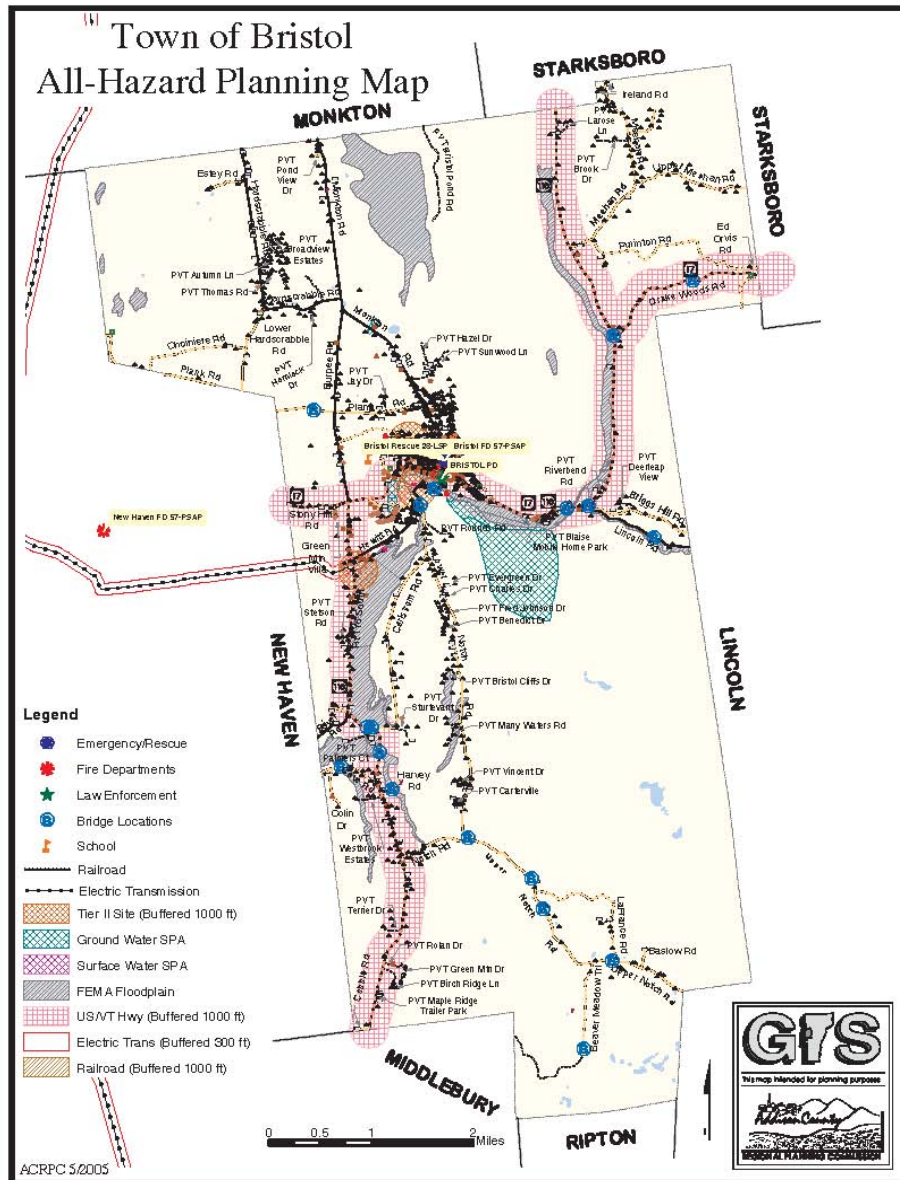


Town of Bristol, Vermont



Single Jurisdiction All-Hazards Mitigation Plan

Final Plan Prepared 10/19/2011

Bristol, Vermont All-Hazards Mitigation Plan

1.1. Planning Process

1.1.1. Current Plan Update Process

The Town of Bristol Selectboard met on 9/10/07 and authorized its support for this planning process. Detailed information for this plan version was subsequently provided by the Town Administrator- William Bryant and the Water District operator – Scott Powell on 9/25/07.

An initial draft plan was made available for review and comment by the town selectboard on 7/15/08 and to town residents at the annual town meeting on 3/3/09. The Bristol Planning Commission offered the plan for review in its 8/18 meeting in 2008. In addition the town's Conservation Commission reviewed and offered the plan for comment on 2/17/09.

After further review and comment by the Bristol Selectboard, appropriate edits were added to reflect public comments. The draft local annex and associated regional section of the Pre-Disaster Mitigation plan was presented to the State Hazard Mitigation Officer (SHMO) for review and comment and a recommendation for forwarding to FEMA Region I. After receipt of comments from FEMA Region I, final changes were intended to be made and the resulting document adopted by the Bristol Selectboard.

However, 2010 interpretations of FEMA mitigation plan requirements resulted in a reformat of the original multijurisdictional plan and appropriate local annex into this single jurisdiction plan. This final plan will be forwarded to FEMA Region I for formal review and conditional approval. At that time the Bristol selectboard will adopt and send a final plan to FEMA for confirmation.

1.1.2. Opportunities for public comment

As indicated in 1.1.1, multiple opportunities for public comment were made available during the planning process:

- The draft plan was made available at the Bristol Town Meeting on 3/3/09.
- Meetings of both the Town Selectboard where the plan was available for review and comment were open for public comment throughout the planning and draft phases of this plan.
- Ongoing drafts were made available for review and comment at meetings of the Bristol Conservation Commission.
- Outreach to specific community leaders involved in emergency services, education and public works was completed during September and October of 2010.

1.1.3. Opportunities for additional comments

Additional opportunities for regional and state-level comments in the draft stage were provided throughout the planning process.

- An initial copy of the draft plan was provided to the State Hazard Mitigation Officer Ray Doherty for comment on 5/27/08
- An updated copy of the draft plan was provided to the State Hazard Mitigation Officer Ray Doherty for comment on 1/7/09 and forwarded to FEMA Region I.
- After a rewrite of the draft plan to convert it to a single jurisdictional plan a copy of the draft was provided to Ray Doherty on 12/12/10 and forwarded to FEMA Region I.
- On 3/22 and 3/23/2011 staff attended a mitigation planning workshop and had a brief review of the Bristol PDM Plan by FEMA staff and attendees.
- A substantially completed rewrite following CFR 44 201.6 “Local Mitigation Plans”. was submitted to the State of Vermont Agency of Natural Resources staff for comment and resubmitted in June of 2011
- A copy of the draft plan was posted on the ACRPC website for regional review and notice was given during monthly meetings of ACRPC as to its availability.

1.1.4. Extent of review

Throughout the plan update process all sections of the plan were reviewed and corrected for accuracy. Recently completed studies and newly developed data were included in the document. Examples of changes due to new data include addition of information from:

- 2010 Basic Emergency Operations Plan
- January 2007 Town Plan
- 2008 Addison County Regional Plan
- 2007 State of VT Hazard Mitigation Plan
- Disaster updates within Section 1.4 Community Risk Assessment
- 2003, 2004, and 2008 Geomorphic Assessments of the New Haven River
- 2009 Report of the State Fire Marshall

1.2. Community Background

The Town of Bristol is located at the foot of the Green Mountains and as such has a topography that ranges from steep to relatively flat as the town extends out onto the bed of the Champlain Valley. The town covers approximately 23,000 acres of which 5,529 or 20% is owned by the Green Mountain National Forest. Bristol has two State highways running through it, Route 17 bisecting the Town and Village east/west and Route 116 going generally north/south.

Bristol experienced dramatic growth from 1960 to 1990 but that has begun a slow decline recently with a total population of 3,788 in 2000 and an estimated 3,770 in 2007. The overall population is aging rapidly with significant drops being felt in the 18-34 age group. The rapid population growth experienced from 1970-1990 coupled with an overall reduction in family size was also reflected in an 80% increase in housing during that period. A little more than half (63%) of the housing units in Bristol are single-family, approximately 22% are multi-family units and nearly 15% are mobile homes.

In Bristol, power is provided by Central Vermont Public Service through a 12.5KW line that is slated to be upgraded to 34.5KW within the next 20 years. The village has a water distribution system that is spring fed and includes a covered storage reservoir located above town off Mountain Street. This water system serves 646 connections and provides exceptional water pressure and volume, invaluable for fire suppression. Most Bristol residents outside of the Village area have individual wells and springs that serve individual houses. There is a small Town-operated septic system that supports a portion of the commercial blocks downtown. Bristol's remaining residents are served by individual on-site septic systems. Storm water is an ongoing concern for many residents due to a limited village storm water system capacity and an outflow that directly discharges onto the banks of the New Haven River.

In Bristol, fire coverage is provided by the 38 member all-volunteer Bristol Fire Department. In 2006 the Fire Department reported 130 alarms of which, the majority were motor vehicle accidents (45). 16 structure fires were reported during the same period.

The Bristol Rescue Squad, an independent volunteer group provides EMS ambulance coverage to the Town of Bristol. The nearest hospital services are provided by Porter Medical Center a 45 bed community hospital located 10 miles away in Middlebury. The nearest Level I Trauma center is located 25 miles North in Burlington.

Law Enforcement in a designated Police District is provided by the 4 full time officers of the Bristol Police Department. The district is limited to an area of approximately 1 square mile around the central business district. In 2006, police responded to 1899 calls. Vermont State Police and the Addison County Sheriff's Department support the remainder of the Town of Bristol.

The Town uses a Basic Emergency Operations Plan (BEOP) to guide its response to larger incidents and the BEOP identifies several high hazard/vulnerable sites that are associated with flooding, fire and transportation accidents. Additionally, the BEOP designates the Fire Station, Holley Hall and the Rescue Garage as potential emergency operations centers. Mount Abraham Union High School, Bristol Elementary School and Holley Hall are designated community shelters. MAUHS Parking lot has been identified as a potential C-POD in the event Federal supplies need to be distributed in the area.

1.3. Existing Adopted Plans which support Hazard Mitigation

The following plans pre-date this plan and are used as an example of how the community, the Addison region and the State of Vermont have incorporated mitigation thinking into standard planning mechanisms. As planning efforts continue forward, this plan will, in turn, inform and be integrated into these and other future planning processes.

Bristol Basic Emergency Operations Plan (Mitigation repairs identified)

- Wellhead contamination during flood events- Construct flood-proof protection
- West Street bank instability- Stabilize bank per plans
- Erosion at Memorial Park- Additional riprap needed
- Downtown block fire susceptibility- Sprinklering

Bristol Town Plan (January 15, 2007) Strategies that support Hazard Mitigation

- Assure that new water and sewage uses meet minimum safe water standards and sewage disposal standards.
- Control access to public roads to maintain safe use of those roads.

Addison County Regional Planning Commission Regional Plan (2008) Goals that support Hazard Mitigation

- Work to restore and maintain stream equilibrium by developing and implementing river corridor plans.
- Reduce flooding and related damages through appropriate mitigation techniques.
- Encourage watershed based cooperation and educate towns and the general public about water quality and stream dynamics
- Provide communities the support they need to be proactive in reducing flood and erosion hazards by adopting appropriate zoning regulations to limit development in hazardous areas.
- Encourage proper maintenance and sizing of bridges, culverts and other structures to accommodate flow from storm events and to mitigate flood hazards.
- 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.
- Recognize the connections between land use, storm-water, road design/ maintenance and the effects from disasters.
- Ensure that mitigation measures are sympathetic to the natural features of the region's rivers, streams and other surface waters; historic resources; character of neighborhoods; and the capacity of the community to implement them.
- Encourage hazard mitigation planning as a part of the Municipal Planning Process.

State of Vermont Hazard Mitigation Plan (2007) Goals that support Hazard Mitigation

- Avoidance of Hazards
- Prioritize Public Safety
- Utilize Federal Funding to Support Hazard Mitigation Initiatives
- Integrate plans with other state and regional initiatives

1.4. Community Risk Assessment

In Bristol, the interviews indicate that the following hazards are listed as High or Medium-High in terms of likelihood – Power Outage, Flooding, High Winds, Landslide, Lightning, HazMat Spill, Structure Fire, Wildfire, and Winter Storm/Ice Storm. In terms of Vulnerability, the town rated these hazards as High or Medium-High – Flooding, Landslide, HazMat spill, Structure Fire, and Earthquake. Hazards that rated as likely and to which the town is vulnerable include Flooding, Landslide, HazMat Spill, Structure Fire, and Winter Storm/Ice Storm. (Complete HIRA table for Bristol can be found in Annex E)

1.4.1. Hazard Type, Location, Extent and Vulnerability

The following Hazard types have been identified and evaluated based on a risk vs. probability formula. The table shown in Annex E is a visual representation of that evaluation process for the Town of Bristol.

- **Drought** – Local knowledge indicates dry spells are periodic in nature and would be considered severe about every 10 years on the average. Generally, risks associated with these droughts include drying up of shallow wells and reduced productivity of agricultural crops.

An extended drought period in the 1960s saw the development of several community-owned water systems in communities along Lake Champlain. Similar conditions could result in new calls for expansion/extension of the public water supply in Bristol. Most recently a dry period in 2000 saw a few residents without water for several weeks which was finally relieved by fall rains. Direct costs of drought conditions tend to be borne by individual residents and therefore are difficult to track accurately. No direct costs to the town have been recorded in the past 25 years.

The community vulnerability to drought would be considered MODERATE to LOW based on a limited overall impact to the community with a relatively common period of occurrence.

- **Widespread Power Failure** – Based on local knowledge, widespread power outages are a common yet low impact event throughout the Town of Bristol. Possible during all seasons of the year, the lack of power becomes particularly an issue during winter as it often translates into lack of heat as well.

Widespread outages have been common through much of the past 50 years with limited overall impact to the community. However, extended outages during winter months coupled with extreme cold have periodically resulted in more extensive damage associated with freezing pipes particularly in private residences.

In 1998 a severe ice storm hit much of northern Vermont however much of the village area of Town of Bristol was spared due to microclimate differences associated with its elevation. Power outages continued for several days in some areas as remote power lines were accessed by off-road vehicles. In spite of being spared much of the destruction, the Town of Bristol still incurred over \$48,000 in damages. Subsequent mitigation activities by power companies have re-routed many of those remote lines onto town highway rights of way and an increased pruning effort has reduced the impact of a similar event would it happen today.

The community vulnerability to Widespread Power Outage would be considered HIGH based on a high likelihood of occurrence (near 100% possibility within the next year) and a moderate (<75%) geographic impact within the town. Due to existing preparedness levels within Bristol, these factors alone do not effectively measure actual impact. Actual

vulnerability could be considered LOW based on limited unmitigated impacts to infrastructure, health, and environment.

- **Flood/Flash Flood**– Based on the results of overlaying the FIRM flood maps with the location of the E911 points, thirty-four 911 locations in the town are vulnerable to potential flooding. These locations include 27 single family homes, 3 mobile homes, 2 camps, 1 commercial establishment and 1 utility substation located on Hewett Road. The estimated loss for damage to these properties ranges from a low of \$5.8 million to \$6.3 million. This is 2.2% of the grand list.

Local interviews indicate other areas of potential loss to the infrastructure due to erosion and road flooding is shown on maps in annex C. There is also a possibility of contamination to the spring that supports the water distribution system in the village.

The Town of Bristol has been hit with two presidentially declared disasters in the past 10 years both as a result of flash flooding. In 1998, heavy rains caused the New Haven River to flood, washing out several town roads as well as State Routes 17 and 116. In addition, several residences were made uninhabitable and were subsequently the targets of FEMA-funded buy-outs. Overall damages associated with DR 1228 came in at just under \$300,000.

In 2004, a stalled summer storm dropped large amounts of rain onto South Mountain and Deer Leap causing flooding to residences and businesses in the downtown area as well as inflicting damage to town and state highways. The 2004 storm caused over \$70,000 in damage to the Town of Bristol, much of which was reimbursed through State and Federal sources.

Since the desirability of a “home on the river” is quite high, pressure to develop additional lands along the riverbank is increasing. Both the Bristol Planning Commission and the Bristol Conservation Commission have requested assistance to determine the potential added risks associated with development along the river in areas of erosion hazard that are not addressed under the NFIP.

The community vulnerability to a Flooding incident is HIGH based on the likely (10% to 100% probability in the next year) occurrence of an incident with the potential for limited (10% to <25% of the community including homes and infrastructure) impact.

- **High Winds** – High winds come in many forms in Addison County and are included in damages associated with Hurricane, Tornado and Hail Storms. In addition to these specific events, high winds are often associated with collision of major weather fronts when high pressure and low pressure systems create extreme gradients between them. Locally developing thunderstorms due to convective forces in the atmosphere can also generate high winds, such as those experienced in parts of eastern Vermont on July 6, 1999, downing hundreds of large trees in 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. In fact, 34 tornadoes were recorded in the State between 1950 and 1999, injuring 10 people and causing over \$8.4 million dollars in estimated property damage. Nearly all of these occurred from May through August and most of these occurred in the afternoon.

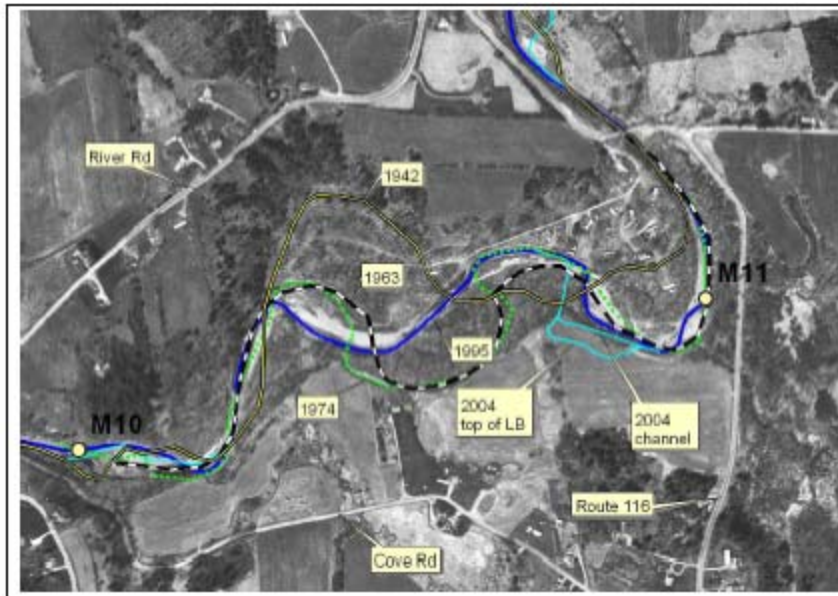
Remnants of Hurricanes striking New England are a rare but possible occurrence in all of Vermont and Bristol has not been spared. Hurricanes in 1938 and 1950 are still remembered by older residents when barns collapsed and animals needed to be rescued or put down due to injuries.

While Bristol has managed to avoid many of the larger events, localized strong winds have resulted in occasional loss of roofs on lesser maintained structures. With its location at the intersection of the Champlain Valley and the Green Mountains winds from the SSW tend to be compressed against the mountains causing locally higher winds than are experienced in other areas of the region. Fortunately for Bristol, these same geographic conditions tend to break up potential tornadic wind patterns.

The community vulnerability to a High Wind incident is MODERATE based on the moderately likely (25% chance) occurrence of an incident with the potential for limited (10% to <25% of the community including homes and infrastructure) impact.

- **Landslide/Erosion Hazards-** The Town of Bristol is located in a transition zone of the New Haven River as it changes from a steep rocky stream to a slow meandering river moving through the flatter topography of the Champlain Valley. The more densely settled village portion of the Town of Bristol is located above the valley on an extensive gravel bed formed during a time of receding glaciers at the end of the last ice age.

These two circumstances join to create unstable reaches within the town as identified in the Phase I and II Geomorphic Assessments of the New Haven River conducted in 2003, 2004, and 2008. Based on comparison of current channel positions to channel positions as displayed on 1995 orthophotographs, lateral erosion rates may have been particularly influenced by the 1998 flood. In one example, for reach M10 at Sycamore Park in Bristol a review of past channel positions on historic aerial photographs dated 1942, 1963, and 1974 indicated 60-year channel migration zones with widths up to 950 feet. (see diagram)



Historic Channel Migration on Reach M10 of the New Haven River in South Bristol

The community vulnerability to a Landslide/Erosion Event is MODERATE based on the likely (at least one chance in the next 10 years) possibility of an incident with the potential for negligible (<10% of the community) impact. Value of identified privately owned and town owned infrastructure at risk for an erosion event is nearly \$5,000,000.

Landowner resistance to the geomorphic assessment process has limited Phase II assessments in Bristol to reaches M10, M11, M15 and M16. Within the reaches studied, M15 and M16 are considered as having areas of extreme sensitivity while reaches M10 and M11 have areas of very high sensitivity. These findings are the basis of draft Fluvial Erosion Hazard zones. Notable infrastructure located within those draft FEH zones are identified in the following table:

Notable examples of infrastructure at risk, Bristol, Vermont, New Haven River watershed.

Reach	Town	Structure	Description/Identified Vulnerability
M10	Bristol	Residence, Left Bank	One residence is positioned mid-way along the reach at the southern boundary of the historic channel migration zone and could be subject to future erosion hazards if the channel migrates to the south. (avg. house value \$200,0000)
M11	Bristol	Route 116	A series of 90-degree meander bends in the reach has resulted in low-to-moderate flows directed nearly perpendicular to Route 116 armoring along right bank at the upstream extent and mid-reach. (Continued expansion of meanders could adversely affect State Rte #116 in this area)
M11	Bristol	residence, RB	A residence along right bank has experienced erosion and inundation hazards in past floods, including the recent 2004 flood. (avg. House value \$200,000)
M12, M13	Bristol	Lumber Mill, RB	This mill was constructed on the historic floodplain decades ago and is susceptible to erosion and inundation hazards during flood events. (Total Mill value \$1,758,900)
M14	Bristol	Town Septic System, RB	Erosive action could put the town septic system at risk during high volume flooding events. (replacement cost: \$1,500,000)

M14	Bristol	Residences, Commercial properties along High RB	These structures are potentially susceptible to both mass failure of the West Street bank above,(Top-Down) or from erosion of the toe of the slope below. (Total values; \$1,434,000)
M14	Bristol	Mill, LB	Potentially susceptible to mass failure from RB failure of West Street above and from erosion of LB during flood event. (Total Mill value \$695,000)
M14	Bristol	South Street, Notch Road LB	Erosive action could put these town roads at risk during high volume flooding events. (Repair Costs \$350,000)
M15	Bristol	residences, RB	The newly-constructed home and Blaises Trailer Park homes along right bank are at imminent risk from streambank erosion and failures in this actively adjusting reach. Other homes and businesses in the Rockydale development are also at risk. (Total at risk property values \$308,000)
M15	Bristol	Route 17 / 116	Route 17 / 116 is highly susceptible to failures from streambank erosion particularly mid-way along the reach. (State owned highway failed in this area during the 1998 flood event)
M16	Bristol	potential infrastructure	The downstream 750 feet of reach M16 near the confluence with Baldwin Brook is a highly adjusting subreach of river channel subject to braiding flows and lateral channel migration. Future development and placement of infrastructure in this area should be minimized. (Currently largely undeveloped)

To prevent future losses of property, roads, buildings, and lives, streambank setbacks can be developed that recognize the dynamic nature of the river. A standard buffer width or setback from top of bank may be sufficient for relatively stable reaches, but will not be adequate for some reaches where the top of bank is moving laterally at a rate of up to 19 feet per year. Whether draft FEH corridors are adopted to create this buffer or not, consideration must be given to ensure additional infrastructure is not added in these at-risk areas.

Additionally, assessment of the reaches previously not studied (M12, M13, M14) is critical for the Town of Bristol to understand the context of channel adjustments occurring in M15 and also downstream in reaches M11 and M10. In the future, landowners will be encouraged to allow access to the river for any future assessments. (As of this update, a study has been contracted by the Town of Bristol which will further evaluate reaches M12 and M13 during the summer/fall of 2011. Initial scoping has identified two residences in reach M12 in addition to one in M11 which are at risk to further channel migration.)

Additional erosion hazards associated with gravel removal from the base of the village area have been identified along West Street behind the Creemee stand and at the rear of the high school. These areas are currently at risk of major slides and the Town of Bristol seeks to limit the future risks in these areas. Past treatments have included deposition of large rock at the tow of the slopes but continued gravel removal at the base of the slopes over time by man and by the New Haven River continue to leave these areas at risk.

- **Lightning** – Severe storms which include lightning along with wind and rain events are a common occurrence in Bristol during summer months. Lightning strikes routinely cause fires to trees along ridge tops and less commonly start fires in structures. Fires associated with lightning strikes to inhabited buildings occur fewer than once every five years on average. More common is loss of power and damage to electronic equipment in homes where there has been a proximity strike. Anecdotally, there are multiple reports each year of electronic equipment unprotected by surge suppressors which are damaged by lightning strikes. Generally, these homeowners file insurance claims for damages and total annual damages in the entire community likely do not exceed \$10,000.

Community vulnerability to lightning strike is considered LOW due to the limited and scattered effects of strikes combined with the very common occurrence.

- **Hazardous Materials Spill** - There are 7 sites in town that have sufficient types and/or quantities of hazardous materials to require reporting and have reported via Tier II submissions. An additional 7 locations have been identified by members of the local LEPC as likely needing to report via Tier II. The nearest hazardous materials response capacity for the Town of Bristol is limited spill containment capability provided by the County hazmat decon team which has a trailer located in New Haven. The State HazMat response team houses the nearest State hazmat vehicles in Williston (29 miles) and Brandon (26 miles).

Based on the recommended Public Safety evacuation distance from the 2008 Emergency Response Guidebook, a 1000-foot circle was drawn around reporting Tier II sites. Structures inside the circle would be those that may need to be evacuated if an incident occurred. Of the 1439 buildings (E911 locations) in Bristol, there are 121 (residences, public facilities and commercial facilities) or 8.4% of the structures in town that might be impacted by a release at one of these facilities.

The Addison County Hazardous Materials Commodity Flow Study was updated during the summer of 2010. At the sampling site in Bristol at the corner of Rte 116 and Rte 17, 3.5% of trucks were recorded as carrying a hazardous material. Of these trucks, 2/3 were transporting propane and those recorded were relatively small volumes. Results of this sampling would indicate that Bristol's transportation risk would be relatively small but a more thorough sampling would need to be undertaken before a solid conclusion could be arrived at.

The community vulnerability to a Hazardous Materials/Highway/Transport Accident is MODERATE based on the likely (at least one chance in the next 10 years) possibility of an incident with the potential for negligible (<10% of the community) impact.

As additional housing and commercial space is created along state highways, the risk associated with transportation of hazardous materials increases as well. In addition, new commercial and/or industrial uses often result in new hazmat storage (Tier II) locations. Most of these uses are addressed during conditional use review by the Bristol ZBA.

Though hazmat incidents have been infrequent in the Town of Bristol, there have recently been incidents in neighboring communities including most recently a train derailment involving significant quantities of gasoline.

- **Multi-Structure Urban Fire** – Responses by the fire department for structure fires have ranged from 15 to 20 over the past few years. The village has some connected structures that raise the risk for multiple structure involvement should one of them ignite. The impact of this type of incident would primarily be on the commercial sector with a smaller impact on housing.

The community vulnerability to a Structure Fire incident is MODERATE based on the highly likely (near 100% probability in the next year) occurrence of an incident with the potential for negligible (<10% of the community) impact.

New development has not had a huge impact on fire risk due to improved construction methods. State codes for commercial construction have fire protection embedded within the standards. In addition, the village downtown blocks are being renovated and made more fire-resistant by their new owners as these properties change hands. Unfortunately, risks to firefighters continue to escalate as newer construction materials often produce a dangerous combination of gasses when burned.

- **Winter Storm/Ice Storm** -With the almost annual occurrence of a significant snow or ice storm, the town feels an impact most on the infrastructure of the community. The town is able to keep the roads open and treated for most storms and any loss of power is usually limited to hours, however, the intersection of Burpee Road and Monkton Road is subject to frequent drifting of snow (Tab c). This area has the potential to be a high accident area.

The community vulnerability to Winter Storm/Ice Storm is LOW based on the highly likely (near 100% probability in the next year) occurrence and the negligible (<10% of the community) impact.

As population growth and housing expands into the more rural areas of town, increasing dependency on local roads by the new homeowners requires changes in winter maintenance. The town has, thus far, been able to keep up with those increased demands on its services.

In 1998 a severe ice storm hit much of northern Vermont. Fortunately, the Town of Bristol was spared the brunt of the damage due to micro-climate differences from its neighboring communities. As recently as February 2006, a significant snowstorm coupled with high wind nearly crippled much of Vermont including the Addison County region. This storm stressed the resources of most local communities, including the Town of Bristol, to capacity.

- **Earthquake** – Surprising as it is to some, Vermont is classified as an area with “moderate” seismic activity. This can be compared to the west coast of the U.S., which is

classified as “very high” and the north-central states classified as ‘very low.’” Sixty-three known or possible earthquakes have been centered in Vermont since 1843 (*Ebel, et al 1995*). 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 on July 6, 1943, and the second occurred in 1962 in nearby Middlebury. The Swanton quake caused little damage, but the Middlebury quake did result in broken windows, cracked plaster and falling objects (*VEM, 1995*).

Earthquakes centered outside the state have also occasionally been felt in Vermont. Twin quakes of 5.5 occurred in New Hampshire in 1940. In 1988, an earthquake with a magnitude 6.2 on the Richter scale took place in Saguenay, Quebec and caused shaking in the northern two thirds of Vermont (*Ebel, et al 1995*).

In May 2001 and again in the summer of 2010, earthquakes in the 5.0-5.5 range have been felt in Bristol with epicenters in New York and Quebec respectively.

Based on information provided by the Vermont Geological Survey, Department of Environmental Conservation, Agency of Natural Resources, HAZUS outputs for the region are summarized as follows:

The Middlebury Once-in-500 year earthquake (5.7 magnitude) could cause significant damage in Addison County. The Goodnow, NY Once-in-500 year earthquake (6.6 magnitude) could cause shaking just above the lower limit for building damage. The Montreal, Quebec (6.8 magnitude) and the Tamworth, NH (6.2 magnitude) Once-in-500 year earthquakes probably would not cause damage in Addison County. Only the loss data from the Middlebury and Goodnow events are shown below:

Middlebury Scenario:

- Building damage – HAZUS estimates that over 1600 buildings will receive at least moderate damage. This is a little more than 13% of the total number of buildings in the county. (13% of buildings in Bristol would be 187). HAZUS also estimates that all essential facilities (hospital, schools, police stations and fire stations will receive at least moderate damage. 13 families would be predicted to be displaced from their homes and will need temporary shelter in Bristol.
- Transportation & utility systems – HAZUS estimates minimal disruption of the transportation and utility systems. However, over 9000 households in the region are expected to be without electrical power for up to three days.
- Casualties – Minimal casualties are also expected with less than twenty-five requiring medical attention and less than three needing hospitalization in the region.
- Economic loss – Direct building losses are estimated at > \$83 million and business interruption losses are expected to be as much as \$105 million. HAZUS estimates that although there was minimal damage to the transportation system the loss would still be

close to \$15 million. Approximately \$4.4 million would be needed to repair damaged communications systems.

Goodnow Scenario:

- Building damage – HAZUS estimates that over 600 buildings will receive at least moderate damage. This is a little more than 5% of the total number of buildings in the county. (5% of buildings in Bristol would be 72) HAZUS also estimate that all essential facilities (hospital, schools, police stations and fire stations will receive at least moderate damage. 6-7 families are predicted to be displaced from their homes and will need temporary shelter.
- Transportation & utility systems – HAZUS estimates minimal disruption of the transportation and utility systems. However, over 4000 households are expected to be without electrical power for up to three days in the region.
- Casualties – Minimal casualties are also expected with less than six requiring medical attention and only one needing hospitalization.
- Economic loss – Direct building losses are estimated at > \$17 million and business interruption losses are expected to be as much as \$24 million. HAZUS estimates that although there was minimal damage to the transportation system the loss would still be close to \$3.6 million. Approximately \$0.9 million would be needed to repair damaged communications systems.
- **Dam Failure** – The Town of Bristol is home to four dams which were identified in the 2008 State DEC Dam survey. All of these are relatively small structures whose failure would result in extremely limited flooding should they fail at any time.

The Lake Winona/Bristol Pond dam is the most obvious and serves to increase the elevation of Bristol Pond 2-3 feet above natural elevations.

On the former Vergennes Waterworks Property in northwest Bristol, two earthen dams have served to increase the water holding capacity of these former city water supplies. Since the development of the Vergennes-Panton Lake Champlain water source, these water supply ponds have been discontinued and their water levels have been lowered so as to limit downstream effects of failure.

The final dam in Bristol serves to create a small 2-3 acre pond off North Street. In each case, if a dam were to fail, no existing homes would be at risk and town highway infrastructure would experience temporary inundation.

Historical water power sources at Bartlets Falls and along the river at A Johnson's and Lathrop's Sawmills have not been used once mills were repowered with electricity in the early 20th century. Associated check dams failed years ago and were never rebuilt.

The community vulnerability to Dam Failure would be considered LOW based on the low likelihood (10% probability in the next year) of occurrence and the Low (<5% of the community) impacted

1.5. Community Mitigation Strategies

1.5.1. Hazard Mitigation Goals by Hazard Type

Each hazard type identified in Section 1.4 “Community Risk Assessment” can be mitigated dependent on the willingness to do so at the local, state or federal level. For example, the mitigation of flood damage is basically a simple fix- don’t allow anything in the floodplain that can’t afford to be lost and when it is lost, don’t replace it. This would include all forms of infrastructure whether it be homes, highways, dams or croplands. Unfortunately, political will can rarely stand up to such a simple mitigation strategy.

The Town of Bristol has identified that its goals for hazard mitigation are to reduce and/or avoid all long and short term vulnerabilities to the hazards identified in section 1.4. In doing so, it also recognizes that political will and lack of funding stand in the way of many mitigation projects. The town particularly supports local residents’ efforts to mitigate their personal risks. The Town also supports projects that lead to a positive benefit vs. cost evaluation and which the voters can afford.

1.5.2. Ongoing Mitigation Strategies by Hazard Type

Drought

Most homeowners with shallow wells have learned to live with the inconvenience of dry spells by purchasing bottled water and using public toilets and laundries for the short periods they would be without a dependable water supply. When the inconvenience has become too much, many of these homeowners have mitigated the problem by drilling deep wells. Increasingly, home mortgages are requiring a dependable deep well water supply as a condition of a loan.

Agricultural activities highly dependent on water such as fruit and vegetable crops can be severely impacted by lack of rain. Most of these businesses have mitigated the effects of periodic droughts by providing irrigation systems. Other farms, dependent on crops to feed livestock rather than humans, are highly impacted by low water supplies and may be dependent on a USDA disaster declaration to find relief.

Reduced water supplies also impact the community’s fire fighting capabilities. Since outside of the village area no public water supply is available, the fire department is highly dependent on surface water supplies for fire fighting. Increasingly, the department is installing dry hydrants in deep water ponds and streams to make access easier but as housing continues to expand into rural areas, the potential lack of a dependable water supply for fighting fire is becoming an issue.

As a mitigation measure shared with structure fire and wildfire, larger subdivisions should be required to provide fire ponds as part of an impact assessment.

Widespread Power Failure

Many private residences have their own back-up power sources and essential Town facilities like the Fire Station, Bristol Rescue Garage, Water Department, Police Department/Holley Hall, and Mt Abraham Union High School have been retrofitted in recent years.

As population growth and housing expands along remote road corridors, increasing reliance on dependable power by the new homeowners requires changes in line maintenance. Central Vermont Public Service Company (CVPS) the utility servicing the Town of Bristol has an ongoing program of line clearing and relocation to ensure outages are kept to a minimum. In addition, recent improvements to the transmission system in northwest Vermont have provided redundant systems to bring electric power to the region.

Specifically, improvements to the primary transmission line serving Bristol from the New Haven substation currently underway should provide a more robust power grid for the town. One major liability to power robustness is the utility substation at Hewett Road which lies within the FEMA designated floodplain. Loss of this substation due to flooding would cause power outages throughout much of town.

The Town of Bristol supports development of a robust and redundant local electric generation and transmission system for its residents.

Flood/Flash Flood

The Town of Bristol is a member in good standing of the National Flood Insurance Program. There are 8 structures in town that have policies under the NFIP. These structures represent \$1,447,900 in total coverage in the community. A total of \$26,096.36 has been paid out to NFIP policy owners since 1978. There are currently no structures in the Town of Bristol which are considered to be Repetitive Loss Structures under the National Flood Insurance Program.

The Town of Bristol has an adopted and approved set of floodplain regulations which are administered by the Town Administrator in his role as Zoning Administrator. All town zoning applications are reviewed against a map that has the FIRM superimposed over the zoning districts. Required reports are submitted to FEMA on an annual basis indicating compliance with the NFIP.

The Town of Bristol has been active in mitigating some of its hazards by utilizing available FEMA mitigation funds to complete buyouts of at risk residences. Following the 1998 flooding, multiple homes were purchased in the “Tin City” area, removed and the space converted into “Sycamore Park” which serves as an education and recreation area for the town.

The Town of Bristol has also adopted road and bridge standards as recommended by VT AOT. These documents address road and bridge construction standards designed to mitigate local traffic issues and are particularly designed to mitigate potential damages due to flooding and flash flooding. The standards address culvert sizing, ditch treatments and driveway access to reduce flood caused erosion.

The Town supports continued compliance with the NFIP and would support Community Rating System (CRS) improvements where the benefits to the town's residents would outweigh the costs of additional administration and compliance. The town also supports buyouts where this solution is economically feasible and supported by the landowners.

High Winds

Residents of the Town generally do not recognize high wind as a hazard which can be mitigated with the exception of the effects previously discussed under widespread power failure.

Newly constructed buildings may have tie downs between roof and side walls but no building codes exist within the community that require residential construction to any particular standard.

Where high wind hazards have been recognized, it is usually a function of damage that might be caused if a tree were to be blown over and its effect on a residents' home. For this reason, some trees are removed from the landscape to reduce their vulnerability to high wind events.

The Town of Bristol supports removal of dead and hazardous trees in the town right-of-ways to mitigate the hazards associated with their falling either on town highways or on power lines. The Town also supports the efforts of individual residents in making their properties more wind resistant but does not require specific construction standards.

Landslide/Erosion Hazard

Unfortunately, the relatively short lives (compared to geologic time) of property owners lead them toward the belief that the river has always been stable and that it is poor management that causes channel migration rather than the unstoppable forces of nature.

In 2007, the Addison County Regional Planning Commission supported a river corridor planning effort which included reaches M10 and M11 in the Town of Bristol. Landowners along these reaches were contacted and potential projects discussed. Specific recommendations of the resulting corridor plan include protection of the riverbanks through adoption of fluvial erosion hazard zones, streambank stabilization through tree plantings and continued buyouts of properties when supported by landowners.

The Bristol Conservation Commission supports identification of erosive hazards associated with riverbank instability as a first step in the process of mitigating hazards associated with erosion vs infrastructure conflicts in river corridors.

Adoption of a Fluvial Erosion Hazard Overlay District could be difficult to adopt as property owners often do not recognize the threats associated with river channel migration over time. Additional education of residents will be a long term mitigation process which could result in eventual adoption of protective exclusion zones along the sensitive reaches of the New Haven River.

Lightning

The town has mitigated potential damage to Town-owned structures due to lightning strike by installing lightning rods to channel the electrical energy directly to ground rather than through the structure's electrical system.

Most larger, privately owned structures in vulnerable locations have similarly installed lightning rod systems to protect them from lightening strike with the encouragement from insurance companies and extension agents.

The Town has no adopted building standards which would require this action but feels the risk to private residences should be borne by each resident on their own.

Hazardous Materials and Highway Transport Accidents

Representatives from the Town of Bristol are considered to be members of the Local Emergency Planning Committee in planning for hazardous materials incidents. The Town mitigates risk to local responders by reporting its Tier II facilities as required at both the state and local levels.

The Town zoning bylaws section 521 and 522 specifically address storage of flammable liquids above ground and within specified distances of property lines including up to 200ft setback in the case of 10,000 gallon tanks or greater. Aboveground storage of flammable liquids also requires a retention dike of at least 1.5 times the capacity of the tank for storage greater than 550 gallons. In addition, Town zoning bylaws limit storage of hazardous materials in the mapped floodplain.

The Town of Bristol is in the process of evaluating its bicycle and pedestrian access throughout the village area to reduce accident risks associated with bike/ped vs vehicle interaction.

A representative from the town sits on the local Transportation Advisory Committee, a regional group whose purpose is to prioritize potential transportation related projects within the region. This group rates High Accident Locations (HAL) highly in prioritizing projects to mitigate the risks associated with these locations by changing alignments, added signage and reduced speeds. The Town of Bristol also participates in the High Risk Rural Roads Program which has identified Plank Road from Vergennes to Bristol which passes through New Haven as a targeted hazardous stretch of local highway.

Structure Fire

The Town of Bristol actively mitigates structure fire hazards in its community through ongoing support of the Bristol Fire Department and its support of fire prevention programs at the local elementary school. These two indications of support will both show a reduction in fire loss over time.

In addition, the installation of dry hydrants at water supply locations outside of the village area as well as village area wet hydrants increase the availability of and speed in which water can be accessed for firefighting purposes. Recent inquiries by the fire department to reevaluate its ISO rating may ultimately result in lower insurance costs to its residents by recognizing the high level of preparedness in the community.

Actions identified under the Drought hazard would also mitigate structure fire and wildfire risk in future developments.

Wildfire

The town has no guidelines for home construction in place that would limit the risk to wildfire in Bristol. The appointment of a town Fire Warden and enforcement of state and local laws limit the setting of uncontrolled outdoor fires and ultimately result in an overall limited risk. In addition, fire ponds required as an impact assessment should mitigate fire risk in future developments.

Winter Storm/Ice Storm

Mitigation activities by power companies have re-routed many of the remote lines along town highways since a 1998 ice storm and an increased pruning effort has reduced the impact of a similar event would it happen today.

The Town of Bristol generally mitigates its winter storm risk through preparedness activities in the form of appropriately sized equipment and training. The periodic cutting of brush along town highways also mitigates the effects of large winter storm events by reducing their ability to act as snow fence dropping windblown snow into the town highway system.

Where drifting snow is an annual problem, the Town highway crew routinely erects snow fence in the fall to mitigate drifting snow.

Earthquake

Despite the probability of an earthquake within the next 50 years, most town residents do not even attempt to mitigate its hazard.

The Town of Bristol has also not identified earthquake as a hazard it feels is imminent enough to justify much in the way of mitigation actions.

Dam Failure

The Town of Bristol does not generally address dam failure mitigation in its day-to-day activities leaving the protection of the public up to State dam safety inspectors.

The Town Planning Commission, however, has considered writing of water impoundment construction standards into its zoning regulations. The intent of such standards would be to limit the volume of water which could be stored in a man-made impoundment and therefore limit risk.

1.5.3. Proposed Mitigation Actions and Projects by Hazard Type

In developing the following list of proposed mitigation actions and projects, care was taken to include only those projects which could be considered reasonable and feasible based primarily on cost and political willingness.

Drought

The Town supports recent changes to state rules which require a potable water supply and septic plans prior to development and supports groundwater protection efforts around both public and private water supplies.

No local action necessary-cost \$0

Widespread Power Failure

Vermont Public Service Company (CVPS), the utility servicing the Town of Bristol has ongoing programs of line clearing and relocation to ensure outages are kept to a minimum. The town balances its support for these efforts with residents desires to keep the beauty of tree-lined streets and roads.

No local action necessary-cost \$0

Flood/Flash Flood

The Town supports continued enrollment in the NFIP to allow residents the option of purchasing flood insurance on their properties. As a part of continued compliance, the Town supports participation in NFIP training for the Zoning Administrator when offered by the State or NFIP.

Estimated cost: \$200-\$300

Source of Funds: Town General Fund Planning and Zoning budget

Responsibility: Town Zoning Administrator

Timeframe: Yearly ongoing

The following specific projects have been identified which will serve to mitigate the effects of flooding and/or flash flooding in the Town of Bristol:

- Protect the village spring from contamination due to flooding. A feasibility study and/or engineering will be needed prior to implementation.

Estimated cost: \$5,000- \$10,000

Source of Funds: Village water budget

Responsibility: Town Administrator and water dept

Timeframe: 3-5 years

- Improve storm water capacity on Mountain Terrace and East Street to limit basement flooding

Estimated cost: \$208,000

Source of Funds: HMGP, PDM-C

Responsibility: Town Administrator, highway dept and selectboard

Timeframe: 0-5 years as funding allows

- Expand storm water capacity in the Mountain Street/ Crescent Street area to meet a minimum 10 year flooding event.

Estimated cost: \$364,000

Source of Funds: HMGP, PDM-C

Responsibility: Town Administrator, highway dept and selectboard

Timeframe: 0-5 years as funding allows

- Replace and upgrade storm water system along Spring Street and North Street to prevent flooding damage to the elementary school during heavy rain events.

Estimated cost: \$1,330,000

Source of Funds: HMGP, PDM-C

Responsibility: Town Administrator, highway dept and selectboard

Timeframe: 0-5 years as funding allows

- Replace South St. Bridge with more flood resistant span when needed

Estimated cost: \$1,200,000

Source of Funds: State bridge/culvert grant program

Responsibility: Town Administrator, highway dept and selectboard

Timeframe: 0-10 years as funding allows

High Winds

The town generally supports limiting damages due to high winds by removing dead and dying trees within the town right-of-way that could fall during a high wind event.

Estimated cost: \$5,000 annual cost

Source of funds: Town highway budget.

Responsibility: Joint Town Highway Dept and Selectboard

Timeframe: Annual maintenance task

Landslide/Erosion Hazard

The Town supports adoption of a Fluvial Erosion Hazard Overlay district in its zoning bylaw rewrite.

Estimated cost: \$2,000 as part of an overall rewrite

Source of funds: Municipal planning grants.

Responsibility: Joint Selectboard and Planning Commission

Timeframe: 2-5 years once studies are finalized

The Town also supports the following specific projects which are intended to limit erosion hazards in known locations:

- Stabilize the intersection of Basin Street where it meets East St/Rte 17

Estimated cost: \$5,000- \$10,000

Source of Funds: Village water budget

Responsibility: Town Administrator and water dept

Timeframe: 1-3 years

- Explore options for river bank stabilization along West Street behind existing structures especially behind the Merchants Bank.
Estimated cost: \$15,000
Source of Funds: State ERG grants, town highway funds, cooperative private funding
Responsibility: Town Administrator and water dept
Timeframe: 2-5 years
- Support a study of options for additional bank stabilization West of Mount Abraham Union High School.
Estimated cost: \$5,000- \$10,000
Source of Funds: UHSD budget
Responsibility: UHS School Board and Superintendent
Timeframe: 0-4 years
- Explore options for bank/ditch stabilization along Upper Notch Road.
Estimated cost: \$70,000
Source of Funds: BBR, Town Highway funds, stormwater pollution grants
Responsibility: Town Administrator and highway dept
Timeframe: 3-5 years as funding allows

Lightning

The Town feels the risk to private residences of lightning strike should be borne by each resident on their own.

No local action necessary-cost \$0

Hazardous Materials and Highway Transport Accidents

The Town has identified the following high risk locations on its highway system and supports mitigation of the hazard in any future construction/reconstruction activities:

- Implement Better Back Roads low cost safety improvements at intersection of Burpee Road and Monkton Road to reduce the likelihood and severity of motor vehicle accidents.
Estimated cost: \$5,000- \$10,000
Source of Funds: HMGP, BBR, Town Highway Funds
Responsibility: Town Administrator and highway dept
Timeframe: 0-2 years
- Support implementation of Plank Road/Burpee Road intersection improvements to reduce known accident hazards.
Estimated cost: \$15,000- \$25,000
Source of Funds: State local highway funds
Responsibility: Town Administrator and highway dept
Timeframe: 0-2 years

- Work with State transportation personnel to realign the intersection of River Road with Rte 116 as part of the bridge replacement on Rte 116 in this area.
Estimated cost: \$10,000
Source of Funds: State Highway Funds
Responsibility: Town Administrator and highway dept
Timeframe: Dependant on state bridge replacement schedule
- Support a feasibility/design study to address the intersection of Briggs Hill Rd, Lincoln Rd. and State Rte 116 including possible abandonment of Lincoln Road in favor of Briggs Hill Road improvements
Estimated cost: \$15,000- \$20,000
Source of Funds: State Highway Funds
Responsibility: Town Administrator and highway dept
Timeframe: 1-5 years
- Support designs that would reduce accidents at the traffic light at Rte 116/17 and North/South Streets.
Estimated cost: \$5,000- \$10,000
Source of Funds: State Highway Funds
Responsibility: Town Administrator and highway dept
Timeframe: 1-3 years
- A study exploring a realignment of Plank Road at the Waterworks property should be conducted in conjunction with New Haven to review the feasibility of eliminating the two sharp curves.
Estimated cost: \$10,000,
Source of funds: Town highway budget or Regional Planning funds
Responsibility: Joint Town Highway Dep. and Selectboard
Timeframe: 0-3 years

Structure Fire

The Town supports efforts by the fire department to install dry hydrants throughout town not served by the village water supply..

Estimated cost: None additional beyond annual FD support
Source of funds: Federal Rural fire protection grants and town FD funds
Responsibility: BFD
Timeframe: Annually dependent on grant awards

The Town supports efforts by the fire department to improve its ISO rating through testing and training activities.

Estimated cost: None additional beyond annual FD support
Source of funds: Federal Rural fire protection grants and town FD funds
Responsibility: BFD
Timeframe: 1-3 years

The Town is exploring the feasibility and/or need for sprinkler system as part of a current Town buildings energy conservation project.

Estimated cost: \$10,000 as part of an overall project

Source of funds: Town Funds

Responsibility: Joint Selectboard and Energy Committee

Timeframe: 0-3 years

Wildfire

The Town supports the fire warden system requiring outdoor burn permits prior to any outdoor burning.

Estimated cost: None

Source of funds: Town General Fund

Responsibility: Joint Selectboard and Fire Warden

Timeframe: Annually

The Town believes it is the homeowner's responsibility to mitigate their susceptibility to wildfire through "firewise" practices.

No local action necessary-cost \$0

Winter Storm/Ice Storm

The Town supports the installation of snow fence when and where it can mitigate drifting on town highways.

Estimated cost: \$2,000 annually

Source of funds: Town Highway Funds

Responsibility: Town Highway Dept.

Timeframe: Annual treatments in fall

The Town supports ongoing efforts by power companies to mitigate power outages due to ice storms by pruning and tree removal activities.

No local action necessary-cost \$0

Earthquake

The Town does not believe the risks associated with earthquake are large enough to require any town building retrofits at this time.

No local action necessary-cost \$0

The Town believes it is the responsibility of private homeowners to be ready for earthquakes. The town generally believes that building construction standards are the responsibility of each private homeowner.

No local action necessary-cost \$0

Dam Failure

The Town of Bristol does not generally address dam failure mitigation in its day-to-day activities leaving the protection of the public up to State dam safety inspectors.

No local action necessary-cost \$0

The Town Planning Commission, is considering writing of water impoundment construction standards into its zoning regulations. The intent of such standards would be to limit the volume of water which could be stored in a man-made impoundment and therefore limit risk.

Estimated cost: \$2,000 as part of an overall rewrite

Source of funds: Municipal planning grants.

Responsibility: Joint Selectboard and Planning Commission

Timeframe: 0-3 years

1.5.4. Project Prioritization process

Projects and actions included in Annex A were all evaluated and prioritized. Mitigation actions identified in Section 1.5.3, however, are considered the jurisdiction's priority mitigation actions based on cost and political will to implement. The actions identified in Section 1.5.3 are in order of priority for each hazard from top to bottom, top being highest priority, to bottom being lowest priority. Before undertaking these projects, they will additionally be prioritized based on their feasibility and benefit vs cost review. A minimum C/B result of 1.0 will be required prior to any request for federal mitigation funds. All projects will be reviewed for progress after any local disaster declaration and annually as part of overall town budgeting.

1.6. Routine Plan Maintenance Procedures

Any Hazard Mitigation Plan is dynamic and should not be static. To ensure that the plan remains current and relevant, it is important that it be updated periodically. The plan will be updated at a minimum every five years in accordance with the following procedure:

1. The Bristol Selectboard assembles a Review/Update Committee.
2. The Committee will discuss the process to determine if any modifications or additions are needed due to changing conditions since the last update occurred. Data needs will be reviewed, data sources identified and responsibility for collecting/updating information will be assigned to members.
3. Other Town plans (Emergency Operations Plan, Town Plan, Road Plan, etc) will be reviewed to ensure a common mitigation thread still exists throughout.
4. A draft update will be prepared based on these evaluation criteria:
 - Changes in community and government processes, which are hazard-related and have occurred since the last review.
 - Progress in implementation of plan initiatives and projects.
 - Effectiveness of previously implemented initiatives and projects.
 - Evaluation of unanticipated challenges or opportunities that may have occurred between the date of adoption and the date of the report.
 - Evaluation of hazard-related public policies, initiatives and projects.
 - Review and discussion of the effectiveness of public and private sector coordination and cooperation.

5. Selectboard members will have an opportunity to review the draft update. Consensus will be reached on any changes to the draft.
6. The Selectboard will notify and schedule a public meeting to ensure adequate public input.
7. The Selectboard will recommend incorporation of community comments into the draft update.

1.6.1. Programs, Initiatives and Projects Review

Although the plan should be reviewed in its entirety every five years as described above, the Town should review and update its programs, initiatives and projects annually as the town budget is created. This review will ensure that, whenever possible, progress can be reviewed and projects either added or removed from the towns work plan based on changing local needs and priorities.

1.6.2. Post-Disaster Review Procedures

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

1. Within six (6) months of a declared emergency event, the Town will initiate a post disaster review and assessment.
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 report of the review and assessment will be created by a Review/Update Committee.
4. The committee will make a determination whether the plan needs to be amended. If the committee determines that NO modification of the plan is needed, then the report is distributed.
5. If the committee determines that modification of the plan IS needed, then the committee drafts an amended plan based on its recommendations and forwards to the Selectboard for public input.
6. The Selectboard adopts the amended plan.

Annex A

Mitigation Measures by Hazard Type

Mitigation measures for “all-hazards” have been adapted from a flood mitigation approach developed by French Wetmore, of Wetmore and Associates in Park Forest, Illinois, into six categories:

- Prevention – measures intended to keep a hazard risk problem from becoming worse. They ensure that future development does not increase hazard losses. Examples would include: Planning and Zoning, Open space preservation, Land Development regulations, storm water management.
- Property Protection – measures used to modify buildings, or their surroundings, subject to hazard risk rather than prevent the hazard from occurring. Examples are: Acquisition of vulnerable properties, Relocation from hazard prone areas, Rebuild or modify structures to reduce damage by future hazard events, Flood-proofing of flood-prone buildings.
- Natural Resource Protection – measures intended to reduce the intensity of hazard effects as well as improve the quality of the environment and wildlife habitats. Erosion and sediment control and Wetlands protection are examples.
- Emergency Services – measures that protect people before and after a hazard event that would include: Warning, Response, Critical facilities protection, Health and safety maintenance.
- Structural Projects – measures that involve construction of man-made structures to control hazards. Some examples would include: dams, reservoirs, debris basins, channel modifications, storm sewers, elevated roadways.
- Public Information – activities intended to inform and remind people about hazardous areas and the measures to avoid potential damage and injury. Examples are: Outreach projects, Real estate disclosure, Technical assistance, Community education programs.

The following suggested Mitigation Measures were taken from the website of the Northeast States Emergency Consortium (NSEC).

ALL HAZARDS

- Map vulnerable areas and distribute information about the hazard mitigation strategy and projects.
- Provide information to contractors and homeowners on the risks of building in hazard-prone areas.
- Develop a list of techniques for homeowner self-inspection and implementation of mitigation activities.
- Organize and conduct professional training opportunities regarding natural hazards and hazard mitigation.
- Distribute NOAA weather radios.
- Develop sound land use planning based on known hazards.
- Enforce effective building codes and local ordinances.

- Increase public awareness of community hazards.
- Provide sites that are as free as possible from risk to natural hazards for commercial and industrial activities.
- Consider conservation of open space by acquisition of repetitive loss structures.
- Consider conservation of open space by acquisition of areas identified as “vulnerable or at risk”
- Ensure a balance between residential growth and conservation of environmental resources through a detailed analysis of the risks and vulnerability to natural hazards.
- Conduct joint planning and sharing of resources across regions, communities, and states.
- Establish a hazard mitigation council.
- For future proposed development design guidelines, incorporate hazard mitigation provisions, including improved maps.
- Consider adding a "safe room" requirement for all new buildings.
- Establish incentives to encourage business owners and homeowners to retrofit buildings with hazard resistant features.
- Teach disaster and hazard awareness in schools.

FLOOD

Flood Hazard Mitigation Measures for Communities:

- Developing and enforcing all-hazards building codes,
- Adopting incentives to encourage mitigation
- Developing administrative structures to support the implementation of mitigation programs
- Mitigation should be incorporated into future land use plans through riparian corridor protection, limiting flood hazard area development, and other measures.
- Developing and conducting public information campaigns on hazard mitigation should be a priority.
- Participate in the National Flood Insurance Program (NFIP).
- Conduct watershed geomorphic assessments.
- Encourage riparian corridor protection.

Flood Hazard Mitigation Measures for Individuals:

How to Protect Your Property:

- Keep insurance policies, documents, and other valuables in a safe-deposit box. You may need quick, easy access to these documents. Keep them in a safe place less likely to be damaged during a flood.
- Avoid building in a floodplain. Some communities do not permit building in known floodplains. If there are no restrictions, and you are building in a floodplain, take precautions, making it less likely your home will be damaged during a flood.

- Raise your furnace, water heater, and electric panel to higher floors or the attic if they are in areas of your home that may be flooded. Raising this equipment will prevent damage. An undamaged water heater may be your best source of fresh water after a flood.
- Install check valves in building sewer traps to prevent flood water from backing up into the drains of your home. As a last resort, when floods threaten, use large corks or stoppers to plug showers, tubs, or basins.
- Seal walls in basements with waterproofing compounds to avoid seepage through cracks.
- Consult with a construction professional for further information if these and other damage reduction measures can be taken. Check local building codes and ordinances for safety requirements.
- Contact your local emergency management office for more information on mitigation options to further reduce potential flood damage. Your local emergency management office may be able to provide additional resources and information on ways to reduce potential damage.

HAZARDOUS MATERIALS

Hazardous Material Hazard Mitigation Measures for Communities:

FEMA's National Mitigation Action Plan suggests that state and local mitigation plans include the following:

- Developing and enforcing all-hazards building codes,
- Adopting incentives to encourage mitigation
- Developing administrative structures to support the implementation of mitigation programs
- Mitigation should be incorporated into land use management plans.
- Developing and conducting public information campaigns on hazard mitigation should be a priority.

Natural hazard events have often triggered technological hazards such as ruptured pipelines and building fires, clearly linking the natural and technological risks. Accordingly, the National Mitigation Strategy, as an all-hazards strategy, will build upon existing programs that mitigate technological hazards, and focus on the critical importance of coordination among efforts to mitigate hazards, regardless of the source of the risk.

- Recognize the dangers posed by hazardous materials.
- Identify places where hazardous materials are likely to be encountered.
- Understand when a hazard may exist.
- Contact the appropriate persons or agencies to give or receive specific hazardous materials information.
- Identify procedures to minimize personal and community exposure to hazardous materials.

Hazardous materials events can and do occur as independent events. Natural hazard events, however, have often triggered technological hazards such as ruptured pipelines and building fires, clearly linking the natural and technological risks. Accordingly, the National Mitigation Strategy, as an all-hazards strategy, will build upon existing programs that mitigate technological hazards, and focus on the critical importance of coordination among efforts to mitigate hazards, regardless of the source of the risk.

Communities can and should:

- Recognize and identify the dangers posed by hazardous materials in the community.
- Identify industries and other locations places where hazardous materials are stored and used.
- Develop a community hazardous materials emergency plan.
- Develop an early warning and notification system.
- Work with local businesses and industry to identify procedures to minimize personal and community exposure to hazardous materials.

Hazardous Materials Hazard Mitigation Measures for Individuals: Individual and families should develop a personal plan of what to do in case of a hazardous materials accident.

How to Plan for a Hazardous Materials Incident:

- Learn to detect the presence of a hazardous material.
- Many hazardous materials do not have a taste or an odor. Some materials can be detected because they cause physical reactions such as watering eyes or nausea. Some hazardous materials exist beneath the surface of the ground and can be recognized by an oil or foam-like appearance.
- Contact your Local Emergency Planning Committee (LEPC) or local emergency management office for information about hazardous materials and community response plans.
- Find out evacuation plans for your workplace and your children's schools.
- Be ready to evacuate. Plan several evacuation routes out of the area.
- Ask about industry and community warning systems.
- Have disaster supplies on hand:
 - Flashlight and extra batteries
 - Portable, battery-operated radio and extra batteries
 - First aid kit and manual
 - Emergency food and water
 - Non-electric can opener
 - Essential medicines
 - Cash and credit cards
 - Sturdy shoes
- Develop an emergency communication plan. In case family members are separated from one another during a hazardous materials accident (this is a real possibility during the day

when adults are at work and children are at school), develop a plan for reuniting after the disaster. Ask an out-of-state relative or friend to serve as the "family contact." After a disaster, it's often easier to call long distance. Make sure everyone knows the name, address and phone number of the contact person.

STRUCTURE FIRE

Fire Hazard Mitigation Measures for Communities:

FEMA's National Mitigation Action Plan suggests that state and local mitigation plans include the following:

- Developing and enforcing all-hazards building codes,
- Adopting driveway and water supply standards for new development.
- Adopting incentives to encourage mitigation
- Developing administrative structures to support the implementation of mitigation programs
- Mitigation should be incorporated into land use management plans.
- Developing and conducting public information campaigns on hazard mitigation should be a priority.

The United States Fire Administration (USFA) serves as the national focus on reducing fire deaths, injuries, and property losses. In 1974, Congress passed the Federal Fire Prevention and Control Act which established the USFA and the fire research program at the National Institute of Standards and Technology (NIST). The USFA works to involve the public and private sector to reduce losses through public education, arson detection and control, technology and research, fire data collection and analysis and fire service training and education. NIST performs and supports research on all aspects of fire with the aim of providing scientific and technical knowledge applicable to the prevention and control of fires.

Fire Hazard Mitigation Measures for Individuals:

How to Protect Your Property:

- Keep lawns trimmed, leaves raked, and the roof and rain-gutters free from debris such as dead limbs and leaves.
- Stack firewood at least 30 feet away from your home.
- Store flammable materials, liquids and solvents in metal containers outside the home at least 30 feet away from structures and wooden fences.
- Create defensible space by thinning trees and brush within 30 feet around your home.
- Landscape your property with fire resistant plants and vegetation to prevent fire from spreading quickly.
- Post home address signs that are clearly visible from the road.
- Provide emergency vehicle access with properly constructed driveways and roadways, at least 12 feet wide with adequate turnaround space.

- Make sure water sources, such as hydrants and ponds, are accessible to the fire department.
- Burning yard waste is a fire hazard. Check with your local fire agency on a non-emergency number for fire permit requirements and restricted burning times.
- Use fire resistant, protective roofing and materials like stone, brick and metal to protect your home. Avoid using wood materials that offer the least fire protection.
- Cover all exterior vents, attics and eaves with metal mesh screens no larger than 6 millimeters.
- Install multipane windows, tempered safety glass or fireproof shutters to protect large windows from radiant heat.
- Use fire-resistant draperies for added window protection.
- Have chimneys, wood stoves and all home heating systems inspected and cleaned annually by a certified specialist.
- Fire Alarm Safety requires checking on or installing fire alarms in your home.
- Residential sprinklers have become more cost effective for homes. Currently, they protect few homes.

How to Prepare for a Fire Emergency:

- Know how to contact fire emergency services in your area.
- Plan ahead. Make sure you and your family are prepared for a fire emergency.
- Develop and practice escape and evacuation plans with your family.
- Install smoke alarms on every level of your home. Test them monthly and change the batteries at least once a year. Consider installing the new long-life smoke alarms.

WINTER STORM

Winter Storm Hazard Mitigation Measures for Communities:

FEMA's National Mitigation Action Plan suggests that state and local mitigation plans include the following:

- Developing and enforcing all-hazards building codes,
- Adopting incentives to encourage mitigation
- Developing administrative structures to support the implementation of mitigation programs
- Mitigation should be incorporated into land use management plans.
- Developing and conducting public information campaigns on hazard mitigation should be a priority.

In addition, FEMA recommends the following actions to further protect communities from the effects of winter storms:

- Building code development and enforcement of snow loads
- Develop a storm water management plan for snowmelt

- Assuring adequate supplies of sand and salt
- Maintaining snow removal equipment so that it is ready to be deployed
- Retrofitting public buildings to withstand snowloads and prevent roof collapse
- Clearing roofs of excessive snow accumulations
- Develop a winter storm plan or annex to the local emergency management plan
- Develop a capability to monitor weather forecasts, conditions and warnings issued by the National Weather Service
- Identify appropriate shelters for people who may need to evacuate due to loss of electricity, heat or coastal flooding due to storm surge
- Assure that critical facilities such as police and fire stations and schools are accessible and equipped
- Clearing streets and roads of snow to assure the passage of public safety vehicles and general traffic.

Winter Storm Hazard Mitigation Measures For Individuals:

How to Protect Your Property:

- Make sure your home is properly insulated. If necessary, insulate walls and attic. This will help you to conserve electricity and reduce your home's power demands for heat. Caulk and weather-strip doors and windowsills to keep cold air out, allowing the inside temperature to stay warmer longer.
- Install storm windows or cover windows with plastic from the inside. This will provide an extra layer of insulation, keeping more cold air out.
- To keep pipes from freezing:
 - Wrap pipes in insulation or layers of old newspapers.
 - Cover the newspapers with plastic to keep out moisture.
 - Let faucets drip a little to avoid freezing.
- Know how to shut off water valves.
- If the pipes freeze, remove any insulation or layers of newspapers and wrap pipes in rags. Completely open all faucets and pour hot water over the pipes, starting where they were most exposed to the cold (or where the cold was most likely to penetrate). A hand-held hair dryer, used with caution to prevent overheating, also works well.
- Consider storing sufficient heating fuel. Regular fuel sources may be cut off. Be cautious of fire hazards when storing any type of fuel.
- Before winter, be sure you install and check smoke alarms.
- Install C/O detector and check annually.
- Use generator safely.
- Maintain functional transistor or battery radio.
- Maintain plug-in phone that functions when power is out.
- Consider keeping safe emergency heating equipment:
 - Fireplace with ample supply of wood.
 - Small, well-vented wood, coal, or camp stove with fuel.

- Portable space heater or kerosene heater. Check with your local fire department on the legality of using kerosene heaters in your community. Use only the correct fuel for your unit and follow the manufacturer's instructions. Refuel outdoors only, and only when cool. Keep your kerosene heater at least three feet away from furniture and other flammable objects.
- When using alternative heat from a fireplace, wood stove, space heater, etc., use fire safeguards and ventilate properly. Fire hazard is greatly increased in the winter because alternate heating sources are used without following proper safety precautions.
- Install snow fences in rural areas to reduce drifting in roads and paths, which could block access to homes, barns, and animals' feed and water.
- If you live in a flood-prone area, consider purchasing flood insurance to cover possible flood damage that may occur during the spring thaw. Homeowners' policies do not cover damage from floods. Ask your insurance agent about the National Flood Insurance Program if you are at risk.

How to Plan for a Winter Storm:

- Understand the hazards of wind chill, which combines the cooling effect of wind and cold temperatures on exposed skin. As the wind increases, heat is carried away from a person's body at an accelerated rate, driving down the body temperature. "Wind chill" is a calculation of how cold it feels when the effects of wind speed and temperature are combined. A strong wind combined with a temperature of just below freezing can have the same effect as a still air temperature about 35 degrees colder.
- Service snow removal equipment before winter storm season. Equipment should be available for use if needed. Maintain it in good working order.
- Keep your car's gas tank full for emergency use and to keep the fuel line from freezing.
- Get training. Take an American Red Cross first aid course to learn how to treat exposure to the cold, frostbite, and hypothermia.
- Discuss with your family what to do if a winter storm WATCH or WARNING is issued. Designate one household member as the winter storm preparedness leader. Have him or her discuss what to do if a winter storm watch or warning is issued. Have another household member state what he or she would do if caught outside or in a vehicle during a winter storm. Everyone should know what to do in case all family members are not together. Discussing winter storms ahead of time helps reduce fear and lets everyone know how to respond during a winter storm.

HIGH WINDS

High Wind Hazard Mitigation Measures for Communities:

FEMA's National Mitigation Action Plan suggests that state and local mitigation plans include the following:

- Developing and enforcing all-hazards building codes
- Adopting incentives to encourage mitigation
- Developing administrative structures to support the implementation of mitigation programs
- Mitigation should be incorporated into land use management plans
- Developing and conducting public information campaigns on hazard mitigation should be a priority

FEMA also suggests that communities further reduce their vulnerability to hurricanes through the adoption and enforcement of wind- and flood-resistant building codes. Sound land-use planning can also ensure that structures are not built in the highest hazard areas.

High Wind Hazard Mitigation Measures for Individuals:

- Make a list of items to bring inside in the event of a storm. A list will help you remember anything that can be broken or picked up by strong winds. High winds, often in excess of 40 miles per hour, can turn unanchored items into missiles, causing damage or injury when they hit.
- Keep trees and shrubbery trimmed. Make trees more wind resistant by removing diseased or damaged limbs, then strategically remove branches so that wind can blow through. High winds frequently break weak limbs and hurl them at great speed, causing damage when they hit property. Debris collection services may not be operating just before a storm, so it is best to do this well in advance of approaching storms.
- Remove any debris or loose items in your yard. High winds can pick up anything unsecured, creating damage to property when the debris hits.
- Install protection to the outside areas of sliding glass doors. Glass doors are as vulnerable as windows to breakage by wind-driven objects.
- If you live in a flood plain or are prone to flooding, also follow flood preparedness precautions. Nor'easters and severe thunderstorms can bring great amounts of rain and frequently cause floods.

EARTHQUAKE

Earthquake Hazard Mitigation Measures for Communities:

FEMA's National Mitigation Action Plan suggests that state and local mitigation plans include the following:

- Developing and enforcing all-hazards building codes,
- Adopting incentives to encourage mitigation
- Developing administrative structures to support the implementation of mitigation programs
- Mitigation should be incorporated into land use management plans.
- Developing and conducting public information campaigns on hazard mitigation should be a priority.

FEMA's Earthquake Program has four basic goals directly related to the mitigation of hazards caused by earthquakes. They are to:

- Promote Understanding of Earthquakes and Their Effects.
- Work to Better Identify Earthquake Risk.
- Improve Earthquake-Resistant Design and Construction Techniques.
- Encourage the use of Earthquake-Safe Policies and Planning Practices.

Earthquake Hazard Mitigation Measures for Individuals

How to Protect Your Property:

- Bolt bookcases, china cabinets, and other tall furniture to wall studs. Brace or anchor high or top-heavy objects. During an earthquake, these items can fall over, causing damage or injury.
- Secure items that might fall (televisions, books, computers, etc.). Falling items can cause damage or injury.
- Install strong latches or bolts on cabinets. The contents of cabinets can shift during the shaking of an earthquake. Latches will prevent cabinets from flying open and contents from falling out.
- Move large or heavy objects and fragile items (glass or china) to lower shelves. There will be less damage and less chance of injury if these items are on lower shelves.
- Store breakable items such as bottled foods, glass, and china in low, closed cabinets with latches. Latches will help keep contents of cabinets inside.
- Store weed killers, pesticides, and flammable products securely in closed cabinets with latches, on bottom shelves. Chemical products will be less likely to create hazardous situations from lower, confined locations.
- Hang heavy items, such as pictures and mirrors, away from beds, couches, and anywhere people sit. Earthquakes can knock things off walls, causing damage or injury.
- Brace overhead light fixtures. During earthquakes, overhead light fixtures are the most common items to fall, causing damage or injury.
- Strap the water heater to wall studs. The water heater may be your best source of drinkable water following an earthquake. Protect it from damage and leaks.
- Bolt down any gas appliances. After an earthquake, broken gas lines frequently create fire hazards.
- Install flexible pipe fittings to avoid gas or water leaks. Flexible fittings will be less likely to break.
- Repair any deep cracks in ceilings or foundations. Get expert advice if there are signs of structural defects. Earthquakes can turn cracks into ruptures and make smaller problems bigger.
- Check to see if your house is bolted to its foundation. Homes bolted to their foundations are less likely to be severely damaged during earthquakes. Homes that are not bolted have been known to slide off their foundations, and many have been destroyed because they are uninhabitable.
- Consider having your building evaluated by a professional structural design engineer. Ask about home repair and strengthening tips for exterior features, such as porches, front

and back decks, sliding glass doors, canopies, carports, and garage doors. Learn about additional ways you can protect your home. A professional can give you advice on how to reduce potential damage.

- Follow local seismic building standards and safe land use codes that regulate land use along fault lines. Some municipalities, counties, and states have enacted codes and standards to protect property and occupants. Learn about your area's codes before construction.

How to Plan for an Earthquake:

- Pick "safe places" in each room of your home. A safe place could be under a sturdy table or desk or against an interior wall away from windows, bookcases, or tall furniture that could fall on you. The shorter the distance to move to safety, the less likely you will be injured. Injury statistics show that persons moving more than 10 feet during an earthquake's shaking are most likely to experience injury.
- Practice drop, cover, and hold-on in each safe place. Drop under a sturdy desk or table, hold on, and protect your eyes by pressing your face against your arm. Practicing will make these actions an automatic response. When an earthquake or other disaster occurs, many people hesitate, trying to remember what they are supposed to do. Responding quickly and automatically may help protect you from injury.
- Practice drop, cover, and hold-on at least twice a year. Frequent practice will help reinforce safe behavior.
- Talk with your insurance agent. Different areas have different requirements for earthquake protection. Study locations of active faults, and if you are at risk, consider purchasing earthquake insurance.
- Inform guests, babysitters, and caregivers of your plan. Everyone in your home should know what to do if an earthquake occurs. Assure yourself that others will respond properly even if you are not at home during the earthquake.
- Get training. Take a first aid class from your local Red Cross chapter. Get training on how to use a fire extinguisher from your local fire department. Keep your training current. Training will help you to keep calm and know what to do when an earthquake occurs.
- Discuss earthquakes with your family. Everyone should know what to do in case all family members are not together. Discussing earthquakes ahead of time helps reduce fear and anxiety and lets everyone know how to respond.

Annex B

Potential Mitigation Project Funding Sources

Federal

FEMA

- **Pre-Disaster Mitigation Program.** As part of the Disaster Mitigation Act of 2000 (Section 322 of the Robert T. Stafford Disaster Relief and Emergency Act), FEMA's Pre-Disaster Mitigation Competitive (PDM-C) Grant Program provides funds to states, territories, and federally recognized tribes for pre-disaster mitigation activities. The grant program is administered by FEMA for pre-disaster mitigation planning and projects primarily addressing natural hazards. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. The intent of the PDM-C grant program is to provide a consistent source of funding for pre-disaster mitigation planning and projects.
- **Hazard Mitigation Grant Program.** The Hazard Mitigation Grant Program (Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act) is activated during Presidential Disaster Declarations to assist in identifying mitigation projects, and funding these projects on a 75% Federal/25% non-Federal cost share basis. Mitigation program funding is based on 15% of the federal funds expended for the Infrastructure and Individual Assistance Programs. The HMGP supports other program activities, i.e. participation the NFIP is required for recipients of HMGP funds.
- **Disaster Preparedness Improvement Grants.** Under the Disaster Preparedness Improvement Grants (Section 201 of the Stafford Act), FEMA provides up to 50% matching funds to states annually to improve or update their disaster assistance plans and capabilities. States can use these funds to: implement measures in a Hazard Mitigation Plan; develop pre-disaster Hazard Mitigation Plans; expand an existing Hazard Mitigation Plan; develop hazard specific annexes; or develop administrative plans for the implementation of the Hazard Mitigation Grant Program.
- **Hazard Mitigation Technical Assistance Program Contract.** HMTAP was established to provide FEMA with response capability for various post-disaster mitigation opportunities. The contractor has the capability to: (1) evaluate construction science techniques and practices, including build codes; (2) prepare environmental assessments or impact statements and historic preservation reviews and assessments; (3) conduct biological assessments and surveys, (4) conduct surveys, assessments, and reviews of other areas of impact such as water quality and wetland delineation; (5) conduct benefit/cost, social science, and public administration assessments; (6) conduct post-event assessments to identify mitigation opportunities; (7) Provide post-disaster land surveying, mapping

services and cost estimates using GIS, GPS, and remote sensing; (8) perform floodplain analyses; (9) conduct hazard identification and risk assessment to confirm accuracy and specific actions or methodologies needed for disaster areas; (10) document estimated flood elevations to guide reconstruction and to compute flood frequency; and (11) provide training for benefit/cost analysis, retrofit options, the Hazard Mitigation Grant Program, and National Environmental Policy Act.

- **National Flood Insurance Program (NFIP).** The National Flood Insurance Program (NFIP) makes federally subsidized flood insurance available to property owners in locations agreeing to participate in the NFIP. If communities enter the NFIP they are required to adopt floodplain ordinances meeting criteria established by FEMA. These criteria include: requiring permits for development within designated floodplains; review development plans and subdivision proposals to determine whether proposed sites will be reasonably safe from flooding; require protection of water supply and sewage systems to minimize infiltration of floodwater; obtain, review, and utilize all base flood elevation data; and assure the maintenance of flood carrying capacities within all watercourses.
- **The Community Rating System.** An element of the NFIP is designed to promote the availability of flood insurance, reduce future flooding damage, and ensure the accurate rating of flood insurance policies. Participating communities may receive credit for proven mitigation measures, thus reducing the cost of flood insurance within their jurisdictions.
- **The Individual Assistance Loss Prevention Program.** Available to provide eligible owner- occupants, who sustained damage and received Disaster Housing Minimal Repair Funds, the opportunity to participate in a voluntary program where additional 100% federal funds are made available to break the damage-rebuild-damage cycle and help homeowners reduce or eliminate losses from future weather-related damage.
- **The Individual and Family Grant (IFG) Minimization Program.** Available to provide IFG-eligible owner- occupants the opportunity to participate in a voluntary program where additional state and federal funds are made available to break the damage-rebuild-damage cycle, and help reduce or eliminate losses from future weather-related damage. In addition, FEMA's 800 series provides funding for low cost mitigation measures.
- **The Infrastructure Program (Section 406 of the Stafford Act).** Authorizes funding for the repair, restoration, or replacement of damaged facilities belonging to public and private non-profit entities, and for other associated expenses, including emergency protective measures and debris removal. The Infrastructure Program also authorizes funding for appropriate cost-effective hazard mitigation related to damaged public facilities.

- **The National Inventory of Dams (US Army Corps of Engineers project).** Identifies high-hazard dams and encourages the development of warning systems and emergency plans for many of these facilities.
- **Hazardous Materials Program.** FEMA's mission under this program is to provide technical and financial assistance to States and local jurisdictions and to coordinate with public and private sector entities to develop, implement, and evaluate HAZMAT emergency preparedness programs. FEMA supports State and local agencies in the design, implementation, and evaluation of HAZMAT-related training and planning exercises and cooperates with the U.S. Department of Transportation in the maintenance of electronic bulletin boards to provide the latest information on HAZMAT planning, training, exercises, and conferences.
- **US Fire Administration (USFA).** Through the USFA, FEMA administers a nationwide program to enhance fire prevention and control activities and to reduce significantly the loss of life and property caused by fires. Programs are carried out by: National Fire Academy; Office of Fire Prevention and Arson Control; Office of Firefighter Health and Safety; Office of Fire Data and Analysis; Office of Federal Fire Policy and Coordination; Office of National Emergency Training Center Operations and Support, and Office of Educational Technology.
- **ARRA Fire Station Construction Grants (DHS)** The purpose of the ARRA SCG is to create or save jobs in recession-hit areas and achieve other purposes stated in ARRA, and achieve AFG goals of firefighter safety and improved response capability/capacity based on need through the construction, renovation or modification of fire stations.

The Emergency Planning and Community Right-to-Know Act of 1986 imposed upon state and local governments planning and preparedness requirements for emergencies involving the release of hazardous materials. The role of the federal government in response to an emergency involving the release of hazardous materials is to support local and state emergency operations. Activation of the federal Regional Response Team (RRT) provides access to federal resources not available at the state and local levels. An on scene coordinator is designated to manage federal resources and support. The national warning and communications center for emergencies involving the release of hazardous materials is manned 24 hours a day, and is located at the U.S. Coast Guard headquarters in Washington, D.C.

The National Weather Service provides meteorological and hydrologic services that include weather and hydrologic warnings, forecasts, and related information. The primary mission of the NWS is to save lives and reduce property damage through timely issuances of tornado and flood warnings and river stage forecasts. To cope with dangerous weather, the NWS interacts with emergency services personnel throughout the state by: issuance of tornado and flash flood watches or warnings for those areas in which a threat is posed; issuance of flood watches and warnings for major streams and rivers

within the state. Addison County is within the coverage area of the NWS office in Burlington but also may receive information from the Albany, NY office.

The U.S. Army Corps of Engineers undertakes a broad range of civil works projects to develop, manage, and conserve the nation's water resources. No work may be undertaken without authorization and funding from Congress, either from specific legislation or continuing authorities. Projects **are** planned to serve as many purposes as are feasible and to protect or improve the environment as much as possible. The Corps is involved in developing and implementing plans for flood control, navigation, hydropower, recreation, and water supply. The Corps has authority for emergency operations, bank protection, permit administration, and technical assistance. Corps of Engineers assistance includes:

- Studies and projects
- Discretionary authority to implement certain types of water resources projects without specific Congressional approval. These projects are typically limited in cost and duration, and include:
 - Section 14 - Emergency Stream Bank Protection of Public Facilities, limitation of \$500,000 per project.
 - Section 107 - Small Navigation Projects, usually for port facilities and navigation channels. Work on channels usually improves stream flow and aids flood control efforts.
 - Section 205 - Small Flood Control Projects, not to exceed \$5 million. Funds may be used for projects such as upgrading flood protection structures and channelization of streams.
 - Floodplain Technical Assistance, to include:
 - Conducting floodplain mapping surveys to provide either first-time mapping of an area or to correct older floodplain maps;
 - Conducting flood studies in cooperation with FEMA to determine actual flood levels for settlement of flood insurance claims;
 - Providing technical advice regarding proposed floodplain ordinances and building codes.
- Emergency operations to respond to flood emergencies, to include flood fighting, constructing advance temporary measures in anticipation of imminent flood, and the repair of damaged flood control works after the flood event.
- Permit authority, the Corps has the authority to issue permits to cover construction excavation and other related work in or over navigable waterways; and permits covering the discharge of fill material in all waters of the United States and adjacent wetlands.

Department of Housing and Urban Development

- Community Development Block Grant Program. Funds are provided as grants to units of local government. Local governments can use the funds to: construct flood and drainage facilities; finance rehabilitation projects that include flood

proofing, elevation, purchase of flood insurance, etc.; finance acquisition and relocation of homes to remove them from the floodplains.

- Rental Rehabilitation Program. Funds to rehabilitate rental properties can be used for flood proofing and repair to flood damage.
- Section 312 Loan Program. Provides funds to rehabilitate both residential and non-residential properties, including flood repair and flood proofing.

Department of Agriculture Natural Resource Conservation Service (NRCS) can provide technical assistance in the conservation, development, and productive use of water resources. In addition, the NRCS monitors use of prime farmland.

- Watershed Protection and Flood Prevention. Technical and financial assistance to local entities to plan and install works of improvement for watershed protection, flood prevention, agricultural water management, and other approved purposes.
- Resource Conservation and Development. Technical and financial assistance to local entities to plan and install works of improvement for watershed protection, flood prevention, agricultural water management, and other approved purposes.
- Emergency Watershed Protection. Provides assistance to reduce hazards to life and property in watersheds damaged by severe natural events. NRCS can provide 100% of the cost of exigency situations, and 80% of the cost for non-exigency situations, if funds are available.
- Conservation Technical Assistance. Provided to land users to control erosion, sediment, and to reduce upstream flooding.
- River Basin Surveys and Investigations. Includes Conservation River Basin Studies to assist in solving existing problems or meeting existing or projected needs, and Floodplain Management Studies to provide information and assistance for reducing future flood damages. Financial assistance is provided by sponsors.

U.S. Geological Survey (USGS) provides certain hazard studies and recommendations. A portion of the mission of the USGS is to collect and analyze data on the quantity of surface water through a network of gauging stations. The data is used in preparing flood frequency reports to evaluate the severity of floods. This data is useful in flood hazard mitigation studies, establishing flood prone areas, and potential flood heights near hydraulic structures.

Economic Development Administration was established to generate new jobs, to help protect existing jobs, and to stimulate commercial and industrial growth in economically distressed areas of the United States.

Small Business Administration (SBA) Disaster Assistance Programs provide loans to businesses and individuals affected by presidential and SBA disaster declarations. The program provides direct loans to businesses to repair or replace uninsured disaster damage to property owned by the business, including real estate, machinery, and equipment, inventory and supplies. Businesses of any size are eligible. Non-profit organizations are also eligible. Assistance to individuals comes in the form of low-

interest loans for repair or replacing damaged real and personal property. The SBA administers the Disaster Assistance Programs.

State

VTrans

- Town Highway Grants Program. State aid grants for highways are made annually to the governing body based on the number of Class 1, 2 or 3 miles in the Municipality. The General Assembly appropriates a lump sum annually for this purpose (19 V.S.A. Section 306(a)). Distribution is made quarterly, with no application required. There is no requirement that State funds be matched with local funds, other than a requirement that municipalities expend no less than \$300 per mile of local tax revenues on their highways (19 V.S.A. Section 307).
- Town Highway Bridge Program. State assistance for major rehabilitation or reconstruction of bridges with a span of six feet or more on class 1, 2 or 3 town highways is made available by the Secretary of Transportation from annual appropriations for that purpose (19 V.S.A. Section 306(b)). State assistance amounts are not limited for any one project. The State assistance requires 10% participation or match of total project cost with town funds for replacement projects and 5% for rehabilitation projects. The local match is capped at the amount raised by a municipal tax rate of \$0.50 on the Grand List (19 V.S.A. Section 309(a)).
- Town Highway Structures Program. State grants for bridges, culverts and retaining walls that are part of the municipality's highway (Class 1, 2 or 3) infrastructure are made by the Secretary of Transportation from annual appropriations for the purpose. State grant amounts are limited to \$150,000 for any one project. State funds are required to be matched, as follows:
 - By at least 20% of the total project cost, or
 - By at least 10% of the total project cost providing that town has adopted Town Highway codes and standards and the town has conducted a highway infrastructure study (not less than three years old), which identifies all town culverts, bridges and identified road problems.
- Town Highway Class 2 Roadway Program. State grants to provide for the preservation of any Class 2 highways by providing grants for resurfacing or reconstruction are made by the Secretary of Transportation or his/her designee from annual appropriations for that purpose. State grants are limited to \$150,000 for any one project and there are match requirements for the town similar to the Town Highway Structures Program.
- Town Road & Bridge Standards, Infrastructure Study. As a result of legislative action relating to the Town Aid programs an incentive program was created providing additional funding to towns meeting two requirements:
 - Adopted codes and standards.
 - Conducted a network infrastructure study.

Agency of Natural Resources

- Ecosystem Restoration Grant Program. As part of a governor's initiative to improve water quality in Lake Champlain, funds have been allocated to assist in clean-up. Funds from this source have paid for a large portion of recent geomorphic studies in the Addison region as well as supporting the development of Fluvial Erosion Hazard Zones. Additionally, funds have been allocated to purchase development rights in hazardous locations.

Department of Public Safety, Division of Emergency Management

- Hazard Mitigation Grant Program. Previously described under Federal Programs.
- Pre-Disaster Mitigation Program. Previously described under Federal Programs.
- Local Emergency Management Director Program. A continuing program of training for local emergency management directors to provide a consistent base of knowledge to understand their roles and responsibilities in Emergency Management.
- Generator Grant Program. VEM allocates funds from FEMA EMPG to allow towns to purchase back-up power sources for emergency shelters for continued use in the event of a power failure.

Regional

The Addison County Regional Planning Commission (ACRPC) provides assistance to local governments concerning planning for future land use, business, transportation, emergency management and population.

In addition to the specific programs mentioned below, ACRPC has identified Municipal Development Plans and Capital Improvement Plans as appropriate local planning mechanisms suitable for incorporating many of the provisions of this plan. These plans, by statute, need to be updated on a 5-year rotation. In Addison County, each municipality adopts these new or updated plans according to their own timetable and therefore, each is at a different place in the planning and adoption process. At the time of each rewrite, ACRPC generally assists local planning commissioners and will encourage inclusion of appropriate provisions of this plan into any new document.

One effective ongoing program is a local culvert survey and upgrade program, which is sponsored by the ACRPC. This program provides funding to communities for survey and location of installed culverts to determine condition and effectiveness. Those identified as needing repair and replacement are eligible for hazard mitigation funding.

Past regional mitigation projects and initiatives include:

Project Impact. FEMA and Vermont Emergency Management designated Addison County as a "Project Impact" community in 1999. The goal of "Project Impact" is to bring

communities together to take actions that prepare for and protect themselves against disasters in a collaborative effort. “Project Impact” encourages communities to do these things:

- Identify Hazards and Community Vulnerability
- Prioritize Hazard Risk Reduction Efforts
- Build Community Partnerships for Risk Reduction Projects and Activities
- Communicate Successes and Establish Public Education

The list of projects that have all or a portion of the project cost supported by Project Impact include:

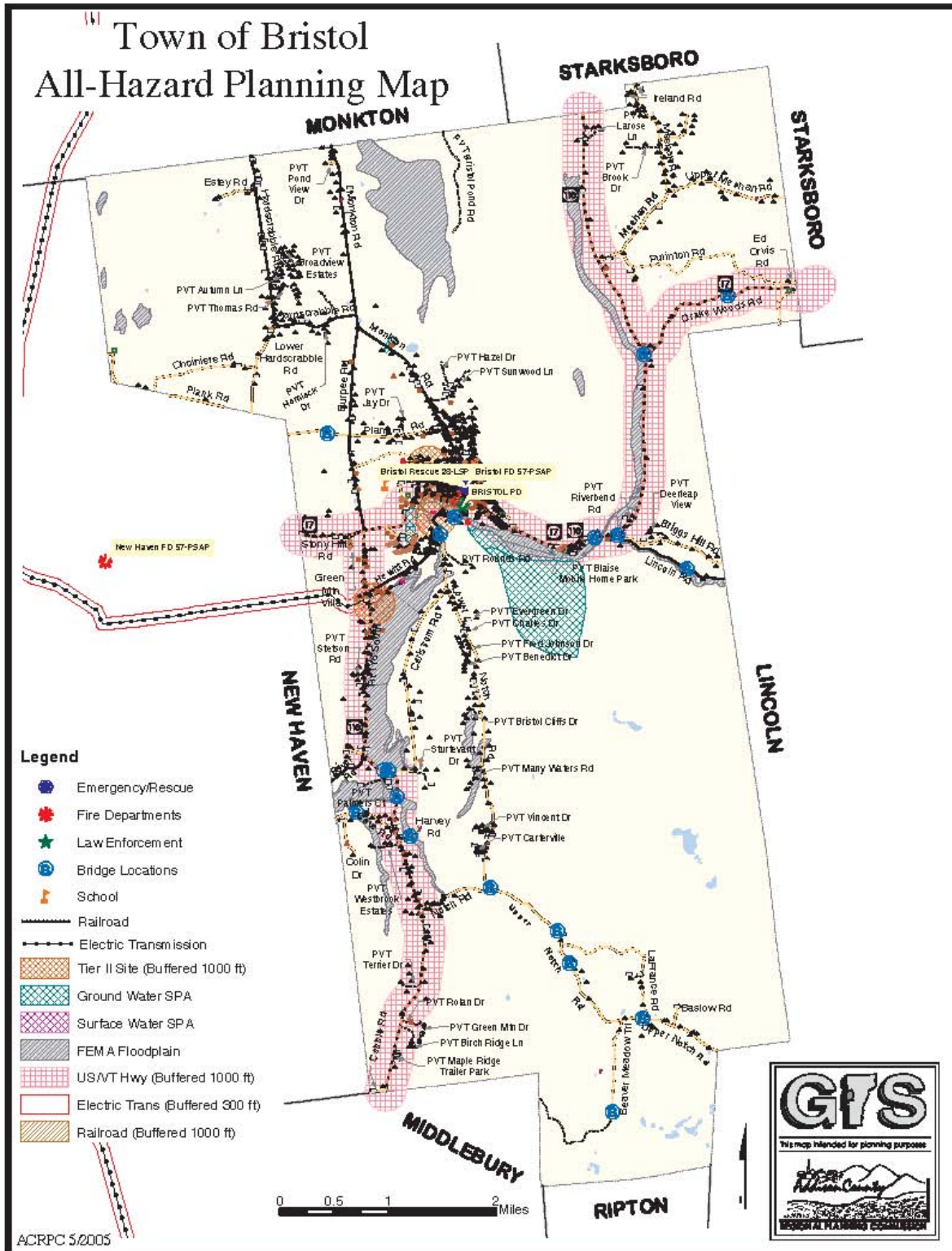
- Red Cross Schools Program
- Culvert Replacement/Stone Lined Ditch in Goshen
- Demonstration House in Cornwall
- Middlebury River Assessment
- Ripton Fire Station Move
- Weather Radio Purchases
- Shoreline Stabilization Handbooks for the Lakeside Towns
- Flood Warning Rain Gauges – Mountain Towns
- Monkton Evacuation Center
- Back-up Power Project

The Lewis Creek Study. Vermont Department of Environmental Conservation (VTDEC) River Management Program, in collaboration with academic, agency and watershed association partners, completed a pilot project in the Lewis Creek watershed. The project was intended to help develop remote sensing and rapid stream geomorphic assessment methodologies that would help to problem solve at the watershed level, gain a broader constituency for river management and to have a consistent statewide protocol.

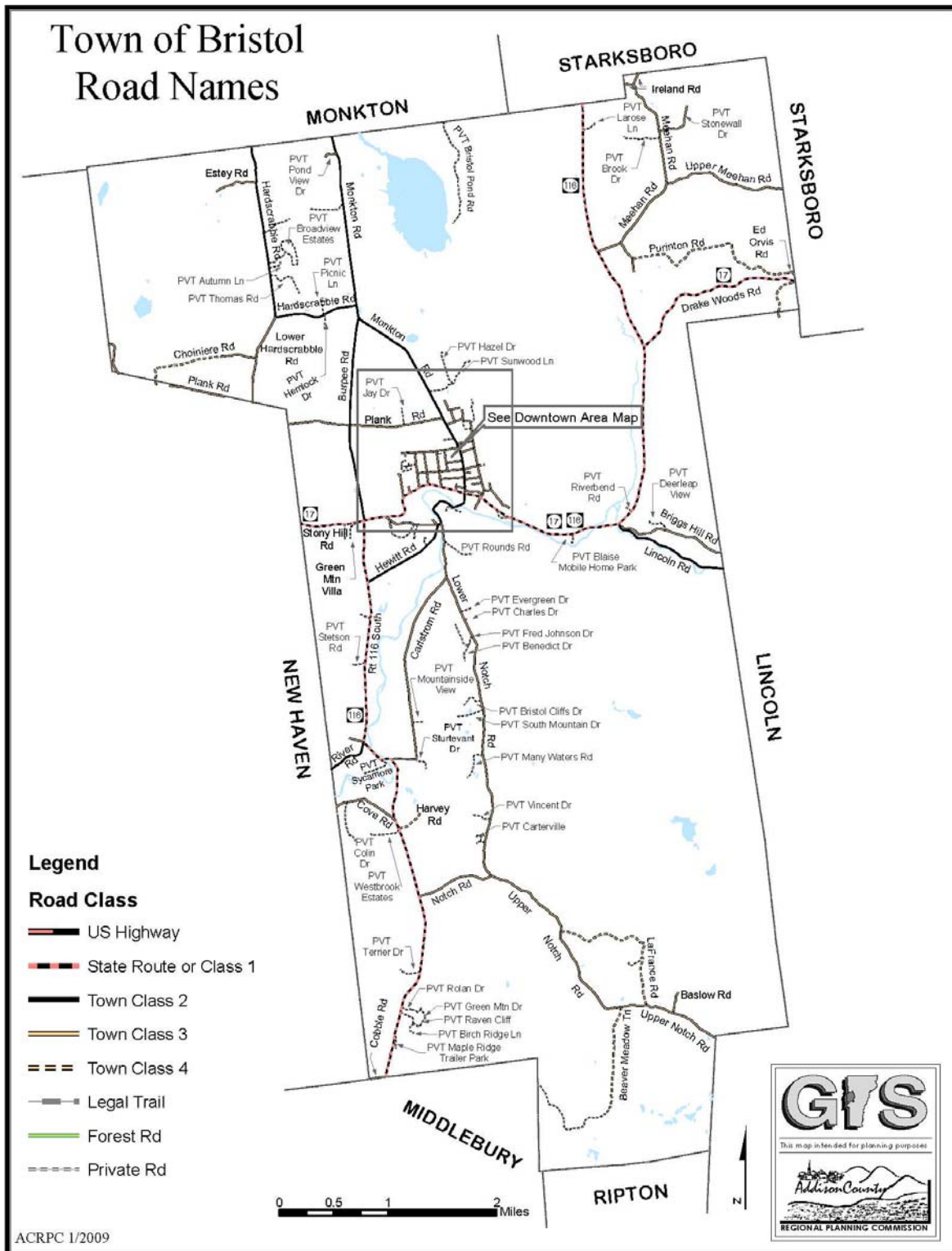
Pre-Disaster Mitigation (PDM-C) Planning Grants: Development and continued updating of this and other mitigation planning activities are supported through funding from FEMA’s PDM-C, Flood Mitigation Assistance (FMA), and Emergency Management Performance Grant (EMPG) grants.

Geomorphic Assessments, State of Vermont Agency of Natural Resources and PDM-C funding supported ongoing geomorphic assessments on the major flash flood prone streams and rivers in the Addison Region including the Middlebury River, New Haven River, Neshobe River, Leicester River, Lemon Fair, and Otter Creek. These studies have benefitted both mitigation of disasters and mitigation of ongoing surface water pollution.

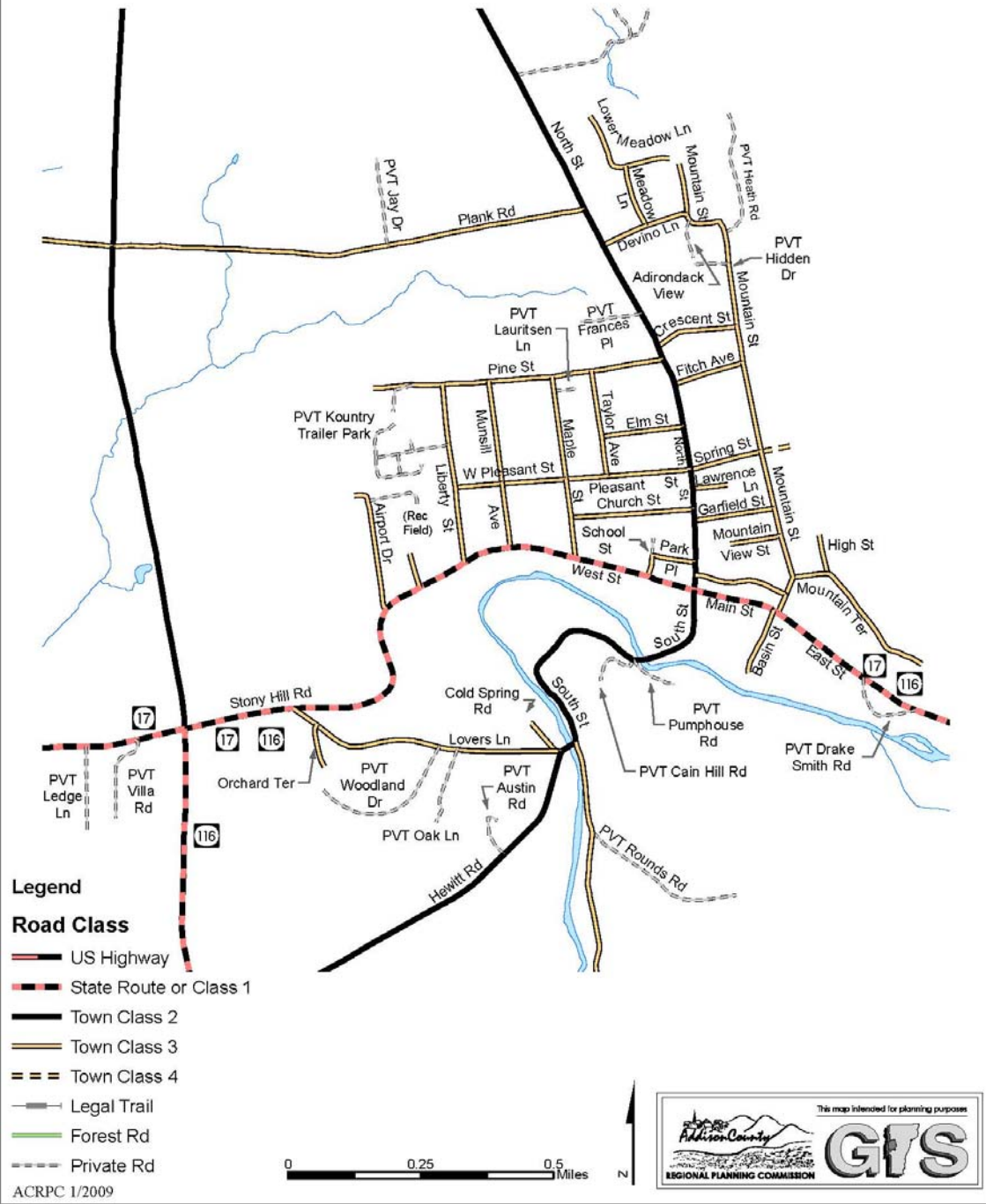
Annex C Local Maps



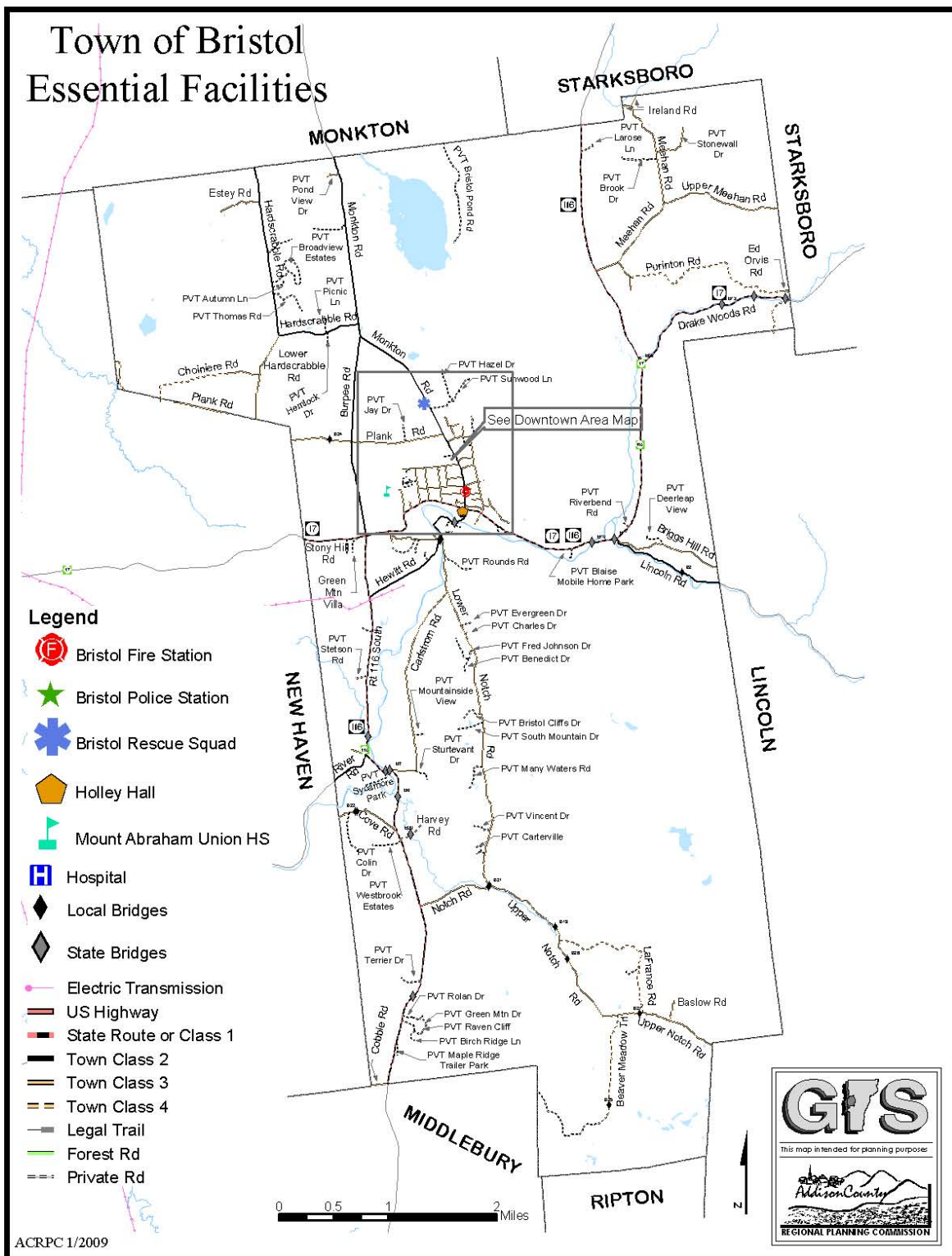
Town of Bristol Road Names



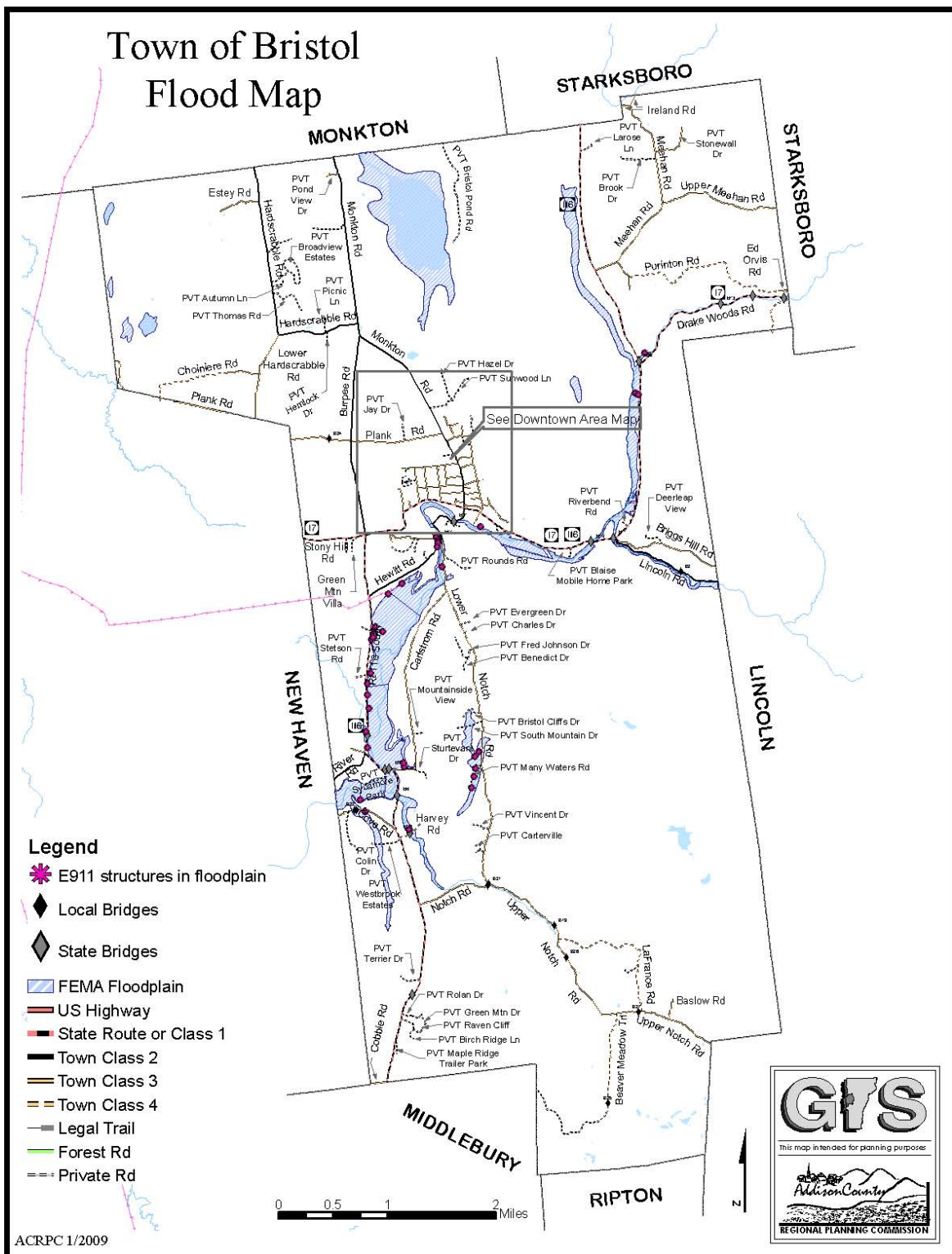
Town of Bristol, Downtown Area



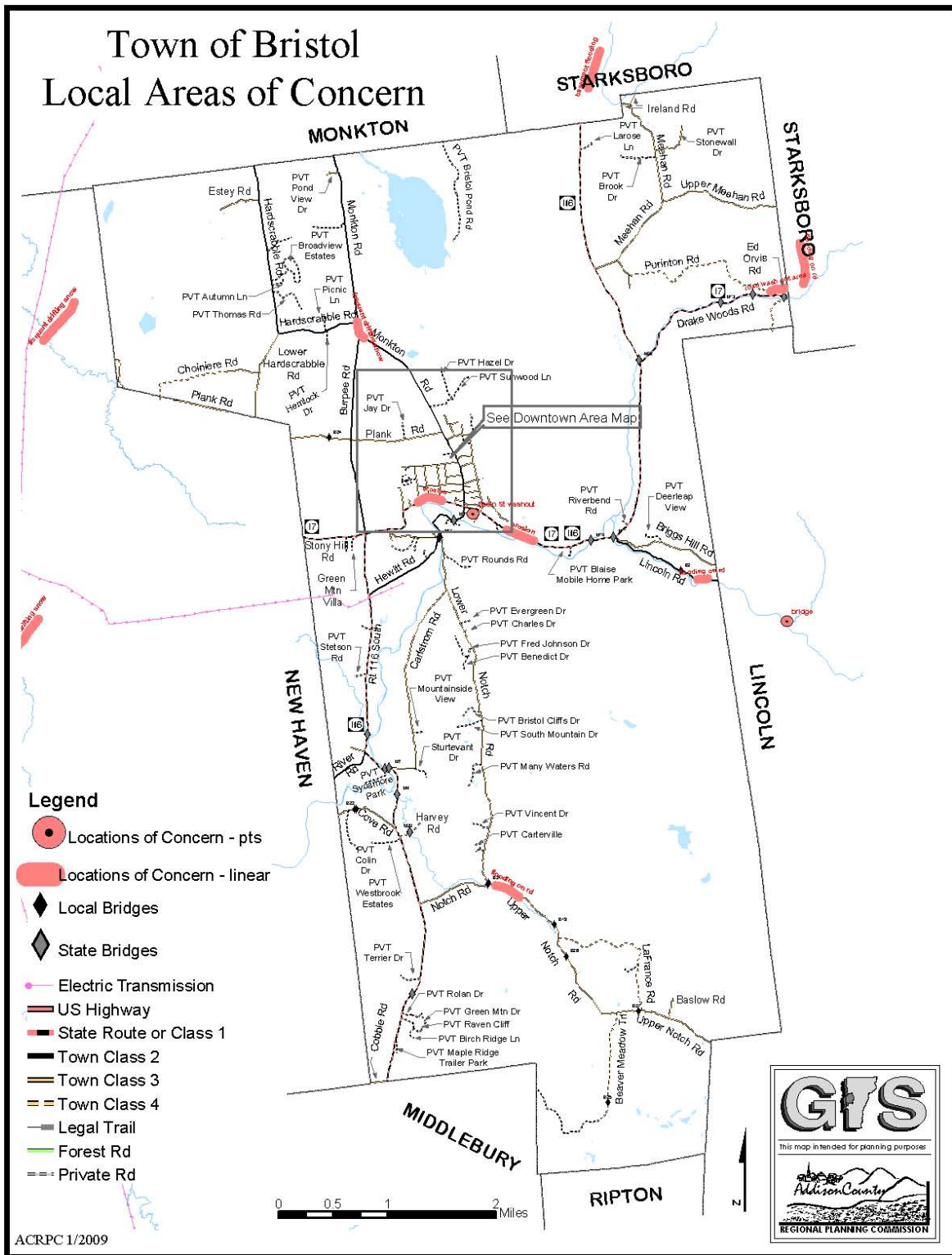
Town of Bristol Essential Facilities



Town of Bristol Flood Map



Town of Bristol Local Areas of Concern

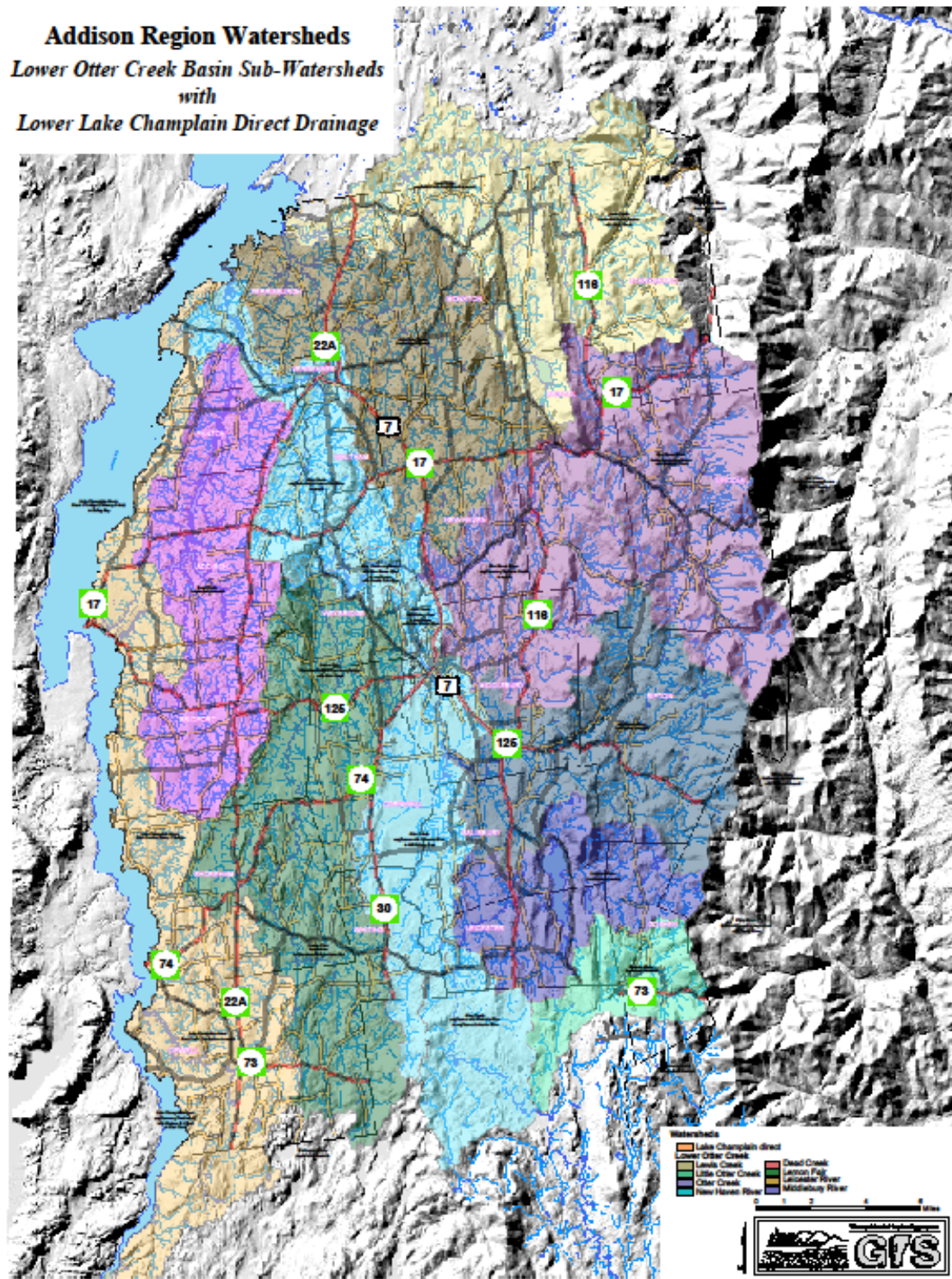


Addison Region

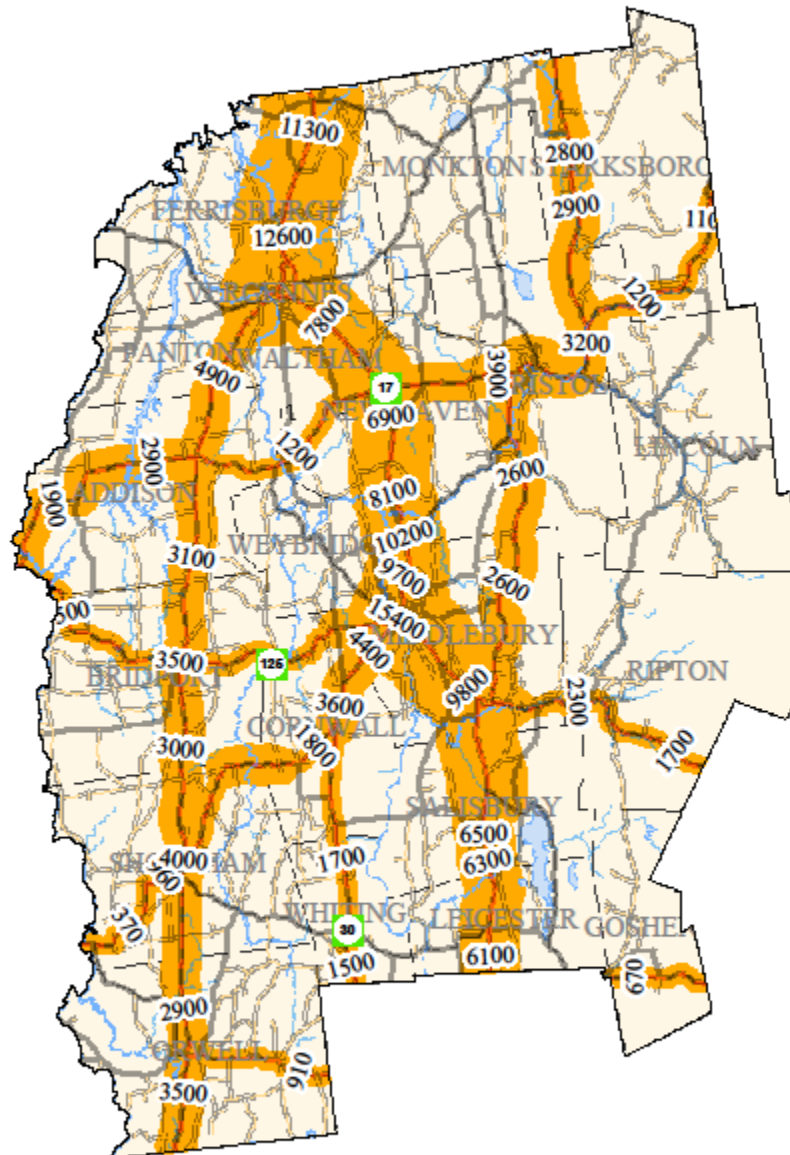
Hazardous Material Locations



Addison Region Watersheds
Lower Otter Creek Basin Sub-Watersheds
with
Lower Lake Champlain Direct Drainage



Addison Region
Average Annual Daily Traffic 2002

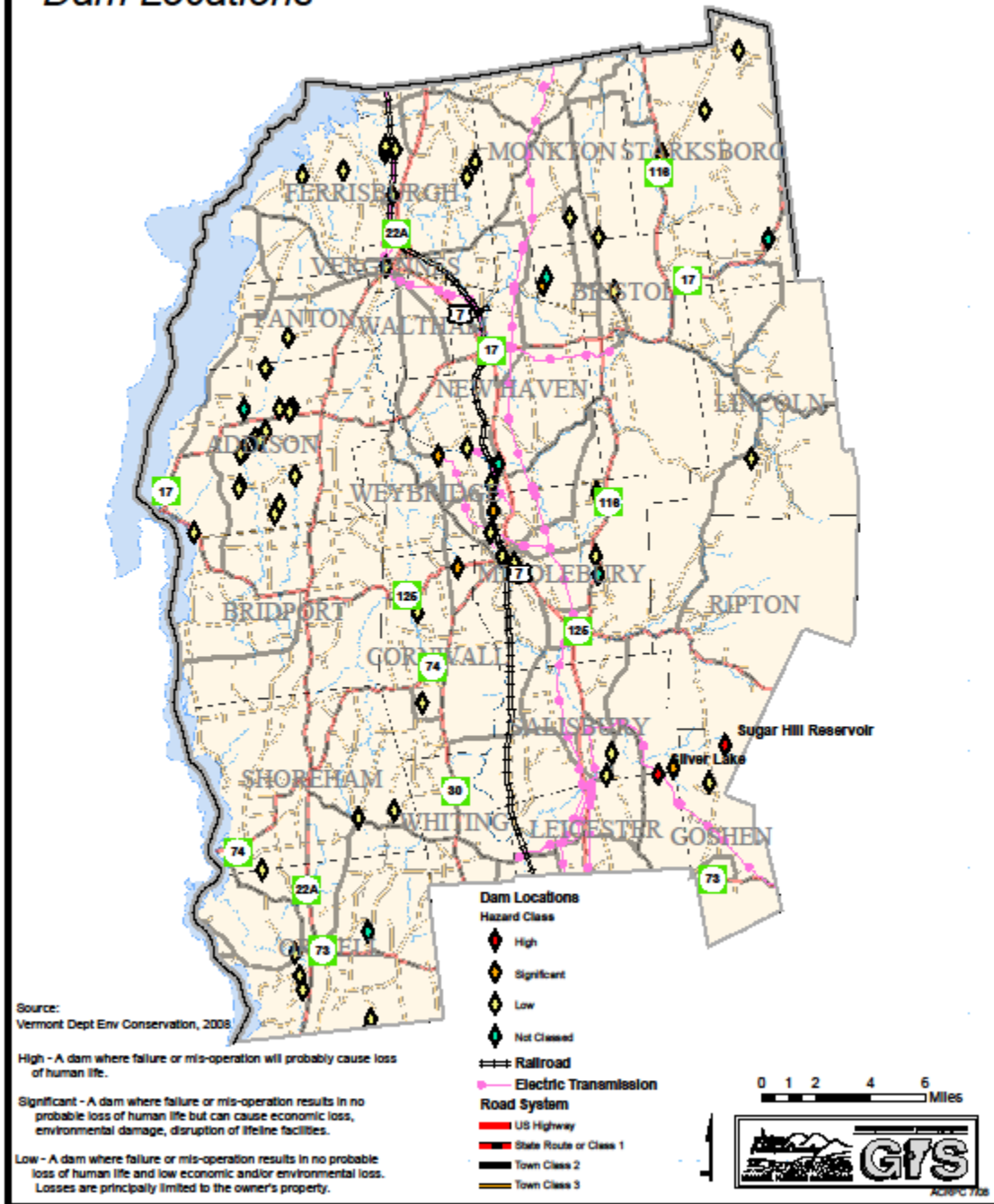


Source:
Vermont Agency of Transportation, 2007.

ACRPG 708

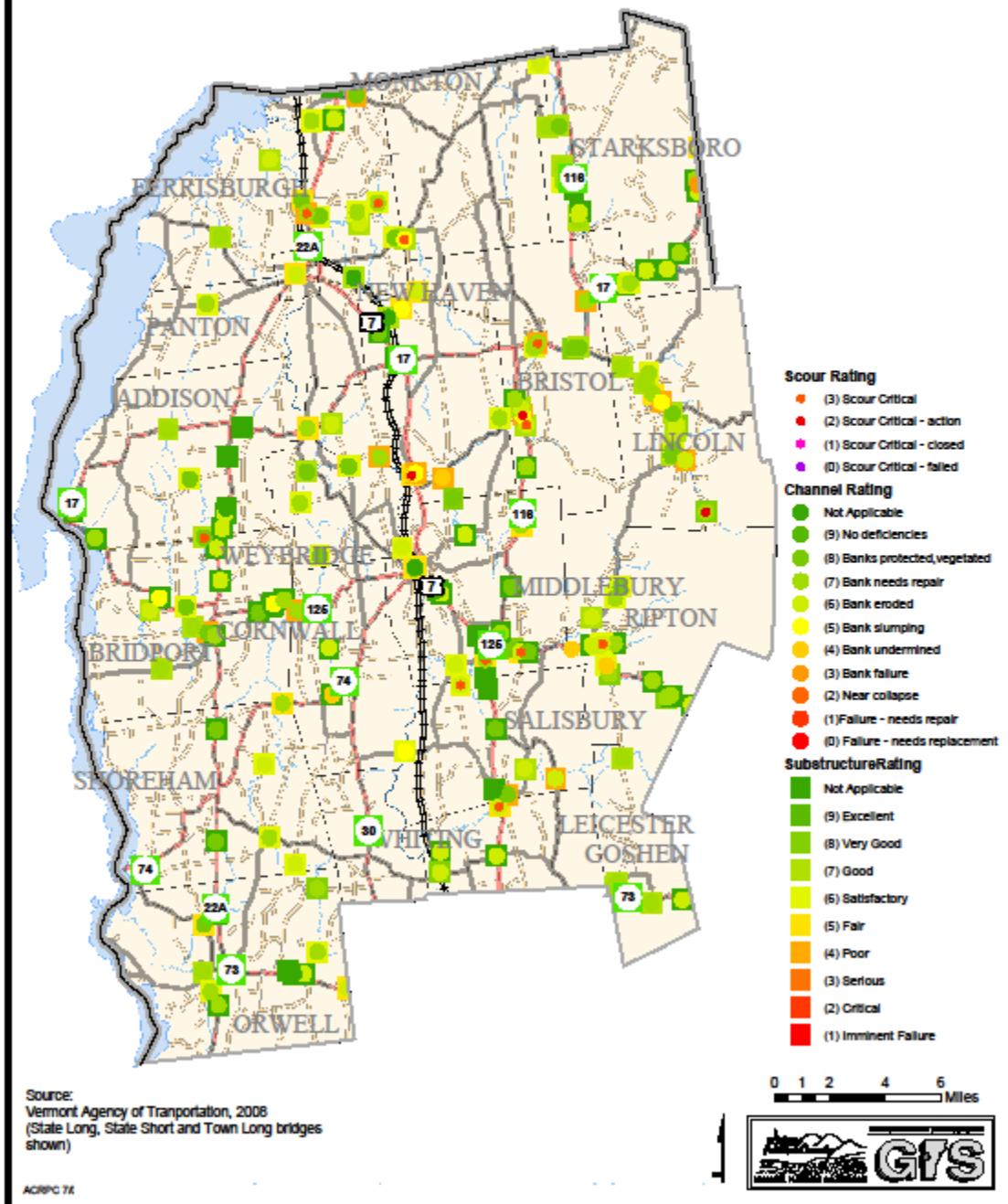


Addison Region Dam Locations



Addison Region

Bridge Locations with fluvial associated ratings



Annex E

Hazard Identification & Risk Estimation Matrix, Town of Bristol

Risk Characteristic		Score	Drought	Power Failure	Flooding	High Winds	Landslide	Lightning	HazMat Spill	Structure fire	Wildfire	Winter Storm	Earthquake
Area Impacted	No developed area	0											
	Less than 25% of developed area	1			1	1	1	1	1	1	1		
	Less than 50% of developed area	2	2										
	Less than 75% of developed area	3		3									
	Over 75% of developed area	4										4	4
Health and Safety Impacts	No health and safety impact	0	0								0		
	Few injuries or illnesses	1		1	1	1	1	1	1	1		1	1
	Few fatalities, many injuries	2											
	Numerous fatalities	3											
Property Damage	None	0											
	Few destroyed or damaged	1	1	1	1	1	1	1	1		1	1	
	Few destroyed, many damaged	2								2			2
	Few damaged, many destroyed	2											
	Many destroyed and damaged	3											
Environmental Damage	Little or no environmental damage	0		0				0				0	0
	Damages-short-term recovery	1	1			1				1	1		
	Damages-long-term recovery	2			2		2		2				
	Resources destroyed-no recovery	3											
Economic Disruption	No economic impact	0											
	Low direct and/or indirect costs	1		1				1			1	1	
	High direct and low indirect costs	2	2			2	2						
	Low direct and high indirect costs	2											
	High direct and high indirect costs	3			3				3	3			3
TOTAL SCORE			6	6	8	6	7	4	8	8	4	7	10
Probability of Occurrence	Unknown but rare occurrence	1											
	Rare but anticipate an occurrence	2											2
	100 years or less occurrence	3	3										
	25 years or less occurrence	4		4	4	4	4		4	4	4		
	Once a year or more occurrence	5						5				5	
TOTAL RISK RATING			18	24	32	24	28	20	32	32	16	35	20

Annex F
Adoption by Local Governing Body

RESOLUTION

Councilperson/Selectperson Carol Wells, offers the following resolution and moves its adoption. Seconded by Councilperson/Selectperson

Alan Huizenga

RESOLVE: That in order to provide for sustained actions to reduce or eliminate long-term risk to people and property from hazards and their effects in the Town/City/Village

of Bristol, the Town/City/Village Council/Selectboard deems it advisable and in the best interests of the community to approve the attached Hazard Mitigation Plan.

PASSED AND APPROVED THIS 13th DAY OF August, 2012

John Jefferson
Mayor/Chairperson
Town/City/Village of Bristol

ATTEST:

Delese Kirby
Town/City/Village Clerk