has instituted a vegetated buffer strip of 75 feet from all streams and rivers and 50 feet from any wetland.

4. Planning Process and Maintenance

4.1 Planning Process

The Central Vermont Regional Planning Commission (CVRPC) coordinated the Cabot Local Hazard Mitigation Plan process. CVRPC contacted the Town Clerk, Tara Rogerson, and sent Town-Specific hazard mitigation material for review. After assessing the material, Tara Rogerson and CVRPC staff held a meeting along with members of the community on September 6, 2011 at the Municipal Offices. The Cabot Hazard Mitigation Meeting focused on assessing past mitigation projects and compiling information on its current and future hazard mitigation programs, projects and activities.

Preparation for the meeting included a review of the Cabot Town Plan, Cabot Rapid Response Plan, 2010 Town Report, and Winooski Headwaters Corridor Plan. Information from these documents is incorporated into various sections of this plan. The Cabot Hazard Mitigation Meeting focused on assessing past mitigation projects and compiling information on its current and future hazard mitigation programs, projects and activities.

Attendees included:

- Tara Rogerson, Town Clerk
- Walter Churchill, Road Foreman
- Gary Katz, UDAG
- Gary Gulka, Planning Commission
- Dan Deasy, Asst. Fire Chief
- Jennifer Miner, VP Cabot Ambulance
- David Westervelt, Disaster Management Coordinator
- Jen Mojo, CVRPC

The meeting indicated that the Town is most vulnerable to dam failure, flood/flash flood/fluvial erosion, hurricanes/severe storms/tropical storms, structure fire, extreme cold/winter storm/ice storms. Moderate threat hazards include high wind and avalanche/landslide. Previously identified hazards include flood/flash flood/fluvial erosion, structure fire, power shortage, winter storms and extreme cold. Power shortage is no longer considered a threat due to improved communications with and service from the utility providers. Cabot is now focusing on flooding hazards as these events are the most common and most destructive.

Once the draft was updated, CVRPC placed a notice for public comments of the draft update on the CVRPC blog and newsletter. The draft update was also available at the Cabot Municipal offices and by request from CVRPC for public review and comments from January 25, 2012 to February 1, 2012. The announcement of the draft update in the CVRPC newsletter reached over 150 people and businesses in the Region's 23 towns, including the adjacent towns of Woodbury, Marshfield, and Calais. No comments were received by CVRPC or Cabot Staff. Public comments submitted, in the future, will be reviewed by the Town Clerk (and CVRPC Staff dependant on funding) and attached as an appendix. In the future, the draft plan will be made available during Town Meeting Day and local meetings with State and local officials to allow for more public comment and review. Once the plan is conditionally approved by FEMA, the plan will go before the Select Board for adoption.

4.2 Plan Update Process

The Cabot Local Hazard Mitigation Plan was originally adopted by the Town as an Annex to the Central Vermont Regional Local Hazard Mitigation Plan in 2005 and received FEMA final approval in January 2006. The 2012 update is intended to be submitted as a standalone Town Local Hazard Mitigation Plan.

The current plan is an overhaul of the 2005 plan. Below is a list of the revisions that have been made from the past plan and the appropriate sections for reference. New hazards identified include dam failure and hurricanes/severe storms.

General Updates

- General reorganization/restructuring of the plan according to future FEMA/VEM checklist
    - New sections added – 4.2 Plan Update Process, 4.3 Plan Maintenance, 5.2 Worst Threat Hazards, 5.3 Moderate Threat Hazards
- Update of all data and statistics using 2010 Town Report and US Census Data (Section 3)
- Revaluation, identification and analysis of all significant hazards (Section 5)
- Acknowledgment of implemented mitigation strategies since 2009 – see matrix below (section 4.2)
- Identification of on-going mitigation projects and strategies – see Existing Mitigation Programs, Projects and Activities section (section 4.2)

Hazard Analysis Updates (Sections 5 and 6)

- New hazards added – dam failure
- Added location/vulnerability/extent/impact/likelihood table for each hazard to summarize hazard description (Section 5.1-5.3 – after each hazard)
- Review of Vermont Hazard Mitigation Plan (Section 5 – hazard analysis table)

Maps

- Review of 2005 Areas of Concern map and Local Hazards Analysis map – added additional flooding areas and forest layer

The following chart provides an overview of Cabot's proposed 2005 hazard mitigation actions along with their current status. Planning mitigations strategies adopted since the 2005 plan was a revised flood hazard bylaw.

Mitigation Action	2012 Status
Prohibit development on slopes greater than 25% and regulate development on slopes over 15%	Will be considered in next Town plan update
Participate in a Stream Geomorphic Assessment	Completed – Upper Winooski Corridor Plan (2006)
Install standby electric power for the Cabot School gymnasium (Town shelter).	Has transfer switch, but not a permanent generator
Construct or retrofit the Cabot School gymnasium (Town shelter) to withstand the impacts of severe winter weather	Still interested – lack of funding
Develop procedures to ensure safe operations/shutdown of hazardous materials located within the Cabot Creamery facilities near the Village during severe winter storms	Cabot Creamery has an emergency response plan
Purchase and install a sprinkler system for the Cabot School	Town is still interested but there is currently a lack of funding
Equip the wastewater infrastructure serving Cabot with redundant service and/or permanently installed standby generators	Completed and inspected yearly
Develop and implement grant/loan program for Town residents or property owners for permanent installation of generators or for pre-wiring of structure for temporary installation of portable generators	Town is no longer interested

Existing Programs, Projects & Activities

The ongoing or recently completed programs, projects and activities are listed by mitigation strategy.

Community Preparedness Activities

- Current Rapid Response Plan – currently updating
- Current Emergency Operations Plan – currently updating

Hazard Control & Protective Works

- Maintenance Programs (Culvert Survey & Replacement)
- Participant in the Capital Mutual Aid System
- Enforcement of adequate fire codes

Insurance Programs

- Participation in NFIP

Land use Planning/Management

- Review and update of Cabot's Flood Hazard Ordinance to comply with FEMA standards;
- Request accurate flood maps through CVRPC where updated data is available;
- Conservation Committee's assessment of the Winooski River and its major tributaries and identify corrective measures to reduce streambank erosion; and
- Zoning Regulations – Prohibited in floodplain areas designated within Flood Insurance Rate Map for Cabot, dated September 18, 1985:
    - All residential, commercial, industrial and other buildings intended for human occupancy or employment, excluding recreational, agricultural (except dwelling units), and temporary uses;
    - All dumps, junkyards and storage of flammable liquids

Protection/Retrofit of Infrastructure and Critical Facilities

- Dry Hydrant Program - 11

Public Awareness, Training & Education

- Fire Safety Educational Programs for Town Residents - ongoing

4.3 Plan Maintenance

The Cabot Local Hazard Mitigation Plan will be updated and evaluated annually at an April Select Board meeting along with the review of the Basic Emergency Operations Plan. Updates and evaluation by the Select Board will also occur within three months after every federal disaster declaration and as updates to town plan/zoning and river corridor plans come into effect. The plan will be reviewed by the Select Board, Town Clerk and public at the above mentioned April select board meeting. CVRPC will help with updates or if no funding is available, the Town Clerk and Select Board will update the plan.

The process of evaluating and updating the plan will include continued public participation through public notices posted on the municipal website, notice in the municipal building,

Hardwick Gazette, Cabot Chronicle, and CVRPC newsletter and blog inviting the public to the scheduled Select Board (or specially scheduled) meeting. Additional stakeholders invited to the meeting will be Village area residents, and representatives from Cabot Creamery, the Schools, Rhapsody Foods, Zuttano and the local famers. Also invited in the future will be the VT Agency of Natural Resources (VT ANR), as they are able to provide assistance with NFIP outreach activities, models for stricter floodplain zoning regulations, delineation of fluvial erosion hazard areas, and other applicable initiatives. These efforts will be coordinated by the Town Clerk.

Monitoring of plan progress, implementation, and the 5 year update process, will be undertaken by the Town Clerk. Monitoring updates may include changes in community mitigation strategies; new town bylaws, zoning and planning strategies; progress of implementation of initiatives and projects; effectiveness of implemented projects or initiatives; and evaluation of challenges and opportunities. If new actions are identified in the five year interim period, the plan can be amended without formal re-adoption during regularly scheduled Select Board meetings. After a five year period, the plan will be submitted for re-adoption following the process outlined the schematic found in the Attachments section.

Cabot shall also incorporate mitigation planning into their long term land use and development planning documents. It is recommended the Town review and incorporate elements of the Local Hazard Mitigation Plan when updating the municipal plan, zoning regulations, and flood hazard/FEH bylaws. The incorporation of the Local Hazard Mitigation Plan into the municipal plan, zoning regulations and flood hazard/FEH bylaws will also be considered after declared or local disasters. The Town shall also consider reviewing future Upper Winooski Corridor planning documents for ideas on future mitigation projects and hazard areas.

5. Community Vulnerability by Hazard

5.1 Hazard Identification

The following natural disasters were discussed and the worst threat hazards were identified based upon the likelihood of the event and the community's vulnerability to the event. Hazards not identified as a "worst threat" may still occur. Greater explanations and mitigation strategies of moderate threat hazards can be found in the State of Vermont's Hazard Mitigation Plan.

Hazard	Likelihood [1]	Community Vulnerability[2]	Worst Threat
Avalanche/ Landslide	Med	No	
Dam Failures	Med	Yes	X
Drought	Low	No	
Earthquake	Low	No	
Extreme Cold/Winter Storm/Ice Storm	High	Yes	X
Flash Flood/Flood/Fluvial Erosion	High	Yes	X
High Wind	Med	No	
Ice Jam	Low	No	
Hurricane/Severe Storms	Med	Yes	X
Structure Fire	Med	Yes	X
Tornado	Low	No	
Water Supply Contamination	Low	No	
Wildfire/Forest Fire	Low	No	

The Town of Cabot identified the following disasters as presenting the worst threat to the community:

- Dam Failure
- Extreme Cold/Winter Storm/Ice Storm
- Flooding/Flash Flooding/Fluvial Erosion
- Hurricane/Severe Storms
- Structure Fire

The Town is interested in focusing a majority of mitigation efforts into reducing impacts from flooding, as the events occur most frequently, severely and cause the most damage to public and private infrastructure.

Moderate threat hazards include:

- High Wind
- Avalanche/Landslide

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

[2] Does the hazard present the threat of disaster (Yes)? Or is it just a routine emergency (No)?

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Type of hazard	General areas within municipality which are vulnerable to the identified hazard.	Types of structures impacted	Minimal: Limited and scattered property damage; no damage to public infrastructure contained geographic area (i.e., 1 or 2 communities); essential services (utilities, hospitals, schools, etc.) not interrupted; no injuries or fatalities. Moderate: Scattered major property damage (more than 50% destroyed); some minor infrastructure damage; wider geographic area (several communities) essential services are briefly interrupted; some injuries and/or fatalities. Severe: Consistent major property damage; major damage to public infrastructure (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and fatalities.	Dollar value or percentage of damages.	High: 10% to 100% probability within the next year or at least once in the next 10 years. Medium: less than 10% to 100% probability within the within the next year or less than once in the next 10 years.

5.2 Worst Threat Hazards

Dam Failure

There are two dams of concern in Cabot. The first is the Marshfield Dam, located in southwest corner of the Town. The Marshfield Dam is a hydroelectric facility operated by Green Mountain Power (GMP). On August 28, 2011, due to the large amount of rain from TS Irene, officials were afraid the dam would breach. Officials were considering releasing a large amount of water to ease pressure behind the dam; however, the rain subsided and the release was called off. Massive flooding would have occurred downstream in East Montpelier and Montpelier had the dam been released. GMP is now working with adjacent towns to improve communications with businesses and residents in times of emergency. GMP is also working with the Army Corps of Engineers to develop inundation models to simulate dam failure and identify what sites will be impacted.

The second dam is much smaller and not in operation. The Saw Mill Dam is located in lower Cabot and in very poor condition. The Town is unsure of who owns the dam. The dam is roughly

135 feet wide and 14 feet high and contains mostly silt behind the dam. If the dam breeched, roughly 12 homes and business could possibly be flooded.

The extent of flooding from dam failure in Cabot is unknown. There have been no inundation studies performed and there are few historical records to base estimates. For the next plan update, Cabot can work with Green Mountain Power to determine the extent of flooding if a dam were to breech.

Hazard	Location	Vulnerability	Extent	Impact	Probability
Dam Failure	Area downstream from Marshfield Dam, and Saw Mill Dam	Private property, roads, culverts, bridge infrastructure	Marshfield dam during TS Irene – 542 ft above sea level (normally at 536 feet); data gap for inundation models	Data gap	Medium

Extreme Cold/ Winter Storm/ Ice Storm

History of Occurrences (county wide)
Snow and/or ice events occur on a regular basis. Recent significant events have included:

Date	Event	Location	Extent
3/6/2011	Winter storm	County wide	12-18” of snow, 10,000 customers lost power statewide
2/23/2010	Winter Storm	County wide	20” of snow and 50,000 customers lost power statewide
2/22/2009	Winter Storm	County Wide	16” of snow, 30 mph wind gusts
2/1/2008	Winter storm	County wide	3-7” of snow and ice ¼-1/2”thick, 50 mph wind gusts
2/14/2007	Winter storm	County wide	22” of snow
2/14/2006	Winter storm	Cabot, County Wide	30” of snow
1/4/2003	Winter storm	County wide	19” of snow
3/5/2001	Winter storm	County wide	15-30” of snow
12/31/2000	Winter storm	County wide	10” of snow
1/15/1998	Winter storm	County wide	10-12” snow (not a DR in Washington County)
12/29/1997	Winter storm	County wide	21” of snow
12/7/1996	Winter Storm	County wide	12” of snow
3/21/1994	Winter storm	County Wide	5-11” of snow
11/1/1993	Winter storm	County wide	15” of snow

1/3/1993	Freezing Rain	Statewide	¼-1/2" of freezing rain

A winter storm is defined as a storm that generates sufficient quantities of snow, ice or sleet to result in hazardous conditions and/or property damage. Ice storms are sometimes incorrectly referred to as sleet storms. Sleet is similar to hail only smaller and can be easily identified as frozen rain drops (ice pellets) that bounce when hitting the ground or other objects. Sleet does not stick to wires or trees, but in sufficient depth, can cause hazardous driving conditions. Ice storms are the result of cold rain that freezes on contact with the surfaces coating the ground, trees, buildings, overhead wires and other exposed objects with ice, sometimes causing extensive damage. Periods of extreme cold tend to occur with these events.

The extent of winter storms on Cabot is difficult to estimate as it is dependent on the size and path of the storm. For the next plan update, Cabot will more closely monitor winter storms to determine the worst impacts possible on the Town.

One of the major problems associated with ice storms is the loss of electrical power. Major electric utility companies have active, ongoing programs to improve system reliability and protect facilities from damage by ice, severe winds and other hazards. Typically, these programs focus on trimming trees to prevent encroachment of overhead lines, strengthening vulnerable system components, protecting equipment from lightning strikes and placing new distribution lines underground.

Other major problems include closed roads and restricted transportation.

By observing winter storm watches and warnings, adequate preparations can usually be made to lessen the impact of snow, ice and sleet, and below freezing temperature conditions on the Town of Cabot. Providing for the mass care and sheltering of residents left without heat or electricity for an extended time and mobilizing sufficient resources to clear broken tree limbs from roads, are the primary challenges facing community officials. Cabot should plan and prepare for these emergencies. That planning and preparedness effort should include the identification of mass care facilities and necessary resources such as cots, blankets, food supplies and generators, as well as debris removal equipment and services. Shelters within Cabot include the High School, Willey Building, Fire Station and Masonic Lodge. Backup power generation is needed at the School and Willey building. The Town encourages residents who are in remote locations to be equipped with generators and backup fuel supplies in the event of prolonged power outages and travel restrictions.

Hazard	Location	Vulnerability	Extent	Impact	Probability
Extreme Cold/Winter or Ice Storm in conjunction with power	Town Wide	Elderly & handicapped populations, remote structures, old/under	Below freezing and severe wind chill factor for multiple days; depends on	Depends on severity – additional sheltering/ plowing/ emergency	High

failure		insulated structures, utilities, trees	severity of event; 18+" snow in March 2011 storm	services costs for town	

Flood/Flash Flood/Fluvial Erosion

History of Occurrences (from NCDC website and FEMA DR List. The closest river gauge is located in Montpelier, approximately 18 miles downstream):

Date	Event	Location	Extent
8/28/2011	Flash Flood (TS Irene)	Cabot Washington County	Winooski River crested at 19.05 feet in Montpelier– flood stage is at 15'; 5-7" of rain -DR 4022
5/26/2011	Flash Flood	Cabot - Washington County	4" of rain; Montpelier gauge at 17.59' – DR4001
4/23-5/9/2011	Flash Flood	Washington County (no Cabot impact)	DR 1995 (flash flooding in Mad River Valley – rain and snowmelt)
8/2/2008	Flash Flood	Washington County	not a historical crest in Montpelier
7/11/2007	Flash Flood	Northeast Washington County	3-6" of rain in 2 hrs – DR 1715 - not a historical crest in Montpelier
6/26/2006	Flood	Washington County	3-4" of rain - not a historical crest in Montpelier
9/16/1999	Tropical Storm Floyd	County Wide	Montpelier flood gauge at 9.30 feet, 5-7" rain county wide DR 1307
6/17/1998	Flash Flood	County Wide	3-6" of rain over 2 day period - DR 1228 - not a historical crest in Montpelier
8/5/1976	Flood	County Wide	Montpelier flood gauge at 12.31 feet – DR 518
6/30/1973	Flood	County Wide	Montpelier gauge at 17.55 ft DR 397
9/22/1938	Flood/Hurricane	County Wide	Montpelier flood gauge at 14.11 feet
11/03/1927	Flood	County Wide	Montpelier flood gauge at 27.10 feet

Flooding/flash flooding/fluvial erosion is Cabot's most commonly recurring hazard. Flooding is the overflowing of rivers, streams, drains and lakes due to excessive rain, rapid snow melt or ice. Flash flooding is a rapidly occurring flood event usually from excessive rain. Fluvial erosion is the process of natural stream channel adjustments. Fluvial erosion causes erosion of

sediment in some areas, while causing aggradation of sediment in other. Fluvial erosion processes occur more quickly and severely during flood events.

Cabot is located in the headwater of the Winooski River, Vermont's second longest river, and as a result experiences minimal impact from flooding compared to municipalities further downstream. Nevertheless, the River does follow Main Street through Cabot Village (See Hazards Analysis Map).

Specific extent data for flood levels in Cabot is lacking as the closest flood gauge is located in Montpelier. During Tropical Storm Irene, the Montpelier flood gauge was 4 feet above flood stage. The worst flooding event in Cabot's history was the 1927 event; however, exact data from that event is not available. In 1927 event, the Montpelier flood gauge was at 27.10 feet; however, since the 1927 flood a number of flood control dams have been installed in the region to prevent the same flooding extent. Lesser but more regular flash flooding occurs in Cabot, with generally 1 foot of water in areas designated on the areas of concern map. For the next update, Cabot can better monitor flood waters by having individuals record flood water levels and submit to the Town Clerk for the Town's records.

Based on the results of overlaying the FIRM flood maps with the location of E911 points, there are 275 properties in the Town which are vulnerable to potential flooding. The estimated loss for a severe flooding event is approximately $38,912,500. Cabot has 7 active NFIP policies for a total coverage of $1,218,000. There are no repetitive loss structures in Cabot. The Zoning Administrator is responsible for enforcing flood hazard regulations.

One site which lies within this zone, which may have particular impact on the community's ability to respond to an incident, is the Town Garage (Hazard Analysis Map). As previous events have made clear, areas beyond the NFIP designated 100-year floodplain may be particularly vulnerable to these types of hazards. Cabot has 64 properties in the fluvial erosion hazard zone for a total possible property loss of $9,056,000. Channel adjustments with devastating consequences have frequently been documented wherein such adjustments are linked to historical channel management activities, floodplain encroachments, adjacent land use practices and/or changes in watershed hydrology associated with conversion of land cover and drainage activities, within and beyond the NFIP floodplain. The attached Hazard Analysis Map identifies the Fire Station, as well as other government buildings, as outside the designated floodplain, but near the river.

During Tropical Storm Irene, approximately 5" of rain fell over Cabot. Cabot only had one road damaged – Porter Rd. Cabot infrastructure was more extensively damaged during the May 2011 flash flood event. 26 roads were damaged for a total of $400,000 worth of damage. Roads that were the most damaged include:

- Ennis Rd
- Sawmill Rd
- Danville Hill
- Main St.
- Bolton Road
- Brickett's Crossing
- Cabot Plains Road
- Coits Pond Road

- Ducharme Road
- Elm Street
- Ennis Road
- Houghton Road
- Houston Hill Road
- Last Road
- Lovely Road
- Mack Mountain Road
- McQueeney Road
- Porter Road
- Sandy Beach Road
- Thistle Hill Road
- Urban Road
- Walbridge Road
- West Shore Road
- White Road
- Whittier Hill Road

As a result of Irene and the May 2011 floods, the Town is applying for a hazard mitigation grant to install a second culvert under Main Street to prevent flooding of the road and adjacent town hall building.

The Upper Winooski Corridor Plan is a valuable tool to help restore the River's health and prevent future flooding impacts. Mitigation and restoration strategies for Cabot's section of the Upper Winooski are attached as an appendix for the Town to refer to if future project ideas area needed.

Hazard	Location	Vulnerability	Extent	Impact	Probability
Flood/ Flash Flood/ Fluvial Erosion	Flood plain and fluvial erosion hazard zones; See above list for specific road locations	Private property, roads, culverts, bridge infrastructure	TS Irene - ~6" of rain, Montpelier flood gauge at 4' above flood stage	$400,000 from May 2011 event; $38,912,500 of property in 100 year floodplain	High

Hurricane/Severe Storms

History of Occurrence (from NCDC website and FEMA DR List. The closest river gauge is located in Montpelier, approximately 18 miles downstream):

Date	Event	Location	Extent
8/28/2011	Tropical Storm, Flash Flood (TS Irene)	Cabot, Washington County	Montpelier flood gauge at 19.05', flood stage at15'; 5" of rain – DR 4022
7/06/2011	Thunderstorm	County Wide	50 knot winds; 15,000 people in VT lost power
5/26/2011	Hail/Thunderstorms/Flash Flooding	County Wide	1" hail, 50 knot winds, 25,000 customers lost power in VT, 3-5" of rain - DR- 4001

8/9/2010	Thunderstorm/Wind/Hail	North Washington County	50 knot winds
7/21/2010	Hail	County Wide	1" Hail
7/18/2008	Hail	County Wide	1" Hail, 30 knot winds
7/9/2007	Hail, thunderstorms	County Wide	Baseball sized hail - DR 1715
6/19/2006	Hail, thunderstorms	County Wide	50 knot winds
6/9/2005	Severe thunderstorms	Calais (adjacent town)	Downed power lines, 60 knot winds
9/16/1999	Tropical Storm Floyd	Statewide	Tropical storm winds and flooding – DR 1307
6/17/1998	Severe Storms	County Wide	3-6" of rain DR 1228
7/15/1997	Severe Storms	County Wide	3-5" of rain
5/19/1982	Thunderstorm winds	County Wide	56 knot winds
7/3/1964	Hail	County Wide	1.5" hail
9/22/1938	Hurricane	Statewide	Category 1 force winds

Hurricanes and tropical storms are violent rain storms with strong winds that have large amounts of rainfall and can reach speeds up to 200 mph. Hurricane season is between the months of June and November. These types of storms originate in the warm waters of the Caribbean and move up the Eastern seaboard where they lose speed in the cooler waters of the North Atlantic. Severe storm events can occur late spring and early summer as temperatures increase in the summer season. The frequency and intensity of hurricanes, tropical storms, and severe storms is expected to increase with climate change.

Similar to flooding, the extent of severe storms is not well documented in the Town of Cabot. The impact of storms is usually flood related. See flood extent description in flood section above. Wind extent from storms is not well documented as there is no monitoring station in Cabot. Estimates for wind are gathered from county wide data off the NCDC website. In the future, Cabot could consider installing a monitoring station to better gather data for wind events.

Cabot was more greatly impacted by the severe storms during the May 2011 event, as opposed to TS Irene. See flooding hazard analysis for greater description of the events.

In 1999, Tropical Storm Floyd passed through Vermont. The primary impact from Floyd was downed trees and power lines due to high winds. 5-7" of rain fell over the Central Vermont Region; however, flood impacts were offset by drought conditions caused earlier in the year.

Hazard	Location	Vulnerability	Extent	Impact	Probability
Hurricane/ Tropical Storms/ Severe	Town Wide for Wind impacts; Flooding –	Large trees, power lines, culverts, bridges	Tropical Storm/Cat 1 hurricane wind speeds	$400,000 + for damages in May and August 2011	Medium

Storms	See above locations		during Irene and Floyd; 5-7" of rain		

Structure Fire

Structure fire is when a building is partially damaged or destroyed by a fire. About one quarter of the calls received in 2010 by Cabot's fire department were fire related incidents – chimney fires, smoke alarms, and carbon monoxide alarms. There have been no major fires in Cabot. The extent of a fire is difficult to estimate as there are no historic fires to base an extent. Although many structures in Cabot are less than 100 years old, many residents heat their homes with wood or pellet burning stoves. The density and closeness of buildings and homes in the Village also increases the likelihood of a spreading from building to building. The remoteness and distance from fire and emergency services of many homes also increases the likelihood of a home being completely, opposed to partially, destroyed by a fire. The Town is most concerned about the High School, Willey Building, Church, Town Garage and Hardware Store (chemical storage). The total value of properties at risk of fire within the Village represents 14% of the grand list value.

Hazard	Location	Vulnerability	Extent	Impact	Probability
Structure Fires	Town Wide	Wood structures, especially older than 100 yrs, homes that use wood burning stoves for heat	14% of grand list within Village	$150, 000 per home based on median grand list value	Medium

5.3 Moderate Threat Hazards

High Wind

High wind is defined as an event with sustained wind speeds of 40 m.p.h. or greater lasting for 1 hour or longer or an event with winds of 58 m.p.h. or greater for any duration. Thunderstorms can generate high winds and down hundreds of large trees within a few minutes. The State can also experience tornadoes, which 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. Across the State, however, 34 tornadoes have been recorded between 1950 and 1999, injuring 10 people and causing over $8.4 million dollars in estimated property damage. Nearly all of these incidents occurred from May through August with most of occurring in the afternoon. High wind events in Cabot often occur in conjunction with severe storm events. See hurricane/severe storm analysis for extent and occurrences.

Hazard	Location	Vulnerability	Extent	Impact	Probability
High Winds	Town Wide	Power lines, trees, structures	Depends on severity of event	Depends on severity of event	Medium

Avalanche/Landslide

A landslide is the sliding of a large mass of rock material, soil, etc., down the side of a mountain or cliff. Landslides can be caused by rainstorms, fires, alternate freezing or thawing and/or by the steepening of slopes by erosion or human modification. In Cabot, erosion and landslides are usually a result of rainstorms and freeze/thaw cycles. The extent of landslides in Cabot is unknown due to lack of in-depth soil and geological studies. In the future, Cabot can perform said studies to better identify the location and extent of possible landslides and highly erodible areas.

Due to the steep terrain around the Village area, Cabot is concerned about storm water runoff and erosion of the roads leading into the Village. There are two significant tributaries of the Upper Winooski that are located in the hills just east of the Village. During the May 2011 events, these tributaries experienced serious levels of flash flooding and caused damage to culverts and bridges within the Village (see flood/flash flood/fluvial erosion section for greater analysis.) Serious erosion occurred behind the Cabot School after the May 2011 storm event. The area was repaired by shoring up the hillside with rip rap and installing drainage ditches and detention ponds. Currently, the Town is working with an engineering firm to divert water along the steep roads through the use of drainage ditches and collection ponds.

Hazard	Location	Vulnerability	Extent	Impact	Probability
Avalanche/ Landslide	Cabot Village area and surrounding hillsides	Road infrastructure & private property, Cabot School	Unknown – Data gap	Unknown – data gap	Medium

6. Mitigation

6.1 Town Plan (March 2003) Goals that Support Local Hazard Mitigation

- Reduce damage from future flooding and prevent changes to the landscape which could increase hazardous flooding conditions;
- Maintain high groundwater quality;
- Efficiently operate the wastewater system in accordance with State and local regulations;
- Regulate future development within the wastewater service area; and
- Improve compliance with the sewage ordinance.

Cabot's town plan will be updated in 2012. The Town is interested in adding goals which relate to mitigation planning such as:

- To take actions to reduce or eliminate the long-term risk to human life and property from:
  - Dam failure
  - Flooding/Flash Flooding/Fluvial Erosion
  - Hurricanes/Tropical Storms/Severe Storms
  - Extreme Cold/Winter Storms/Ice Storms
  - Structure Fire

Specific hazard mitigation strategies related to goals of the Plan include:

- Ensure existing and future drainage systems are adequate and functioning properly.
- Preserve and prevent development in areas where natural hazard potential is high.
- Ensure that all residents and business owners are aware of the hazards that exist within Cabot and ways they can protect themselves and insure their property.
- Ensure that emergency response services and critical facilities functions are not interrupted by natural hazards.

6.2 Identified Hazard Mitigation Programs, Projects & Activities

Hazard mitigation programs, projects and activities that were identified for implementation at the Town Local Hazard Mitigation meeting are:

Hazard Mitigated	Mitigation Action	Local Leadership[3]	Prioritization (High, Med)	Possible Resources[4]	Time Frame
Flooding, Severe Storms	Install additional culvert under Main St/Rte 215	Road Foreman, SB	High	HMGP	1 year
Flooding, Severe Storms	Upgrade and replace bridge at Ennis Rd	Road Foreman, SB	High	HMGP, VTrans	2 years
Flooding, Severe storms	Upgrade and expand culverts on Danville Hill, Mac Mountain Road, White Road, West Shore Road, Bolton Road	Road Foreman, SB	Med	HMGP, VTrans, Town Funds	2-3 years
Severe Storms, Winter Storms	Install generator at Cabot Commons	Fire Dept, SB	Med	EMGP, FD	2 years

[3] SB – Select Board, PC - Planning Commission, ANR – Agency of Natural Resources

[4] HMGP – Hazard Mitigation Grant Program, EMGP – Emergency Management Grant Program, PSIC/NTIA – National Telecommunications and Information Administration, USDA – United States Dept. of Agriculture

Severe Storms, Winter Storms	Install generator at Cabot Creamery	Fire Dept, SB	Med	EMGP, Cabot Creamery	2-3 years
Severe Storms, Winter Storms, Emergency Preparedness	Develop community networking system to encourage neighbors to check on neighbors before and after hazard events	Fire Dept, SB	High	Town Funds	2 years
Flooding, Severe Storms	Development of driveway culvert ordinance	SB, PC	High	Town funds	1-2 years
Flooding, Severe Storms	Select strategies outlined in Upper Winooski Corridor Plan	PC, SB	High	Town Funds, ANR	2-4 years
Dam Failure	Work with Green Mountain Power to help with inundation modeling for the Marshfield Dam	SB, PC	High	Town Funds	Annually
Dam Failure	Work with landowners and ANR to decide fate of Sawmill Dam	SB, PC, ANR	Med	Town Funds	2-3 years
Structure Fire	Work with landowners to develop additional dry hydrants in remote areas of Cabot	SB, FD	Med	USDA, Town Funds	3-4 years
Structure Fire	Improved fire education materials for homeowners regarding heating homes safely during winter months and proper chimney/furnace maintenance	SB, FD	Med	FM Global Fire Prevention Grant Program	2 years
NFIP Compliance	Work with elected officials, the State and FEMA to correct existing compliance issues and prevent any future NFIP compliance issues through continuous communications, training and education	SB, PC	Med	Town Funds, USDA	2-3 years

VEM also emphasizes a collaborative approach to achieving mitigation on the local level, by partnering with ANR, VTrans, ACCD, Regional Planning Commissions, FEMA Region 1 and other agencies, all working together to provide assistance and resources to towns interested in pursuing mitigation projects and planning initiatives.

The Hazard Mitigation Activities Matrix (Attached) lists mitigation activities in regards to local leadership, possible resources, implementation tools, and prioritization. Prioritization was

based upon the economic impact of the action, the Community's need to address the issue, the action's cost, and the availability of potential funding. The action's cost was evaluated in relation to its benefit as outlined in the STAPLEE[5] guidelines.

Cabot understands that in order to apply for FEMA funding for mitigation projects, a project must meet FEMA benefit cost criteria. In addition, the Town must also have a FEMA approved Hazard Mitigation Plan.

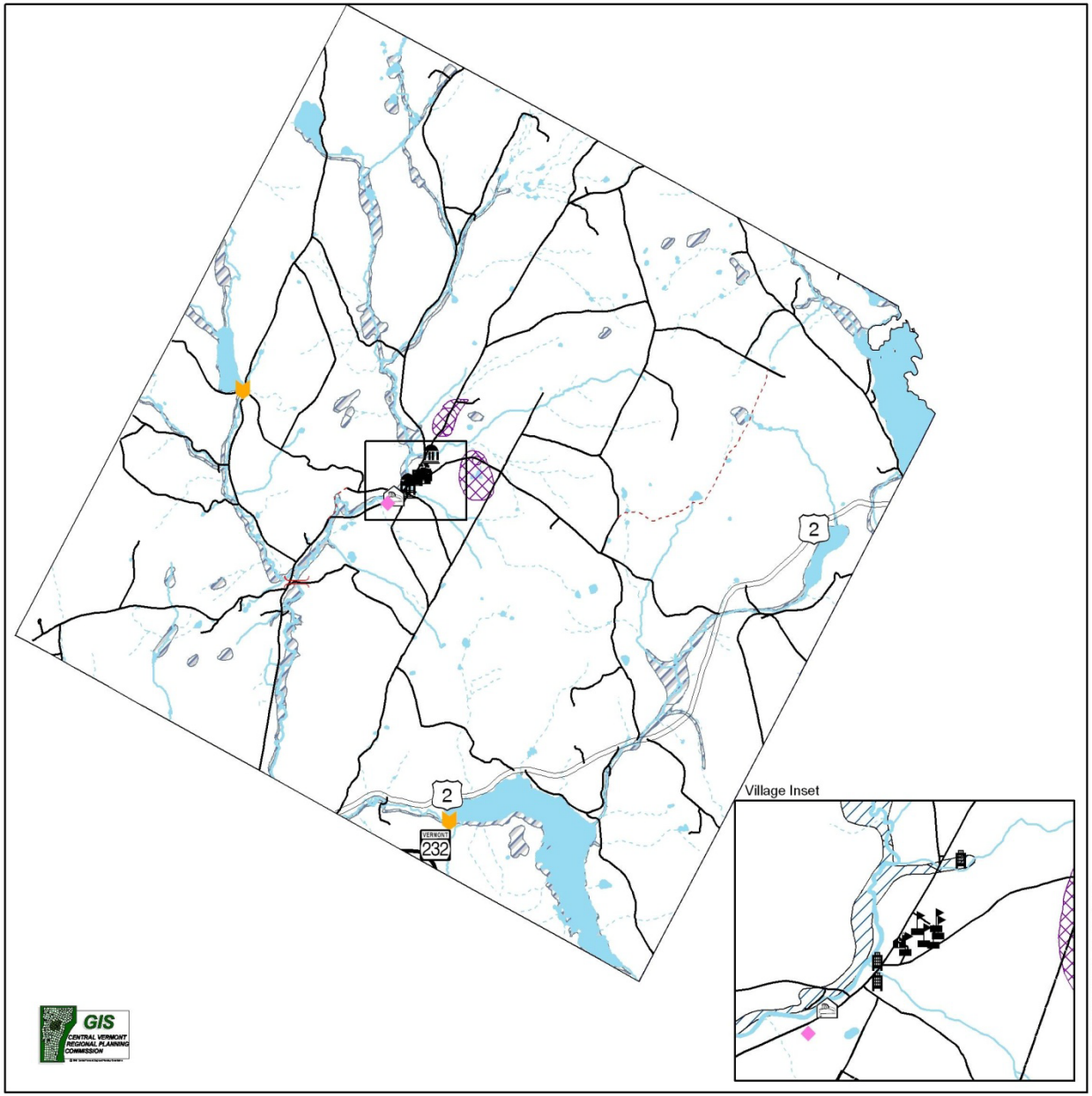
A High prioritization denotes that the action is either critical or potential funding is readily available and should have a timeframe of implementation of less than two years. A Medium prioritization is warranted where the action is less critical or the potential funding is not readily available and has a timeframe for implementation of more than two years but less than four. A Low prioritization indicates that the timeframe for implementation of the action, given the action's cost, availability of funding, and the community's need to address the issue, is more than four years.

Attachments

- Hazards Analysis Map
- Areas of Local Concern Map
- Upper Winooski Corridor Plan Maps and Strategies
- 5 year review and maintenance process
- Town Resolution Adopting the Plan

[5] A method of evaluating mitigation actions based on **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **E**conomic, **E**nvironmental criteria

Town of Cabot Hazard Analysis Map



- Tier II Sites
- Dams
- Bridges

Facilities

- Government
- Church
- School
- Fire Station

Roads

- Legal Trail
- Major Routes
- US Routes
- Wellhead protection areas

Streams

- Intermittent
- Perennial
- Lake/River
- Floodplain

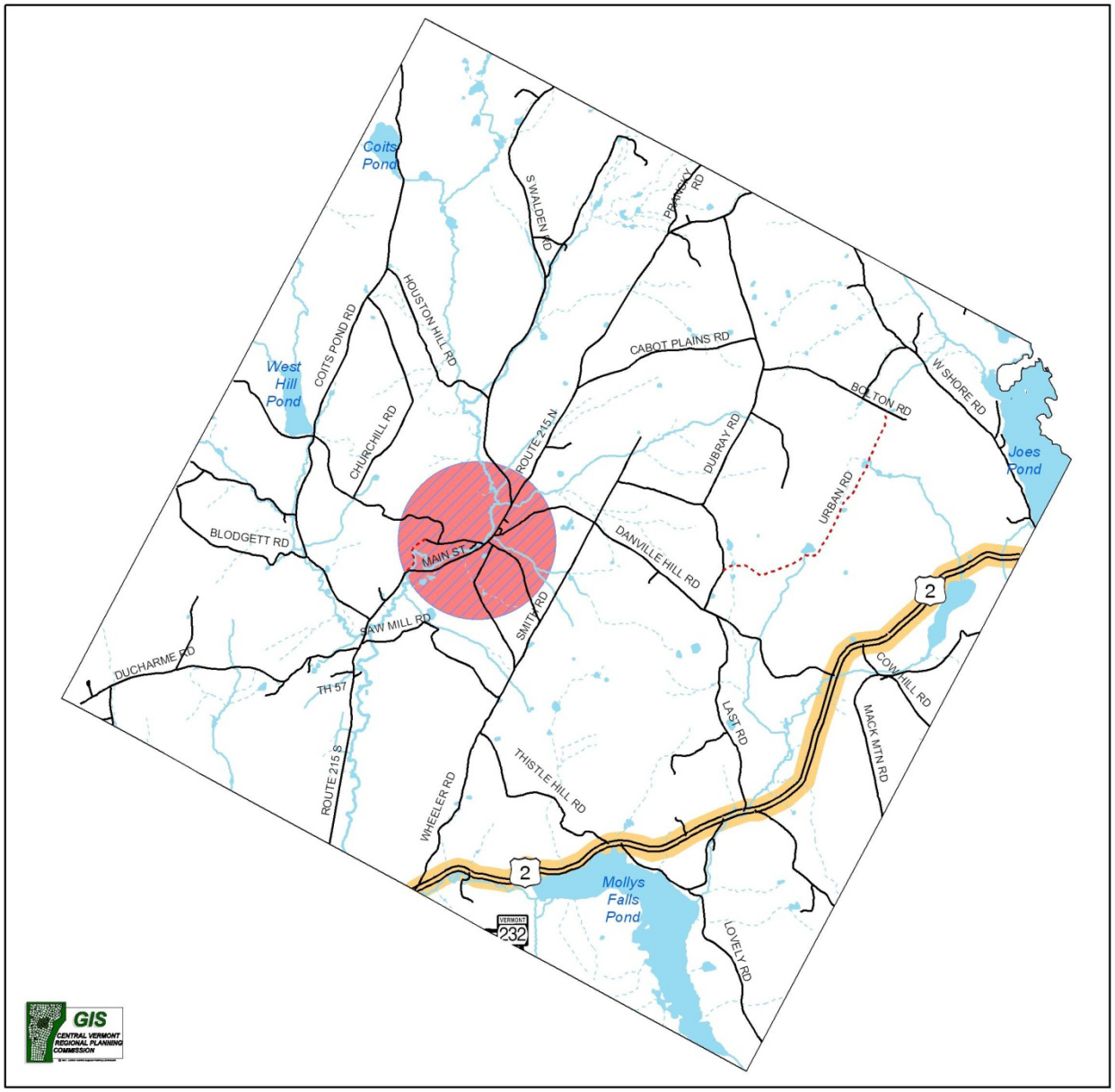
N

0 0.25 0.5 1 1.5 2 Miles

SOURCE:
Facilities: VT E-911 Board, 2004.
Wellhead protection areas: VANR-DEC Water Supply Division and VT Dept. of Health, 1998.
Dams: VANR - VDI, 2004
Tier II Sites: VEM, 2003.
Facilities: E911 Data, 2003
Floodplains: FEMA, 1999.
Roads: VAOT, 2003.
Surface Waters: CVRPC Surface Water Data, 1993.
Map created 1-3-04 by CVRPC.
c:pdm/cabot/new.haz.mxd

Data is only as accurate as the original sources.
This map is for planning purposes only.
This map map contain errors and omissions.

GIS CENTRAL VERMONT REGIONAL PLANNING COMMISSION



Town of Cabot Areas of Local Concern

- Flood Prone Areas
- Structure Fires
- Transportation of Hazardous Materials

Streams

- Intermittent
- Perennial
- Lake/River

Roads

- Legal Trails
- Major Routes
- US Routes

N

0 0.5 1 2 Miles

SOURCE:
Roads: VAOT, 2003.
Surface Waters: CVRPC Surface Water Data, 1993.
Map created 1-3-04 by CVRPC.
c:pdm/cabot/areas_concern.mxd

Data is only as accurate as the original sources.
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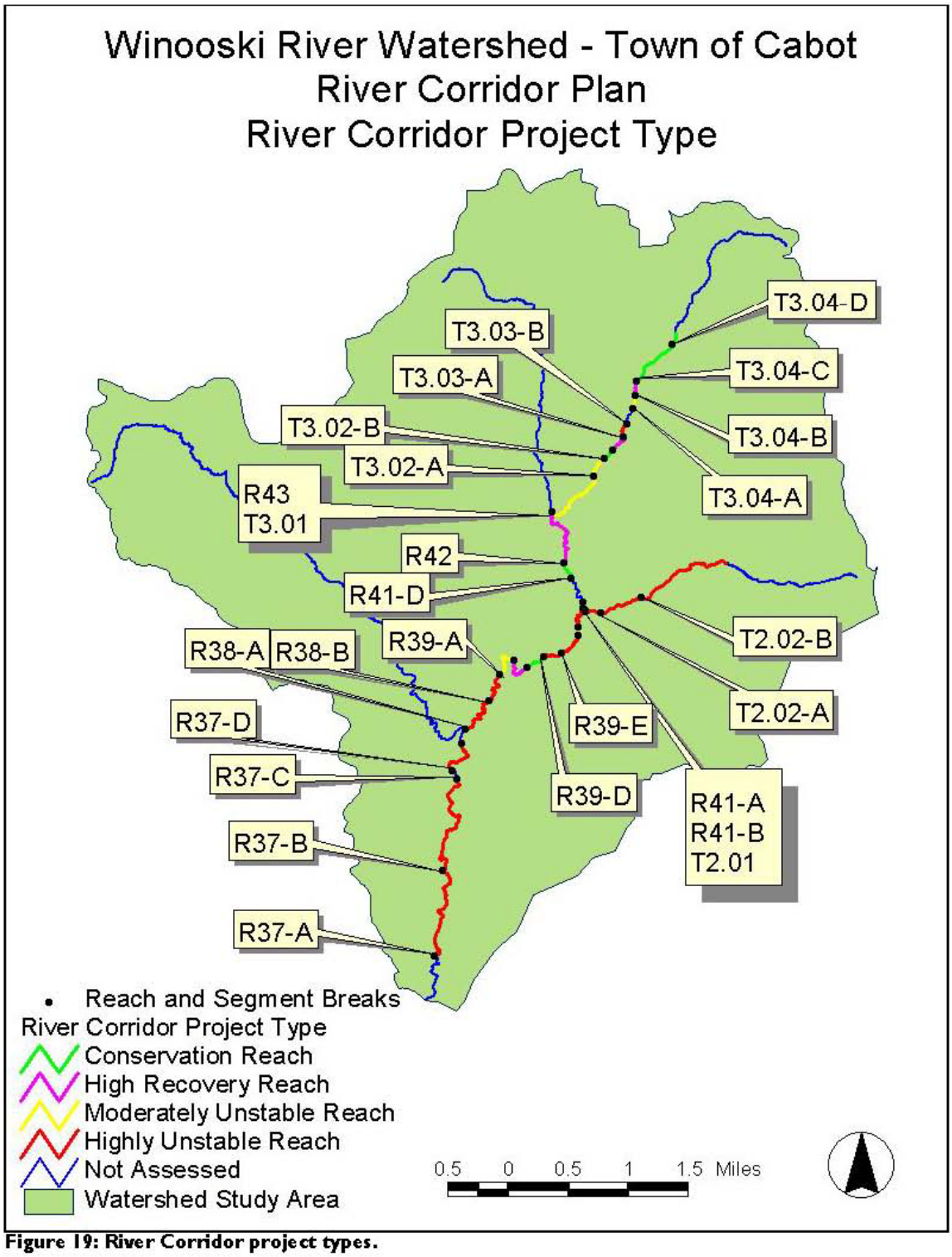


Figure 19: River Corridor project types.

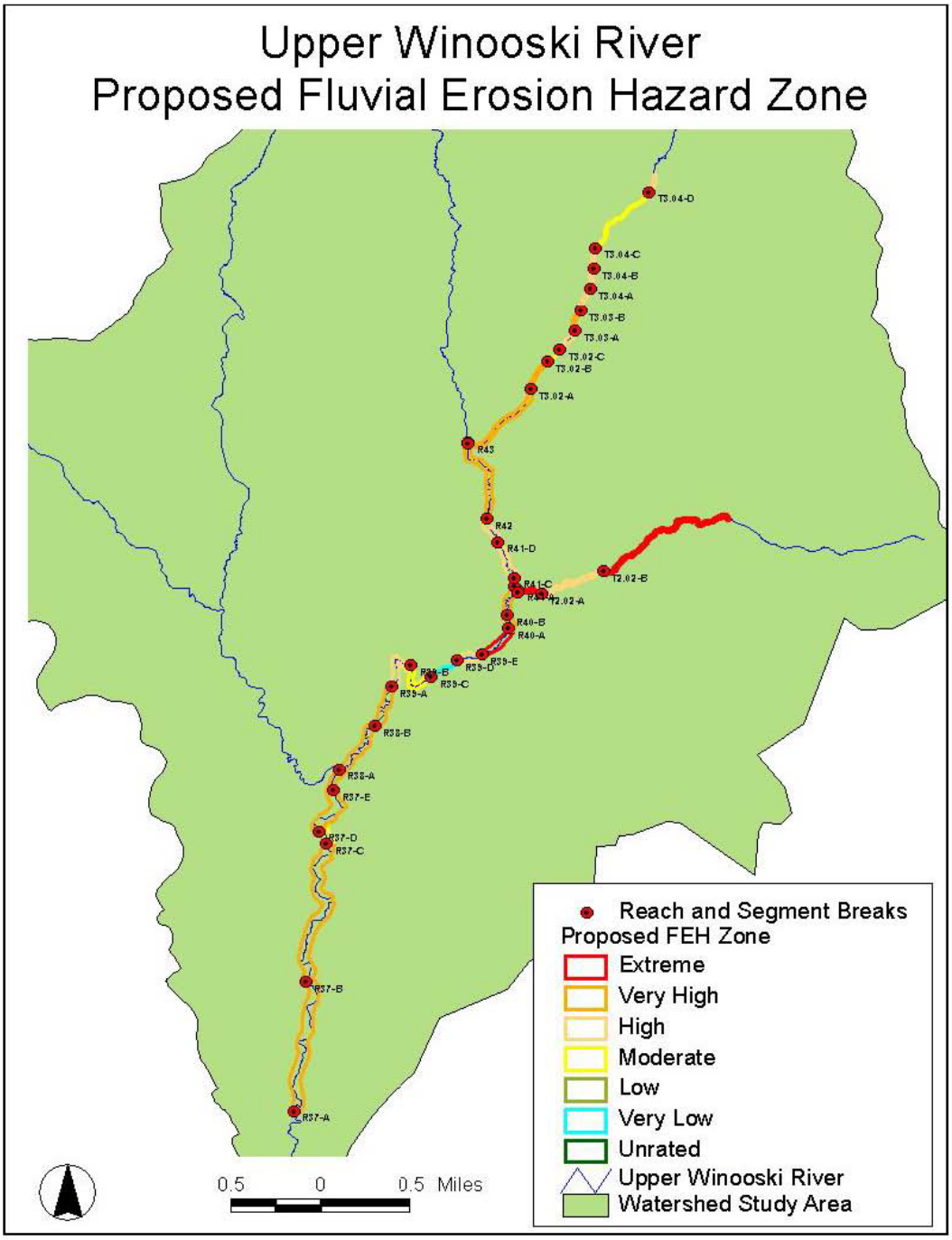


Figure 17: Draft Fluvial Erosion Hazard Map

8.2 Specific Project Recommendations for Cabot

Specific project recommendations are listed in Table 5 and Figure 24.

Table 5: Prioritization of River Corridor Project Types

Project Number	Segment Number	River Project Type	Specific Strategy					Project Description (including Potential Constraints and/or Opportunities)	Priority
			River Corridor Protection	Replace Undersized Structure(s)	Develop New Floodplain and Plant Buffer	Plant Riparian Buffer	Other		
1	R37-A	HU	√	√	√			Extensive historic straightening has led to incision. As no infrastructure is threatened, stream should be allowed to readjust by preventing development in the corridor and allowing for the reestablishment of a riparian buffer.	L
2	R37-B	HU	√	√	√			Bank armoring at cemetery has caused further instability. Development of a floodplain on the opposite bank would relieve pressure on the cemetery and allow for attenuation of sediment and floodwaters through this reach. Opposite bank is agricultural land.	H
3	R37-D	HU	√	√	√			Section has been significantly straightened and is highly incised. Redevelopment of a floodplain through this reach would give the river some relief from flooding. Land use is currently open.	H

Table 5: Prioritization of River Corridor Project Types

Project Number	Segment Number	River Project Type	Specific Strategy					Project Description (including Potential Constraints and/or Opportunities)	Priority
			River Corridor Protection	Replace Undersized Structure(s)	Develop New Floodplain and Plant Buffer	Plant Riparian Buffer	Other		
4	R37-E		√				Conduct dam removal feasibility study	Old mill dam appears to be failing. Alternatives analysis should be conducted to determine feasibility of removing dam. Removal may alleviate flooding upstream, reduce potential of catastrophic failure, and improve fish habitat and passage.	H
5	R38-A[3]	HU	√					Prevent further corridor encroachment and await results of dam removal study.	M
6	R38-B	HU	√	√				Reach is highly unstable. Prevent further corridor encroachment and await results of dam removal study.	M
7	R39-A	MU	√	√			Remove berm	Remove berm on right bank upstream of bridge. Also consider retro fit of bridge to allow for floodwaters to pass unrestricted.	H
8	R39-B	HR	√					Protect corridor from further encroachment.	L
9	R39-C	CR	√				Preserve existing buffer	Protect corridor from further encroachment.	L
10	R39-D	HU	√					Protect corridor from further encroachment.	L

[3] Consideration of active restoration projects in Reach 38 not recommended until dam removal feasibility study is completed.

Table 5: Prioritization of River Corridor Project Types

Project Number	Segment Number	River Project Type	Specific Strategy					Project Description (including Potential Constraints and/or Opportunities)	Priority
			River Corridor Protection	Replace Undersized Structure(s)	Develop New Floodplain and Plant Buffer	Plant Riparian Buffer	Other		
11	R39-E	HU	√	√				Protect corridor from further encroachment. Consider removing undersized structures.	M
12	R40-A	MU	√	√				Protect corridor from further encroachment. Consider removing undersized structures.	M
13	R40-B	HU	√		√			Work with landowners to redevelop floodplain in this incised reach.	H
14	R41-A	HR	√					Protect corridor from further encroachment.	L
15	R41-B	CR	√				Preserve existing buffer	Protect corridor from further encroachment.	L
16	R41-C	HR	√			√		Excellent floodplain access and channel dimensions. Current land use is agricultural. Work with CREP or similar program as this reach is a priority for buffer planting.	H
17	R41-D	CR	√				Preserve existing buffer	Protect corridor from further encroachment.	M
18	R42	HR	√	√		√		Stream has some floodplain access through this reach. Protect corridor from further encroachment. Actively plant buffer to create long term stability and improve habitat through this reach. Replace undersized structures.	H

Table 5: Prioritization of River Corridor Project Types

Project Number	Segment Number	River Project Type	Specific Strategy					Project Description (including Potential Constraints and/or Opportunities)	Priority
			River Corridor Protection	Replace Undersized Structure(s)	Develop New Floodplain and Plant Buffer	Plant Riparian Buffer	Other		
19	T2.01	HU	√			√		Consider removing berm on lower left bank. Plant willows or other low growing shrubs on ball field side to provide some shade/habitat to the reach.	L
20	T2.02-A	HU	√		√			Relocate town sand storage yard and redevelop floodplain in that area. Upstream, protect corridor from further encroachment.	H
21	T2.02-B	HU	√	√				Stream is highly unstable. Protect corridor from further encroachment. Replace culvert at upstream end of reach.	M
22	T3.01	MU	√	√		√		Stream has been historically straightened and lost access to floodplain however is only moderately unstable. Buffer plantings could help to improve habitat and long term stability. Undersized structures should be prioritized for replacement.	M
23	T3.02-A	MU	√	√			Remove berm, replace bridge	Berm on right bank should be removed to provide floodplain access within this reach. Private bridge at upstream end of reach is a channel constriction, should be replaced.	H

Table 5: Prioritization of River Corridor Project Types

Project Number	Segment Number	River Project Type	Specific Strategy					Project Description (including Potential Constraints and/or Opportunities)	Priority
			River Corridor Protection	Replace Undersized Structure(s)	Develop New Floodplain and Plant Buffer	Plant Riparian Buffer	Other		
24	T3.02-B	CR	√				Preserve existing buffer	Protect corridor from further encroachment.	L
25	T3.02-C	HR	√					Protect corridor from further encroachment.	L
26	T3.03-A	HU	√	√				Protect corridor from further encroachment, remove undersized structure.	H
27	T3.04-A	MU	√			√		Replant buffer, prevent further encroachment into corridor.	M
28	T3.04-B	HR	√	√		√		Remove undersized structures in this reach.	H
29	T3.04-C	CR	√	√			Preserve and enhance existing buffer	Protect corridor from further encroachment by conserving this important headwaters reach. Replace undersized private stone culvert. Enhance buffer where it has been removed.	H
30	T3.04-D	CR	√				Preserve existing buffer	Protect corridor from further encroachment by conserving this important headwaters reach.	H

River Corridor Project Type:
CR = Conservation Reach
HR = High Recovery Reach
MU = Moderately Unstable Reach
HU = Highly Unstable Reach
Priority Ranking:
H = Higher
M = Medium
L = Lower

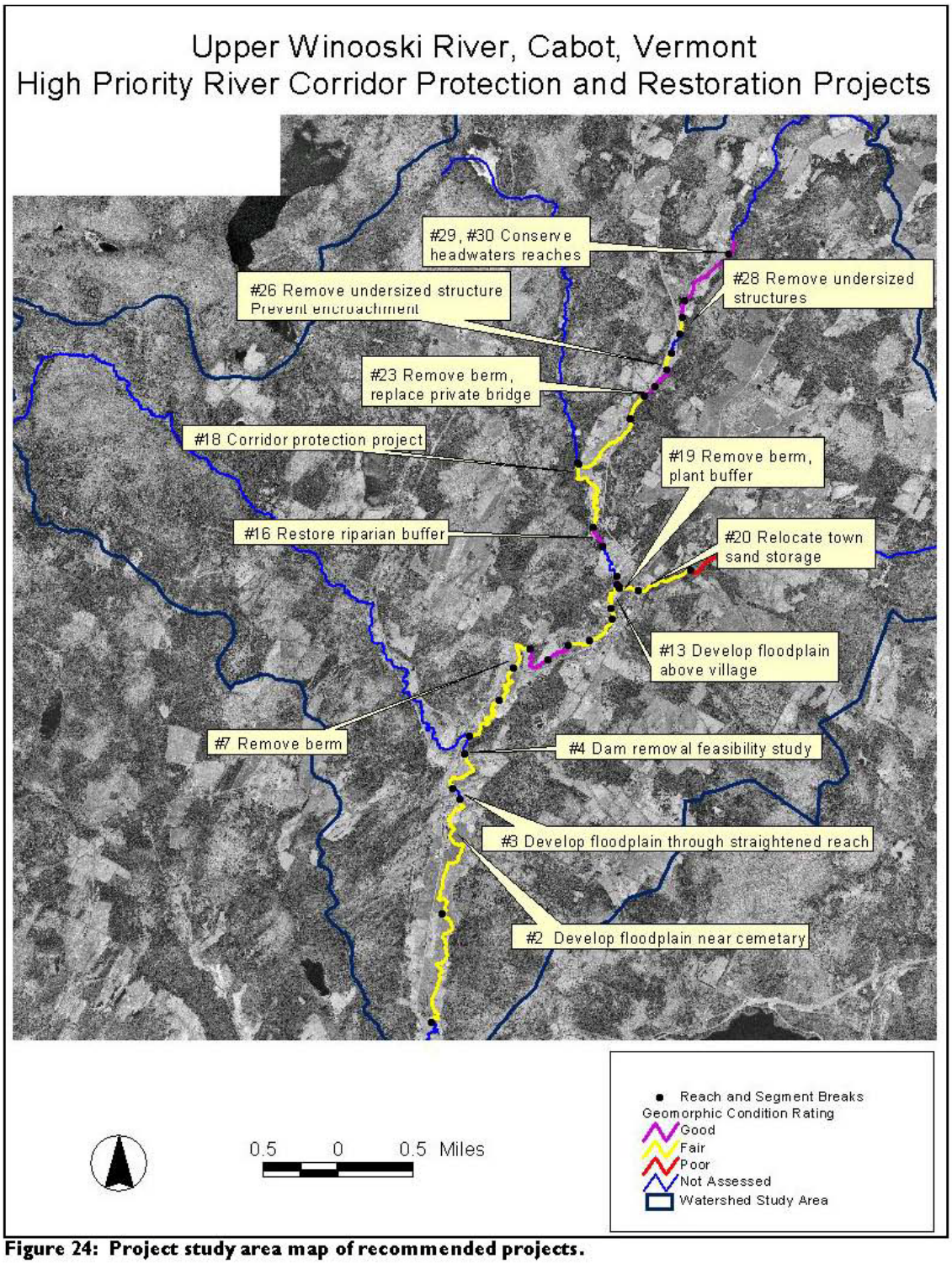
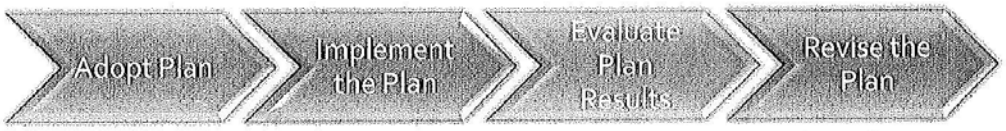


Figure 24: Project study area map of recommended projects.

5-Year Plan Review/Maintenance



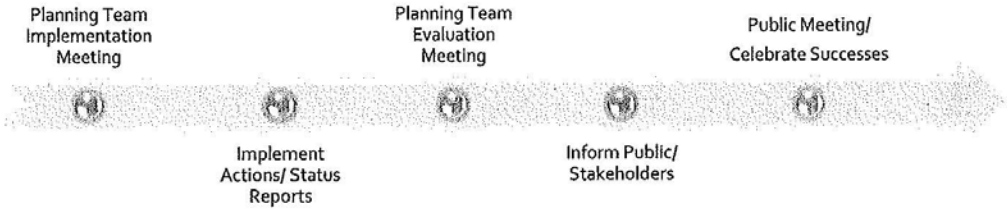
- Brief local leadership on plan approval
- Formally adopt plan
- Publicize plan approval and adoption
- Celebrate success

- Confirm/clarify responsibilities
- Integrate mitigaction actions
- Monitor and document implentation of projects and actions
- Establish indicators of effectiveness or success

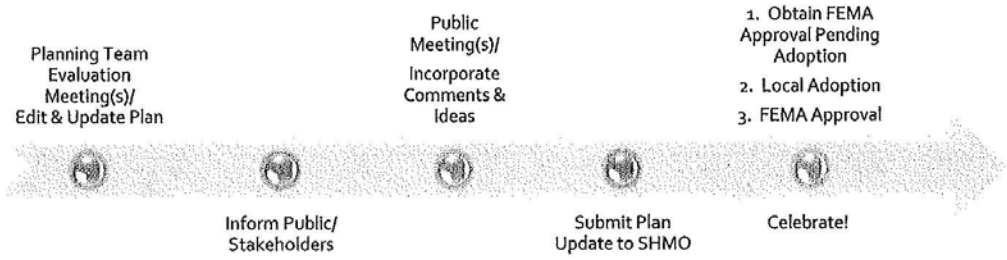
- Effectiveness of planning process
- Effectiveness of actions
- Document success & challenges of actions
- Update and involve community
- Celebrate successes

- Review factors affecting community's context
- Analyze findings; determine whether to revise process or strategy
- Incorporate findings into the plan

After Plan Adoption-Annually
Implement and Evaluate



Fifth Year, and After Major Disaster
Evaluate and Revise



Certificate of Adoption

The Town of Cabot
Select Board
A Resolution Adopting the Local Hazard Mitigation Plan
_____ __, 2012

WHEREAS, the Town of Cabot has worked with the Central Vermont Regional Planning Commission to identify hazards, analyze past and potential future losses due to natural and manmade-caused disasters, and identify strategies for mitigating future losses; and

WHEREAS, the Cabot Local Hazard Mitigation Plan contains several potential projects to mitigate damage from disasters that could occur in the Town of Cabot; and

WHEREAS, a duly-noticed public meeting was held by the Town of Cabot Select Board on _____ __, 2012 to formally adopt the Cabot Local Hazard Mitigation Plan;

NOW, THEREFORE BE IT RESOLVED that the Cabot Select Board adopts the Cabot Local Hazard Mitigation Plan Update.

_____
Chair of Select Board

_____
Member of Select Board

ATTEST

_____

Cabot Clerk