TOWN OF Bolton, Vermont
2017 All-Hazards Mitigation Plan

Annex 1 to the
2017 Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan

Prepared by:
The Chittenden County Regional Planning Commission

and the

Town of Bolton, Vermont

Adopted by the Town of Bolton Selectboard on Month, Day, 2017

Approved by FEMA effective _____

Executive Summary

Hazard Mitigation is a sustained effort to permanently reduce or eliminate long-term risks to people and property from the effects of reasonably predictable hazards. The purposes of this updated Local All-Hazards Mitigation Plan are to:

- Identify specific natural, technological and societal hazards that impact the Town of Bolton;
- Prioritize hazards for mitigation planning;
- Recommend town-level goals and strategies to reduce losses from those hazards; and
- Establish a coordinated process to implement the plan, taking advantage of a wide range of resources.

This plan is a local annex to the 2017 *Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan*. **In order to become eligible to receive various forms of Federal hazard mitigation grants, a Chittenden County municipality must formally adopt its Local All-Hazards Mitigation Plan along with the *Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan,* or develop and adopt an independent, stand-alone Local All-Hazards Mitigation Plan.**

Section 1: Introduction and Purpose explains the purpose, benefits, implications and goals of this plan. This section also describes municipal demographics and development characteristics, and describes the planning process used to develop this plan.

Section 2: Hazard Identification expands on the hazard identification in the *Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan* with specific municipal-level details on selected hazards.

Section 3: Risk Assessment discusses identified hazard areas in the municipality and reviews previous federally-declared disasters as a means to identify what risks are likely in the future. This section presents a hazard risk assessment for the municipality, identifying the most significant and most likely hazards which merit mitigation activity. The top Hazards by type with the most risk in Bolton are:

Natural Hazards:
Fluvial Erosion, Severe Rainstorm, Flooding, Severe Winter Storm, Wildfire
Technological Hazards
Power Loss, Major Transportation Incident & Telecommunications Failure
Societal Hazards
Key Employer Loss, Epidemic

Section 4: Vulnerability Assessment discusses buildings, critical facilities and infrastructure in designated hazard areas, vulnerable populations and the issue of estimating potential losses.

Section 5: Mitigation Strategies is the heart of this All Hazards Mitigation Plan. This section begins with an overview of goals and policies in the *2012 Town of Bolton Town Plan* that support hazard mitigation. This is followed by an analysis of existing municipal actions that support hazard mitigation, such as planning and zoning and public works. This section presents the following municipal all-hazards mitigation goals:

1) Reduce at a minimum, and prevent to the maximum extent possible, the loss of life and injury resulting from all hazards.

2) Mitigate financial losses and environmental degradation incurred by municipal, educational, residential, commercial, industrial and agricultural establishments due to various hazards.
3) Maintain and increase awareness amongst the town's residents and businesses of the damages caused by previous and potential future hazard events as identified specifically in this Local All-Hazards Mitigation Plan and as identified generally in the Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan.
4) Recognize the linkages between the relative frequency and severity of disaster events and the design, development, use and maintenance of infrastructure such as roads, utilities and stormwater management and the planning and development of various land uses.
5) Maintain existing municipal plans, programs, regulations, bylaws and ordinances that directly or indirectly support hazard mitigation.
6) Consider formal incorporation of this Local All-Hazards Mitigation Plan into the municipal comprehensive plan as described in 24 VSA, Section 4403(5) or by reference as allowed under Section 4382(11)(b), as well as incorporation of proposed new mitigation actions into the town's bylaws and ordinances including, but not limited to its zoning bylaws and subdivision regulations.
7) Consider formal incorporation of this Local All-Hazards Mitigation Plan, particularly the recommended mitigation actions, into the town's operating and capital plans and budgets for infrastructure, utilities, highways and emergency services.

<u>This section includes following Mitigation Actions planned by the Town:</u>

CATEGORY A: Secure funds and complete projects to protect vulnerable infrastructure and buildings.

- Action A-1: Projects to mitigate inundation flooding
- Action A-2: Culvert upgrades
- Action A-3: Seek funds for scoping and construction of upgrades to infrastructure vulnerable to erosion and scouring
- Action A-4: Road Improvements

CATEGORY B: Based on completed fluvial geomorphology assessments and River Corridor & River Corridor Protection Area maps from VANR, develop strategies in response to identified risks.

- Action B-1: Explore adoption of River Corridor or River Corridor Protection Area Zoning Overlay District
- Action B-2: Streambank Stabilization

CATEGORY C: Implement Roads Stormwater Management Plan

- Action C-1 Develop Roads Stormwater Management Plan
- Action C-2 Begin Roads Stormwater Management Plan implementation

CATEGORY D: Complete mapping of landslide hazards

- ACTION D-1: Seek funds for mapping of landslide hazards

Finally, this section includes an Implementation Matrix to aid the municipality in implementing the Mitigation Actions and annual monitoring and evaluation of this Plan.

List of Tables

[Note: See appendices of Chittenden County Multi-Jurisdictional AHMP for weblinks to the various data sources used to generate many of the tables noted above. These links are also useful for additional detail on the terms used in this report.]

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SECTION 1: INTRODUCTION AND PURPOSE

1.1 Purpose and Scope of this Plan

The purpose of this Local All-Hazards Mitigation Plan is to identify hazards facing the Town of Bolton, and strategies to reduce the impacts of those hazards. The plan also seeks to coordinate the mitigation efforts of the town with those outlined in the 2017 *Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan,* as well as efforts of quasi-governmental organizations such as Local Emergency Planning Committee- District #1 and the Chittenden County Regional Planning Commission.

This annex, when used with the appropriate sections of the Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan, constitutes an All-Hazards Mitigation Plan for the Town of Bolton. Community planning can significantly reduce the impact of expected, but unpredictable natural and human-caused events. The goal of this plan is to provide hazard mitigation strategies that will aid in creating a more disaster resistant community.

1.2 Hazard Mitigation

The *2013 Vermont State All-Hazards Mitigation Plan* defines hazard mitigation as

> *Any sustained action that reduces or eliminates long-term risk to people and property from natural and human-caused hazards and their effects. The Federal Emergency Management Agency (FEMA) and state agencies recognize that it is less expensive to prevent disaster or mitigate its effects than to repeatedly repair damage after a disaster has struck. This plan recognizes that communities have opportunities to identify mitigation strategies and measures during all of the other phases of Emergency Management—Preparedness, Mitigation Response and Recovery. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where they are most severe and to identify actions that can be taken to reduce the severity of the hazard.*

Hazard mitigation strategies and measures can reduce or eliminate the frequency of a specific hazard, lessen the impact of a hazard, modify standards and structures to adapt to a hazard, or limit development in identified hazardous areas.

1.3 Hazard Mitigation Planning Required by the Disaster Mitigation Act of 2000

Hazard mitigation planning is the process that analyzes a community's risk from natural hazards, coordinates available resources, and implements actions to reduce risks. According to 44 CFR Part 201, Hazard Mitigation Planning, this planning process establishes criteria for State and local hazard mitigation planning authorized by Section 322 of the Stafford Act as amended by Section 104 of the *Disaster Mitigation Act of 2000*. Effective November 1, 2003, local governments now have to have an approved local mitigation plan prior to the approval of a local mitigation project funded through federal Pre-Disaster Mitigation funds. Furthermore, the State of Vermont is required to adopt a State Pre-Disaster Mitigation Plan in order for Pre-Disaster

Mitigation funds or grants to be released for either a state or local mitigation project after November 1, 2004.

There are several implications if the plan is not adopted.

- FEMA Flood Mitigation Assistance Grant Program (FMAGP) funds will be available only to communities that have adopted a local plan.
- A community without a plan is not eligible for FEMA Hazard Mitigation Grant Program (HMGP) project funding, but may apply for planning grants under the 7% of HMGP funds available for planning.
- For the Pre-Disaster Mitigation (PDM) program, a community may apply for PDM funding but must have an approved plan in order to receive a PDM project grant.
- Under Vermont's Emergency Relief Assistance Fund (ERAF) rules, contributions from the State to cover the non-Federal share of a municipality's FEMA Public Assistance project costs varies depending on whether a community has a plan. A community without a plan currently must to cover 17.5% of the overall project cost, but a community with a plan has to cover only 7.5% to 12.5% of the cost.

1.4 Benefits

Adoption and maintenance of this Plan will:

- Make certain funding sources available to complete the identified mitigation initiatives that would not otherwise be available if the plan was not in place.
- Ease the receipt of post-disaster state and federal funding because the list of mitigation initiatives is already identified.
- Support effective pre- and post-disaster decision making efforts.
- Lessen each local government's vulnerability to disasters by focusing limited financial resources to specifically identified initiatives whose importance has been ranked.
- Connect hazard mitigation planning to community planning where possible such as emergency operations plans, comprehensive plans (aka "town plans:), capital plans and budgeting, open space plans and stormwater master plans.

1.5 All-Hazards Mitigation Plan Goals

The Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan establishes the following general goals for the county as a whole and its municipalities:

1) Hazard mitigation planning should take into account the multiple risks and vulnerabilities of the significant hazards in the County due to its mixed urban-suburban-rural nature, its economic importance to the State and its significant presence of public and private infrastructure.
2) Promote awareness amongst municipalities, residents and business in the county of the linkages between the relative frequency and severity of disaster events and the design,

development, use and maintenance of infrastructure such as roads, utilities and stormwater management and the planning and development of various land uses.

3) Ensure that regionally-initiated mitigation measures are consistent with municipal plans and the capacity of municipalities to implement them.
4) Encourage municipalities to formally incorporate their individual Local All-Hazards Mitigation Plan into their municipal plan as described in 24 VSA, Section 4403(5), as well as incorporate their proposed mitigation actions into their various bylaws, regulations and ordinances, including, but not limited to, zoning bylaws and subdivision regulations and building codes.
5) Encourage municipalities to formally incorporate elements of their Local All-Hazards Mitigation Plan, particularly their recommended mitigation strategies, into their municipal operating and capital plans and programs, especially, but not limited to, as they relate to public facilities and infrastructure, utilities, highways and emergency services.
6) Educate regional entities on the damage to public infrastructure resulting from all hazards and work to further incorporate hazard mitigation planning into the regional land use and transportation planning program conducted by the Chittenden County Regional Planning Commission.
7) Maintain existing mechanisms, develop additional processes, or explore funding mechanisms and sources to foster regional cooperation in hazard mitigation, specifically and emergency management planning, generally.

1.6 Town of Bolton: Demographics and Development Characteristics

The Town of Bolton is located *(cf. Figure 1.1)* on the eastern edge of Chittenden County and is bounded on the north by Underhill and Jericho, on the west by Richmond, on the south by Huntington, and on the east by Duxbury and Waterbury in Washington County, and Stowe in Lamoille County. It encompasses 42.26 square miles.

Based on U.S. Census data, Bolton's year-round population numbered 1,182 people in 2010, representing less than one percent of the total county population.

Table 1-1 Town of Bolton, Selected Population Characteristics, 2010

Category	Number	%
Total Population	1,182	--
Median Age	38	--
Population age 65 years and over	73	6.2
Population (and %) under 10 years old	137	11.6
Population (and %) in group quarters	0	0.0

U.S. Census Bureau, 2010 Census of Population and Housing

In 2010 there were 602 housing units reported in Bolton, representing less than one percent of the county's total housing stock. The following shows the types of housing within Bolton:

Table 1-2 Town of Bolton, Selected Housing Characteristics

Category	Number	%
Total Housing Units	602	--
Occupied housing units	487	80.9
Vacant housing units	115	19.1
Vacant housing units used for seasonal, recreational or occasional use	68	11.3
Detached 1-unit housing units	273	66.3
Housing units with 5 or more units in structure	21	5.1
Mobile homes*	127	21.1
Housing structures built in 1939 or earlier	54	13.1

*All data from the 2010 Census and 2010-2014 5-YR ACS estimates, except mobile homes which is drawn from the town's grand list.

Because of its mountainous terrain, much of Bolton remains undeveloped. Small concentrations of population, housing and other development occur largely north of the Winooski River, along the US Route 2 corridor, in West Bolton, and at Bolton Valley, including the Bolton Valley Ski Resort. The majority of Bolton's land is conserved in public ownership or unable to be developed due to steep slopes and floodplains. Scattered, low density residential development, consisting largely of single family homes, occurs along maintained town highways.

Population trends for the town are as follows:

Table 1-3 Town of Bolton, Population Trends, 1980 - 2014

Year	Population
1980	715
1990	971
2000	971
2010	1,182
2014	1,191
U, S Census (1980 – 2010); ACS Estimate (2014).	

1.7 Summary of Planning Process

As noted above the update of this municipal All Hazard Mitigation Plan (AHMP) was part of the planned update of the Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan and the municipal AHMPs that are annexes to the Multi-Jurisdictional Plan. The CCRPC, with funding provided by the State of Vermont via a FEMA Hazard Mitigation Grant, began this update process in the spring of 2015.

1.7.1 Development of the 2017 Bolton All Hazards Mitigation Plan

CCRPC staff met several times with various Town officials during the course of the development of this plan. Initial meetings focused on the following:

1. Review of the matrix used in 2011 to identify and rank local hazards and to determine whether overall scoring still made sense.
2. Identification of any new hazards and actions that could be taken to address them.
3. Progress made on strategies and tasks from the 2011 plan.

In August 2015, CCRPC staff met with the Bolton Town Clerk (Amy Grover), the Emergency Management Coordinator (Sharon Murray) and Road Foreman (Erik Andrews).

Based on this meeting, CCRPC staff forwarded a memo to Bolton's Select Board and Planning Commission that outlined proposed changes to 2011 materials and summarized reported progress. The memos also clearly stated how CCRPC staff could be reached for comment. This memo was discussed at a publicly noticed Planning Commission meeting held on October 12, 2015,warned in compliance with Vermont Open Meeting Laws (1 V.S.A. §§ 310-314). The memo and meeting materials were also made available for public review. Members of the public who attended the meeting were offered the opportunity to provide comments on plan development. The Select Board received the memo for review at their regularly scheduled, publicly noticed meeting held on September 7, 2015.

In addition, the following materials were reviewed in developing this plan:

1. The 2012 Bolton Town Plan.
2. The Bolton Land Use and Development Regulations, as amended through 2010.
3. Joiner Brook River Corridor Plan (2009).
4. Winooski River Basin Plan (2012).
5. Protocol for Identification of Areas Sensitive to Landslide Hazards in Vermont (Joiner Brook, 2012).
6. Information on previous disasters from FEMA.
7. Information from the Vermont Agency of Natural Resources on fluvial erosion hazards, flood hazards.
8. Flood Insurance Rate Maps (as updated through 2011).
9. Vermont Agency of Natural Resources River Corridor and River Corridor Protection Area Maps.
10. Information from the Vermont Agency of Transportation and local inventories on town roads, bridges, culverts and high crash locations.
11. Information from the Vermont Department of Emergency Management and Homeland Security on prior disaster and hazardous materials reporting.

Demographic information for this plan was updated by a CCRPC intern in 2015. New information relative to the 2011 AHMP, from review of the development regulations and the

comprehensive plan, was incorporated into Section 5. Information on prior disasters, fluvial erosion hazards and flood hazards and various transportation data was incorporated into Sections 2, 3 and 4. Throughout plan development, CCRPC staff conferred with and sent drafts of the plan to town officials for review. CCRPC staff also produced updated versions of 2011 maps for inclusion in this 2017 update.

1.7.2 Opportunities for involvement in the planning process and formal public review and governing body approval

Emergency management planners are obligated to provide opportunities for the general public, neighboring communities, local, regional and state agencies, development regulation agencies and other interests to be involved in the review and development of Hazard Mitigation Plans. Additionally, the CCRPC, as a public agency is obligated to provide public notice and opportunities for input into its programming and processes. Opportunities for public review and development of the Multi-Jurisdictional AHMP are described in Section 1.7.2 of that document.

Opportunities for general public involvement and specific input from neighboring communities in the development of individual Local All-Hazards Mitigation Plans, including this plan for the **Town of Bolton,** included the following:

a) On August 5, 2016, the CCRPC posted all the first drafts of the 18 local AHMPs on the CCRPC website and, via various means (press release, electronic newsletter, etc), made the public aware of the opportunity to comment. This included posting of the CCRPC press release on Front Porch Forum (electronic bulletin board) in every municipality in the county. The public was advised to send comments directly to Dan Albrecht, CCRPC Senior Planner by August 19, 2016.
b) On August 5, 2016 the CCRPC staff also sent direct emails to the state agency staff notifying them of the opportunity to review the 18 local AHMPs posted on the CCRPC website and encouraging them to send any comments directly to Dan Albrecht, CCRPC Senior Planner by August 19, 2016.
c) On August 5, 2016 direct emails were also sent to the municipal Mayors/ Managers/ Administrators and/or Clerks of the abutting 12 communities outside of Chittenden County that abut the County (South Hero, Georgia, Fairfax, Cambridge, Stowe, Waterbury, Duxbury, Fayston, Lincoln, Starksboro, Monkton and Ferrisburgh) notifying them of the opportunity to review the 18 local AHMPs posted on the CCRPC website and encouraging them to send any comments directly to Dan Albrecht, CCRPC Senior Planner by August 19, 2016.

Based upon the solicitation process above, comments were received from Sharon Murray, Bolton Emergency Management Coordinator and Select Board member, and Carol Devlin, Assistant Town Clerk, on the first draft of the Town of Bolton AHMP. Their suggested edits and corrections were incorporated in the final draft. No inquiries from the public were received concerning this AHMP from August 19th through December 15, 2016 while the Plan was posted on the CCRPC website.

1.7.3 Submission of drafts to VDEMHS and FEMA for Review and final adoption process

On July 31, 2016 the first draft of this local Town of Bolton AHMP was sent to the Vermont Department of Emergency Management and Homeland Security (VDEMHS) for review. Comments and required revisions were received from VDEMHS on August 8, 2016. CCRPC staff, working in concert with town officials, made requested revisions to the Plan for formal submission to VDEMHS and FEMA.

This memo was discussed at a publicly noticed Planning Commission meeting held on October 12, 2015,warned in compliance with Vermont Open Meeting Laws (1 V.S.A. §§ 310-314). The memo and meeting materials were also made available for public review. Members of the public who attended the meeting were offered the opportunity to provide comments on plan development. The final draft version of this Plan was presented by CCRPC staff at a meeting of the Bolton Select Board on April 3, 2017.

Boilerplate to be filled in April-May 2017 after FEMA approval

On Month Day, 2017, the revised final draft annex was submitted to VDEMHS for review and forwarding to FEMA for formal review and approval pending municipal adoption

On Month Day, 2017 FEMA Region One issued a notice that the Town of Bolton AHMP was approved pending adoption by the relevant municipal governing body.

On Month Day, 2017, CCRPC staff provided the final versions of the Multi-Jurisdictional Plan and this Municipal Annex to the Town manager for distribution to the Town of Bolton Selectboard members and also provided draft language for a resolution of adoption to be discussed at a regularly scheduled and properly warned Town of Bolton Selectboard meeting

On Month Day, 2017 the revised annex was adopted by the Selectboard and a copy of the resolution sent to VDEMHS and FEMA Region One on Month Day, 2017.

On Month Day, 2017 issued a letter that the Town of Bolton's Plan was approved effective Month Day, 2017.

1.7.4. Monitoring, Evaluation and Updating of the Plan

Section 6 of the Multi-Jurisdictional AHMP document provides extensive details on the role each municipality and the Chittenden County RPC will play to be certain that progress on the implementation of this local AHMP is monitored and evaluated and that the AHMP is updated as needed and no later than its anticipated expiration in early 2022. In short, the Town of Bolton will:

- in the fall of 2017 and each fall thereafter, the Town will respond to CCRPC's questionnaire seeking information on the status (progress, problems if any, etc.) of each identified mitigation strategy detailed in Section 5;
- in the fall of 2018 and the fall of 2020, provide information to aid CCRPC in its more comprehensive review of the Multi-Jurisdictional AHMP and this local AHMP which will address issues such as goals, risks, resources, implementation problems, and partners; in partnership with the municipalities, the CCRPC will make the public aware of the availability of these review documents (via press releases, posting on the CCRPC website, electronic newsletters, one formal announcement in a paper of general

circulation in the County, and other mechanisms) and provide detailed instructions on how to provide comment on these reviews;

- provide at least one representative of the municipality to participate as a member of the Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan Update and Review Committee which, after the current Plan update process is completed, to resume meeting in 2018; and
- participate in the Plan update process (assumed to commence in 2020 and conclude by early 2022).

Finally, it should be reemphasized that the Town of Bolton may review and update their own programs, initiatives and projects more often by working directly with the State Hazard Mitigation Officer (SHMO) based on changing local needs and priorities. Formal changes to individual municipal annexes may be made at any time by each municipality's governing body in order to reflect changing conditions, priorities, and opportunities during the 5-year life cycle of their single jurisdiction plan.

SECTION 2: HAZARD IDENTIFICATION

Detailed descriptions of the natural, technological, and societal hazards affecting the municipalities of Chittenden County are contained Section 2 of the *Multi-Jurisdictional All-Hazards Mitigation Plan*. Designated and non-designated hazard areas are described in Section 3 of this annex. Vulnerability of structures and infrastructure to hazards is also described in Section 4 and depicted in Figure 4.1.

2.1.1 Profiled Hazards

This Plan profiles six (6) Natural Hazards: Severe Winter Storm, Flooding, Fluvial Erosion, Severe Rainstorm, Extreme Temperatures and Wildfire. Prior to this discussion of Hazards and the subsequent analysis of Risk and Vulnerability, it will be first helpful to summarize the general state of knowledge regarding Location, Extent and Impact in the Town of Bolton.

Hazard (section of MJAHMP where discussed)	**Are Location data available? (affected areas)**	**Are Extent data available? (magnitude, severity)**	**Are Impact data available? (estimated damages)**
Severe Winter Storm (2.1.1.1)	No, occurs across the municipality and not mapped	No, only long-term data is at single point of National Weather Service station in South Burlington	Yes, if FEMA declares disaster. See 3.3 below.
Flooding (2.1.1.3)	Yes, 100 & 500 year flood areas delineated in the municipality. *See Figure 2.1*	*Yes but only at a few discrete locations with gauge data such as USGS gauge on Winooski River downstream of the Town.	Yes, if FEMA declares disaster but co-mingled with fluvial erosion and severe rainstorm hazards events. See 3.3 below.
Fluvial Erosion (2.1.1.4)	Yes, fluvial erosion hazards areas (now termed river corridor protection areas) are mapped in the municipality. *See Figure 2.1.*	Though fluvial erosion is considered a significant hazard in the municipality, the number of feet-acres of soil lost in any one event has not been recorded nor is there a record with such data.	Yes, if FEMA declares disaster but data co-mingled with flood and severe rainstorm events. See 3.3 below.
Severe Rainstorm (2.1.1.2)	No, occurs across the municipality and not generally mapped. Those that do cause damage in the Town tend to be highly	*Yes but only long-term data is at single point of National Weather Service station in South Burlington. Severe rainstorms may	Yes, if FEMA declares disaster but data co-mingled with flood and fluvial erosion events. See 3.3 below.

	localized. Note that damages can just as easily be a function of poorly designed road and/or driveway drainage as it is a function of heavy rain exceeding infrastructure capacity.	also trigger the other hazards of Fluvial Erosion or if occurring in conjunction with high river levels also cause Flooding. Lastly in some cases may also trigger landslides.	
Extreme Temperatures (2.1.1.5)	No, occurs across the municipality and not mapped.	*Yes but only at single point of National Weather Service station in South Burlington	†Data not systematically collected on impacts.
Wildfire (2.1.1.6)	No, occurs across the municipality and not mapped; 96% of town is forested	Some compiled data on a countywide basis as shown in the Multi-Jurisdictional Plan but no systematic data collected after 2010.	‡Data not systematically collected on impacts.

** It is useful to note that while this NWS data is reliable it represents one discrete location in a county that has an area of 620 square miles in area. Likewise, while there are likely other systematic point-specific records being collected by individuals, business or organizations, these data do not appear to be easily accessible. Finally, even if such data were accessible, only if the data was collected by mutually compatible means would it be useful.*

†An intensive search of municipal public works records may reveal documentation of some prior repair or labor costs associated with frozen or burst sewer and/or water pipes caused by Extreme Cold. However, such analysis would show where past events happened not the location of inadequately buried pipes which might be vulnerable to future events.

‡ *An intensive search of fire department records may reveal documentation of locations and acres burned caused by Wildfire. However, such analysis would show where past events happened but would not show the location of areas susceptible to future events (warnings by the US Forest Service and local fire departments are not location-specific) nor the location of individuals who are likely to unwisely burn trash or leaves or fail to extinguish a campfire during dry conditions.*

This Plan profiles several Technological Hazards. Prior to this discussion of Hazards and the subsequent analysis of Risk and Vulnerability, it will be first helpful to summarize the general state of knowledge regarding Location, Extent and Impact in Town of Bolton for these hazards.

Hazard (section of MJAHMP where discussed)	**Are Location data available? (affected areas)**	**Are Extent data available? (magnitude, severity)**	**Are Impact data available? (estimated damages)**
Water Pollution (2.2.1)	Streams with water quality concerns are identified in Tactical Basin plans. The 2012 Winooski Basin Plan identifies insufficient flows	Phosphorus-loading for general locations is known but non-point sources are varied and dispersed. A road erosion inventory was performed in 2016 but data analysis is not yet	Annual budgetary impacts to individual municipalities are may be significant and vary depending upon location. The town is subject to the requirements of the

	due to snowmaking water withdrawals, affecting 2.9 miles of Joiner Brook.	complete and projects have not yet been prioritized or scoped.	pending Municipal Roads General Permit.
Hazardous Materials Incident (2.2.2)	Storage locations are known (see listing below of addresses). Incidents occurring during transport could occur anywhere but are most likely to occur along major transportation corridors in town (I-89, US2, NECR).	Rough estimates of spill amounts are recorded.	No formal data readily available on cleanup costs.
Power Loss (2.2.3)	Utility Service Areas/Corridors include Green Mountain Power, VT Electric Coop, VELCO; Outage locations not mapped.	During an actual outage some data is recorded on duration although typically this is stated as "x,000 customers within the power company's service area".	Outage data is broad and refers to total customers within a county.
Invasive Species (2.2.4)	Several species known to occur, mostly along road, utility line and river corridors, but no systematic mapping has taken place.	No formal damage has been documented to date.	No formal damage has been documented to date.
Multi-Structure Fire (2.2.5)	Could happen anywhere; but most likely in West Bolton, Bolton Valley where development is concentrated.	Data not formally collated across agencies.	Data not formally collated across agencies.
Major Transportation Incident (2.2.6)	Depends upon type of incident; in Bolton most likely along major corridors (I89, US2, NECR)	No formal database of damages.	Varies depending upon type of incident.

Water Supply Loss (2.2.7)	Most residences, businesses use private wells, but a private community system serves Bolton Valley Resort and surrounding development. This system has had repeated line breaks in recent years.	Data not formally collated across agencies.	Data not formally collated across agencies.
Sewer Service Loss (2.2.8)	Most residences and businesses use private septic systems, but a private community system serves Bolton Valley Resort and surrounding development.	Data not formally collated across agencies.	Data not formally collated across agencies.
Natural Gas Service Loss (2.2.9)	No natural gas service.	Information for this rare occurrence not publicly available.	No formal damage has been documented to date.
Telecommunications Failure (2.2.10)	Depending upon type of incident, could happen anywhere. Towers are located on Robbins and Ricker Mountains	Information for this rare occurrence not publicly available.	No formal damage has been documented to date
Other Fuel Service Loss (2.2.11)	Distribution points of fuels such as firewood, fuel oil and propane are individual addresses and not mapped nor publicly available.	No formal loss of servie has been documented.	No formal damage has been documented to date.

The following discussion of societal hazards is based upon qualitative information from discussions with Chittenden County law enforcement professionals as well as quantitative data from the State of Vermont.

Hazard (section of MJAHMP where discussed)	**Are Location data available? (affected areas)**	**Are Extent data available? (magnitude, severity)**	**Are Impact data available? (estimated damages)**
Crime (2.4.1.1)	Significant incidents could happen anywhere in the municipality.	Data collection is not standardized across municipalities.	Significant socio-economic impacts.
Economic Recession (2.4.1.2)	Would occur across the community.	Historic data on unemployment levels & poverty rates.	Longer lasting impacts hard to measure below county level.
Terrorism (2.4.1.3)	The FBI does not share a list of potential targets.	Unknown but assumed to be significant if incident occurs.	Unknown but assumed to be significant if incident occurs.
Civil Disturbance (2.4.1.4)	County-wide. Significant incidents can happen anywhere but are unlikely in Bolton given low population density; lack of public event and meeting facilities	No formal damage has been documented to date	No formal damage has been documented to date
Epidemic (2.4.1.5)	Could happen anywhere	Data not formally collated across agencies.	Other than 1917 Influenza epidemic no formal damage has been documented to date.
Key Employer Loss (2.4.1.6)	Depending upon type of employer. Bolton Valley Resort is the town's single major employer.	No formal database of damages.	No formal database of key employer loss is maintained

SECTION 3: RISK ASSESSMENT

3.1 Mapped Hazard Areas

3.1.1 Flood Hazard Areas

Special Flood Hazard Areas (SFHAs), as mapped by FEMA, exist along the banks of the Winooski River which bisects the town. The Town of Bolton has participated in the National Flood Insurance Program (NFIP) since 1981. Official FEMA Flood Insurance Study and Flood Insurance Rate Maps issued for the town by FEMA were most recently amended in 2010 (effective 2011), as incorporated and referenced in the town's current flood hazard area regulations,. Bolton's most recent regulations, as amended in 2010, designate two Flood Hazard Area Overlay Districts: one for the SFHA corresponding to the Village Zoning District and one covering the SFHA outside of the Village District. Replacement homes, small accessory structures and functionally dependent facilities (e.g., bridges) are the only allowed structures within the Flood Hazard Overlay outside of the Village, and are subject to flood hazard area review under the regulations. Where the overlay district intersects with the Village District, most development types are allowed as conditional uses, provided they comply with minimum NFIP standards and are located outside of the FEMA floodway.

A simple GIS intersection analysis reveals that portions of town roads and state highways are located within the 100-year floodplain, as are culverts, bridges and utility poles. Additionally, the railroad tracks through town are in the 100-year floodplain, which changes water flow during flood events. Unfortunately, this level of analysis does not take into account fluvial geomorphology (volume, velocity, direction, etc.) and does not factor in the elevation of the infrastructure relative to flood elevation. Analysis also reveals farmland located within the floodplain, however, without detailed studies it is not currently possible to predict how many cubic yards of productive soils might be lost during a flood event.

Figure 2.1 shows the current extent of the FEMA-FIRM flood hazard area in Bolton, as well as structures, infrastructure, and critical facilities located in the flood hazard area.

The only systematic data on river flow in the municipality historically has been collected on the Winooski River at a gauge downstream of Bolton at a location straddling South Burlington and Essex Junction (cf. Section 2.1.1.3 of the MJAHMP). While the data has been collected since the massive 1927 flood , once dams were constructed by the mid-1930s, water flows became more tightly regulated for flood control and electricity generation and therefore recorded peak flows may not accurately measure total rainfall or total discharge. A new river gauge, installed by the USGS in 2016 upstream of Bolton on the Main Street Bridge in Waterbury Village in response to flooding during Tropical Storm Irene, will provide more relevant river flow and flood level data for use in local emergency response planning and future hazard mitigation planning (data link: http://water.weather.gov/ahps2/hydrograph.php?gage=watv1&wfo=btv).

3.1.2 Fluvial Erosion Hazard and River Corridor Areas

During development and adoption of both the 2005 and 2011 Multi-Jurisdictional Plan and the municipal AHMPs, threats from stream erosion were identified and mapped as Fluvial Erosion Hazard Areas (FEHAs) based on field-conducted Stream Geomorphic Assessments (SGAs). The SGA approach is still used by the Vermont Agency of Natural Resources but the Vermont General Assembly adopted two related terms that are now used in managing fluvial erosion hazards. ANR now identifies and maps:

- *River Corridor*, which is the land area adjacent to a river that is required to accommodate the dimensions, slope, planform, and buffer of the naturally stable channel and that is necessary for the natural maintenance or natural restoration of a dynamic equilibrium condition, as that term is defined

in 10 V.S.A. §1422, and for minimization of fluvial erosion hazards, as delineated by the Agency in accordance with the ANR Flood Hazard Area and River Corridor Protection Procedures.

- *River Corridor Protection Area*, which is the area within a delineated river corridor subject to fluvial erosion that may occur as a river establishes and maintains the dimensions, pattern, and profile associated with its dynamic equilibrium condition and that would represent a hazard to life, property, and infrastructure placed within the area. The river corridor protection area is the meander belt portion of the river corridor without an additional allowance for a riparian buffer to serve the functions of bank stability and slowing flood water velocities in the near-bank region.

As defined under 24 V.S.A. § 4303, these definitions also control for purposes of regional and municipal planning and municipal development regulation.

Phase I SGAs were completed for Duck Brook, Gleason Brook, Preston Brook and the Winooski River, and Phase II SGAs were completed for Joiner Brook and Mill Brook prior to the 2011 AHMP. A Phase 2 SGA based River Corridor Protection Area (formerly Fluvial Erosion Hazard Area) and River Corridor Management Plan was developed for the portion of Joiner Brook where SGA was completed. Sections of Joiner Brook, and its major tributaries, have high fluvial erosion potential; and also a high landslide potential, as separately mapped by the Vermont State Geologist. *Figure 2.1* indicates all portions of streams in Bolton that are included in mapped RCPA and/or RC. Note that a portion of the Smilie School property lies within the ANR-mapped River Corridor for Joiner Brook.

3.1.3 Repetitive Loss Properties and National Flood Insurance Program

Repetitive loss properties are public or private buildings insured under the National Flood Insurance Program that have made at least two insurance claims of more than $1,000 each during a ten year period. According to the National Flood Insurance Program, there are no such properties located in the Town of Bolton.

The status of the town participation's in the National Flood Insurance Program is as follows:

Initial Flood Hazard Boundary Map	Initial Flood Insurance Rate Map	Current effective Map Date	Date of joining Regular NFIP	Date of most recent Community Assistance Visit
02/21/75	04/01/81	08/04/11	04/01/81	8/5/03

The town regulates all subdivisions and development within Special Flood Hazard Areas, as required for participation in the NFIP. The town Zoning Administrator and the town's Development Review Board (DRB) monitor program compliance. The DRB reviews and adjudicates applications for development within the floodplain in consultation with the VT Department of Environmental Conservation (DEC), including any proposed new construction. The town also works with DEC to respond to any local requests for Floodplain identification including questions about mapping.

3.1.4 Preliminary Data on Landslides

One of the study sites in the Vermont Geological Survey's 2012 report *"Protocol for Identification of Areas Sensitive to Landslide Hazards in Vermont"* was the Joiner Brook watershed as well as major tributaries (e.g., Goose Pond Brook on east side of valley) in Bolton. The report first notes:

> *The Joiner Brook watershed is on the west side of the Green Mountains in central Bolton. Joiner Brook flows into the Winooski River. The Bolton Valley Resort lies in the upper part of the drainage and affects*

the drainage in terms of runoff, sedimentation, and erosion. The Bolton Valley Access Road roughly parallels Joiner Brook on its way up to the resort.

Joiner Brook flows south across the site area in a dendritic/rectangular pattern. One major tributary flows east into Joiner Brook from the east central part of the site area. Bedrock outcrops dominate the uplands in the site area. The remaining surface is covered with glacial till (Doll, 1970).

Eleven mass failures were identified in the site area by the Rivers Management Program. Thirteen translational slides were investigated as part of the initial field reconnaissance for this project. All of the slides occur on the valley walls of Joiner Brook, primarily on the east side of the valley. The reason for this is not clear.

After applying the protocol at this study site, the report concluded:

aspect, slope, and roughness are the most influential parameters in Joiner Brook. Because Joiner Brook flows south across the site area and most of the landslides are on the eastern side of the valley, aspect was a dominant parameter and was able to explain many of the landslides. However, areas in valleys not trending north-south, such as the tributary flowing into Joiner Brook from the east were not adequately modeled using this parameter. Therefore, the best map found to identify most landslides at this site area was a combination of slope and roughness.

Excerpted below is the map referenced in the report.

Figure 2.2 Preliminary landslide analysis, Joiner Brook

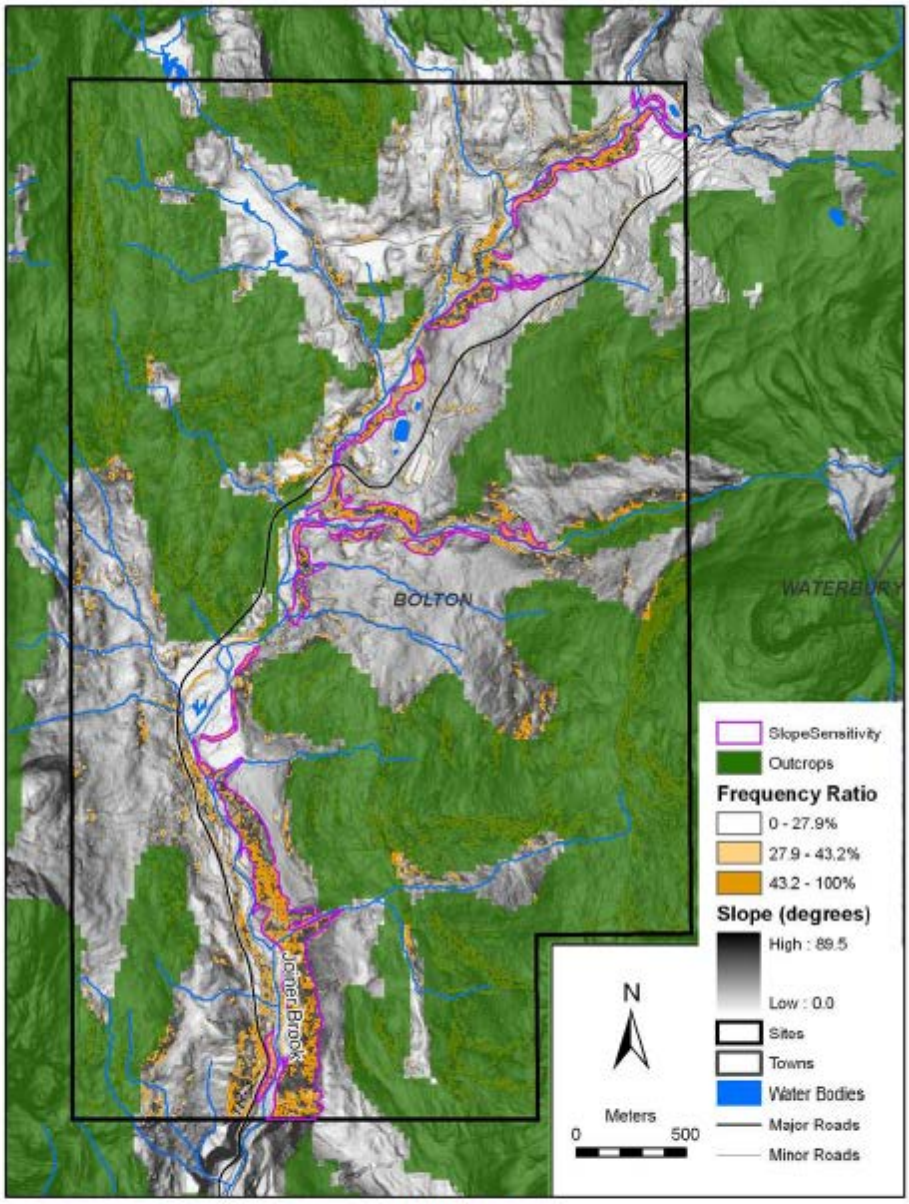

Figure 13
Joiner Brook Site Area
Results of Frequency Ratio Analysis in Percent and Areas of Slope Sensitivity

3.2 Other Information

The following hazards are not formally analyzed nor mapped due to the random nature of where such damage occurs. However they occur with some frequency and therefore are discussed here.

3.2.1 1998 Ice Storm Damage

Impacts of the January 1998 ice storm (DR-1201) in Bolton were minor. Trees in the higher elevations in the northeastern corner of town suffered "Low" damage severity, as ascertained by the VT Agency of Natural Resources. ANR data indicates that a small area of forest in the extreme northeastern corner of

town suffered "High" damage due to the ice storm. Bolton did not receive formal Public Assistance dollars as part of this disaster. Some smaller winter storm events have occurred since then, including most recently DR-4163, declared in January 2014. Bolton Valley Resort is also susceptible to ice damage due to its exposed location and high elevation. However, mapping the locations of potential future events is not feasible as their occurrence is a function of numerous climatic variables.

3.2.2 Severe Rainstorms

In prior versions of this Annex and the County Plan, damage to roads, culverts and bridges from thunderstorm events was discussed as either the result of flooding or fluvial erosion. It was assumed that overflowing nearby streams, rivers or lakes were the cause of the damage. Analysis has shown that this damage is caused by intense, localized thunderstorms which cause excessive and rapid water flows and flash flooding on and over paved and gravel roads, roadside ditches, driveway culverts, stormwater systems, etc. In many cases, damaged infrastructure is located nowhere near a formally mapped Floodplain or Fluvial Erosion Hazard Area or River Corridor Protection Area. This was the case in more recent FEMA-declared disasters in the summer of 2013 and 2015. Because of this new information, CCRPC has decided to add "Severe rainstorm" to the 2016 Update to the County Plan and its annexed local AHMPs. While past damage locations can sometimes be mapped (depending upon the degree and accuracy of data collection efforts) this may or may not provide any degree of predictability of the potential locations for future events.

The Town of Bolton's road infrastructure as well as many private driveways have very steep grades (>10%) and are therefore susceptible to damage from intense rainstorms–including, for example, portions of the Bolton Notch Road and the Bolton Valley Access Road. Damage occurring in DR 4120, DR 4022, DR 4232 and DR 1995 (noted below) included significant damage from severe rainstorms.

High winds and lightning are subsumed within the category of Severe Rainstorms. Ridgeline and hilltop infrastructure, utility lines, and homes located in the midst of mature forests are the most vulnerable to damage from falling trees and tree limbs. Three high wind events have been specifically identified as affecting Bolton in the last five years by the National Climatic Data Center. No lightning strikes resulting in damage have been recorded in Bolton in the past 20 years; but a 2016 wildfire atop Robbins Mountain that took several weeks to extinguish, was attributed to a lightning strike one of 68 such strikes recorded in 2016 in Bolton. High winds are also common through the "Bolton Flats" along Route 2. High winds have caused issues with the Town Garage roof in the past.

3.2.3 High Crash Locations

The following High Crash Locations have been identified by the Vermont Agency of Transportation in Bolton.

Table 3-1 Town of Bolton, high crash road sections, 2010-2014

Road	Road Type	Section (miles)	Severity Index $/crash
Interstate 89	Rural Interstate	72.000-72.300	$8,900

Source: Vermont Agency of Transportation

3.2.4 Road Infrastructure Failure

Of the three bridges inventoried by VTrans for Bolton, one is rated functionally deficient, and none are considered structurally deficient. The functionally deficient rating does not mean that the bridges are in imminent danger of collapse, however. For a listing of culverts identified as "geomorphically-incompatible" either due to inadequate size or improper alignment, see Section 4.2.2.

3.2.5 Hazardous Substances

Hazardous material release is discussed as a possible hazard in the Multi-Jurisdictional All-Hazards Mitigation Plan. According to Vermont Emergency Management, there are 7 reported hazardous material storage sites in Bolton. Sites that contain large amounts of fuel or store what VEM calls Extremely Hazardous Substances are more likely to cause significant problems in a hazardous materials incident. According to the 2014 hazardous materials data obtained from VEM, the following sites in Bolton stored fuel in excess of 10,000 lbs. There are no sites in Bolton that store extremely hazardous substances.

Table 3-2 Town of Bolton, fuel and hazardous materials storage sites in excess of 10,000 lbs

Owner / Facility	Type of Substance
BOLTON SUNOCO (US 2)	GASOLINE
AMERIGAS (US 2)	PROPANE
FERNWOOD MANOR MOBILE HOME PARK (WEST ST)	VARIOUS CHEMICALS RELATED TO DRINKING WATER TREATMENT
GREEN MOUNTAIN POWER (BOLTON SUBSTATION #1, GREEN MT DR)	LEAD-ACID BATTERIES
BOLTON VALLEY RESORT (BOLTON VALLEY ACCESS RD)	VARIOUS FUELS
RCC ROBBINS (TOWER FACILITY, ROBBINS MT)	LEAD ACID BATTERIES AND SULFURIC ACID
VERIZON WIRELESS (TOWER FACILITY, ROBBINS MT)	SULFURIC ACID

Source: Vermont Department of Emergency Management and Homeland Security Tier II Database, 2017.

It should also be noted that many hazardous materials travel through Bolton via the New England Central Railroad, US2 and I-89. Although these substances cannot be identified or quantified for the purposes of this plan, transportation of hazardous materials presents the greatest risk for a hazardous materials incident in Bolton.

3.3 Previous FEMA-Declared Natural Disasters and Snow Emergencies

3.3.1 Public Assistance

Since 1990, Bolton has received public assistance funding from FEMA for the following natural disasters:

Table 3-3 Town of Bolton, FEMA-declared disasters and snow emergencies, 1990-2016

Date (FEMA ID#)	Type of Event	Total Repair Estimates
June 1990 (DR 875)	Flooding	$1,282,529
January 1996 (DR 1101)	Flooding	$29,400
July 1998 (DR 1228)	Flooding	$37,435
April 2001 (EM3167)	Snow Emergency	$8,881
June 2011 (DR 1995)	Flooding	$37,046

September 2011 (DR 4022)	Tropical Storm Irene	$105,950
August 2013 (DR 4140)	Flooding	$25,702
June 2015 (DR 4232)	Severe Storm and Flooding	$334,128.44

Sources: Federal Emergency Management Agency.
Dollar value figures represent the total estimated repair costs for damages suffered to municipal resources. This table does not include damage claims submitted to FEMA by non-municipal organizations or by private individuals or businesses.

The Town of Bolton was reimbursed at a rate of 75% by FEMA for the estimated repair costs, coupled with additional dollars from the State's Emergency Relief Assistance Fund (ERAF), at a rate of 7.5%. Funds provided in response to these natural disasters were used as follows:

- June 1990: Large sections of Bolton Valley Access Road were completely washed out. The road was repaired with more culverts and larger culverts, new ditching, new gravel. This road is a Federal Aid Highway and is therefore not eligible for FEMA funding, but rather received money from the State.
- January 1996: Damages again to Bolton Valley Access Road, but less extensive than in 1990. Repairs to gravel road shoulders as well as new ditching constructed. This road is a Federal Aid Highway and is therefore not eligible for FEMA funding, but rather received money from the State of Vermont.
- July 1998: Shoulder repair and new gravel on Stage Road, Mill Brook and Notch Rd. Minor repairs on Bolton Valley Access Road
- April 2001: Increased contractual costs for snow removal
- June 2011: Repair to road damage on the Notch Road, Duxbury Road and Honey Hollow Road.
- September 2011: Repair of road washouts by Joiner Brook, as well as repair of road damage on Honey Hollow Road and at several sites along Duxbury Road.
- August 2013: Repair of road washouts on Honey Hollow Road, York Road, Notch Road and Stage Road.
- June 2015: Repair of road and culvert washout on Honey Hollow Road and Duxbury Road and road washout on the Notch Road. Bolton Valley Access Road also experienced damage but, as a Federal Aid Highway, was not eligible for FEMA funding; these were covered by the town.
- Note: This storm (and others) also resulted in significant damage to state forest roads/lands (e.g., in 2015 Broadway Trail, which also serves as an access road to state forestland--and previously in Honey Hollow (bridge, culvert wash outs). ANR received some federal assistance for 2015 repairs to forest roads.

See *Figure* 3.1. to see locations where repairs funded in part with FEMA Public Assistance took place for disasters between 2001 and 2015. As the map shows, damage has tended to be concentrated in upland areas and along steep roads. Note that some Debris Removal and Protective Measures locations are shown at the location of the municipal office. This indicates assistance was at various locations throughout the municipality, not that damages were incurred at the office.

3.3.2 Individual Assistance funds

As noted in Section 3.3 of the County Plan, due to privacy concerns, the individual homes or businesses which received Individual Assistance funds are not public information. However, the names of the streets of such homes or businesses from which claims are filed is available as are the funds provided. With regards to the Town of Bolton, data indicate that 3 individual assistance claim was approved following the September 2011 (Tropical Storm Irene) disasters. See table below and *Figure 3.1.1.*

Table 3-4 Town of Bolton, location of individual assistance claims, Tropical Storm Irene, September 2011

Disaster	Damaged Address City	Damaged Address Street	Registrations	Amount
Tropical Storm Irene	BOLTON	DUXBURY ROAD	1	$9,359.39
Tropical Storm Irene	BOLTON	RT 2	1	$1,670.33
Tropical Storm Irene	BOLTON	THEODORE ROOSEVELT HIGHWAY	1	$10,383.91

Additionally, one home on US 2 was purchased through a FEMA buyout following flooding in 2011. The Town has also received a Hazard Mitigation Planning Grant to elevate several homes along US 2 above the base flood elevation. One has been elevated to date under the grant; others are pending based on the availability of matching funds.

3.4 Future Events

Although estimating the risk of future events is far from an exact science, CCRPC staff used best available data and best professional judgment to conduct an updated Hazards Risk Estimate analysis, which was subsequently reviewed and revised by town officials in Fall 2015. This analysis assigns numerical values to a hazard's affected area, expected consequences, and probability. This quantification allows direct comparison of very different kinds of hazards and their effect on the county, and serves as a rough method of identifying which hazards hold the greatest risk. CCRPC staff applied the following scoring system:

Area Impacted, scored from 0-4, rates how much of the municipality's developed area would be impacted.

Consequences consists of the sum of estimated damages or severity for four items, each of which are scored on a scale of 0-3:

- Health and Safety Consequences
- Property Damage
- Environmental Damage
- Economic Disruption

Probability of Occurrence (scored 1-5) estimates an anticipated frequency of occurrence.

To arrive at the overall risk value, the sum of the Area and Consequence ratings was multiplied by the Probability rating. The highest possible score is 80.

As explained in detail in Section 3.4 of the Multi-Jurisdictional Plan, for the 2011 Plan the following Hazards were considered to occur or have the potential to occur with sufficient frequency and/or severity to be profiled for Risk Estimation in that Plan:

Natural Hazards:

- Drought
- Flooding
- Fluvial erosion
- High winds
- Landslide
- Lightning
- Multi-structure urban fire
- Radiological (natural)
- Wildfire
- Winter storm

Technological Hazards:

- Gas service loss
- Hazardous materials incident
- Major transportation incident
- Military ordnance incident
- Power loss
- Radiological incident
- Sewer service loss
- Telecommunications failure
- Water service loss

Societal Hazards:

- Crime
- Civil disturbance
- Economic recession
- Epidemic
- Key employer loss
- Terrorism

For the 2017 update, the CCRPC and its All-Hazards Mitigation Plan Update Committee made slight changes to this list by consolidating some hazards or delineating hazards with more specificity as follows:

Natural Hazards:

- Flooding
- Fluvial erosion
- Severe rainstorm
- Wildfire
- Severe Winter storm
- Extreme temperatures

Technological Hazards:

- Hazardous materials incident
- Major transportation incident
- Multi-structure fire
- Natural gas service loss
- Water Pollution
- Power loss
- Sewer service loss
- Telecommunications failure
- Water service loss
- Other fuel service loss
- Invasive Species

Societal Hazards:

- Crime
- Civil disturbance
- Economic recession
- Epidemic
- Key employer loss
- Terrorism

3.4.1 Natural Hazards

For the 2011 Hazard and Risk Estimation analysis for Bolton, the following natural hazards received the highest risk ratings out of a possible high score of 80:

- Severe Winter Storm (50)
- Flooding (32)
- Fluvial Erosion (20)
- Wildfire (20)

For the 2017 update, the following natural hazards received the highest risk ratings out of a possible high score of 80 (see Table below):

- Fluvial Erosion (55)
- Severe Rainstorm (50)

- Flooding (44)
- Winter Storm (40)
- Wildfire (32)

Although winter storms occur more frequently and occur across the town, they do not cause as much damage as the other hazards which can be more intense and localized.

Table 3-5 Natural hazards risk estimation matrix, Bolton

	Risk Characteristic	Extreme Temps	Wildfire	Winter Storm	Flooding	Severe Rainstorm	Fluvial Erosion
	0 = No developed area impacted						
Area	1 = Less than 25% of developed area impacted	1				1	
Impacted	2 = Less than 50% of developed area impacted		2				
	3 = Less than 75% of developed area impacted				3		3
	4 = Over 75% of developed area impacted			4			
Health and	0 = No health and safety impact	0	0				
Safety	1 = Few injuries or illnesses			1	1	1	1
Consequences	2 = Few fatalities but many injuries and illnesses						
	3 = Numerous fatalities						
	0 = No property damage	0					
Property	1 = Few properties destroyed or damaged			1			
Damage	2 = Few destroyed but many damaged		2				
	2 = Few damaged and many destroyed						
	3 = Many properties destroyed and damaged				3	3	3
	0 = Little or no environmental damage						
Environmental	1 = Resources damaged with short-term recovery	1		1			1
Damage	2 = Resources damaged with long-term recovery		2		2	2	
	3 = Resources destroyed beyond recovery						
	0 = No economic impact						
Economic	1 = Low direct and/or indirect costs	1		1			
Disruption	2 = High direct and low indirect costs		2		2		
	2 = Low direct and high indirect costs						
	3 = High direct and high indirect costs					3	3
	TOTAL SCORE	3	8	8	11	10	11
	1 = Unknown but rare occurrence						
Probability of	2 = Unknown but anticipate an occurrence						
Occurrence	3 = 100 years or less occurrence						
	4 = 25 years of less occurrence	4	4		4		
	5 = Once a year or more occurrence			5		5	5
	TOTAL RISK RATING	12	32	40	44	50	55

3.4.2 Technological Hazards

For the 2011 Hazard and Risk Estimation for Bolton, the following societal hazards received the highest risk ratings out of a possible high score of 80:

- Power Loss (40)
- Telecommunications Failure (28)
- Major Transportation Incident (24)

For the 2017 Hazard and Risk Estimation for Bolton, the following technological hazards received the highest risk ratings out of a possible high score of 80 (see table below):

- Power Loss (40)
- Major Transportation Incident (30)
- Telecommunications Failure (28)

Bolton is vulnerable to Power Loss and Telecommunications Failure because the population is dispersed and repairing utility infrastructure in rural areas can take more time. The presence of Interstate 89, US Route 2, and the New England Central Railroad raise Bolton's risk of a major transportation incident. A large percentage (and in some years the majority) of the Bolton Volunteer Fire Department's calls come from accidents on I-89. The Fire Department and other state emergency service providers have the ability to access I-89 in Bolton from emergency access gates located in town on both the north and southbound lanes.

Table 3-6 Technological hazards risk estimation matrix, Bolton

	Risk Characteristic	Power Loss	Major Transpor. Incident	Tele-comm. Failure	Invasive Species	Hazard Materials Incident	Water Pollution	Multi-structure fire	Other fuel service loss	Sewer Service Loss	Water Service Loss	Gas Service Loss
	0 = No developed area impacted											0
Area	1 = Less than 25% of developed area impacted				1	1	1	1	1	1	1	
Impacted	2 = Less than 50% of developed area impacted											
	3 = Less than 75% of developed area impacted		3									
	4 = Over 75% of developed area impacted	4		4								
Health and	0 = No health and safety impact				0				1	0	0	0
Safety	1 = Few injuries or illnesses	1	1	1		1	1	1				
Consequences	2 = Few fatalities but many injuries and illnesses											
	3 = Numerous fatalities											
	0 = No property damage			0								0
Property	1 = Few properties destroyed or damaged	1			1	1	1	1	1	1	1	
Damage	2 = Few destroyed but many damaged		2									
	2 = Few damaged and many destroyed											
	3 = Many properties destroyed and damaged											
	0 = Little or no environmental damage	0		0				0	0	0	0	0
Environmental	1 = Resources damaged with short-term recovery		1				1					
Damage	2 = Resources damaged with long-term recovery				2	2						
	3 = Resources destroyed beyond recovery											
	0 = No economic impact											0
Economic	1 = Low direct and/or indirect costs				1	1		1	1	1	1	
Disruption	2 = High direct and low indirect costs	2		2			2					
	3 = Low direct and high indirect costs		3									
	4 = High direct and high indirect costs											
	TOTAL SCORE	8	10	7	5	6	6	4	4	3	3	0
	1 = Unknown but rare occurrence								1	1	1	1
Probability of	2 = Unknown but anticipate an occurrence					2	2					
Occurrence	3 = 100 years or less occurrence		3					3				
	4 = 25 years of less occurrence			4	4							
	5 = Once a year or more occurrence	5										
	TOTAL RISK RATING	40	30	28	20	12	12	12	4	3	3	0

3.4.3 Societal Hazards

For the 2011 Hazard and Risk Estimation for Bolton, the following societal hazards received the highest risk ratings out of a possible high score of 80:

- Key Employer Loss (20)
- Epidemic (21)

For the 2017 Hazard and Risk Estimation for Bolton, the following societal hazards received the highest risk ratings out of a possible high score of 80 (see table below):

- Key Employer Loss (24)
- Epidemic (21)

The likelihood of an epidemic is difficult to gauge, but its consequences could be severe. The Bolton Valley Resort is the major employer in the town, making Bolton very vulnerable to a key employer loss.

Table 3-7 Societal hazards risk estimation matrix, Bolton

	Risk Characteristic	Civil Disturbance	Terrorism	Crime	Economic Recession	Epidemic	Key Employer Crisis
	0 = No developed area impacted						
Area	1 = Less than 25% of developed area impacted	1	1	1			
Impacted	2 = Less than 50% of developed area impacted				2	2	2
	3 = Less than 75% of developed area impacted						
	4 = Over 75% of developed area impacted						
Health and	0 = No health and safety impact				0		0
Safety	1 = Few injuries or illnesses	1	1	1			
Consequences	2 = Few fatalities but many injuries and illnesses					2	
	3 = Numerous fatalities						
	0 = No property damage				0	0	0
Property	1 = Few properties destroyed or damaged	1	1	1			
Damage	2 = Few destroyed but many damaged						
	2 = Few damaged and many destroyed						
	3 = Many properties destroyed and damaged						
	0 = Little or no environmental damage	0	0	0	0	0	0
Environmental	1 = Resources damaged with short-term recovery						
Damage	2 = Resources damaged with long-term recovery						
	3 = Resources destroyed beyond recovery						
	0 = No economic impact						
Economic	1 = Low direct and/or indirect costs	1		1			
Disruption	2 = High direct and low indirect costs		2		2		
	3 = Low direct and high indirect costs					3	
	4 = High direct and high indirect costs						4
	TOTAL SCORE	4	5	4	4	7	6
	1 = Unknown but rare occurrence	1	1				
Probability of	2 = Unknown but anticipate an occurrence						
Occurrence	3 = 100 years or less occurrence					3	
	4 = 25 years of less occurrence			4	4		4
	5 = Once a year or more occurrence						
	TOTAL RISK RATING	4	5	16	16	21	24

3.4.4 Hazard Summary

According to the risk estimation analysis, the highest rated hazards by type for Bolton are:

Natural Hazards
- Fluvial Erosion (55)
- Severe Rainstorm (50)
- Flooding (44)
- Winter Storm (40)
- Wildfire (32)

Technological Hazards
- Power Loss (40)
- Major Transportation Incident (30)
- Telecommunications Failure (28)

Societal Hazards
- Key Employer Loss (24)
- Epidemic (21)

It should be noted that three of the natural hazards on the list – severe winter storm, severe rainstorms and fluvial erosion – could be the cause of the highest-rated technological hazards, power loss and telecommunications failure. Fluvial erosion is the highest rated hazard in Bolton due to the town's limited road system and very steep slopes. Winter storms are highly ranked due in large part to their widespread nature and frequent occurrence. The railroad, I-89 and US2 run through Bolton; a transportation incident on these could block or put excessive traffic on other roads.

There is only one road to Bolton Valley Resort; blockage or washout of this road in the past has isolated and limited emergency response at the resort and adjoining residential neighborhoods, and this is possible in future disasters. The town has secured an emergency access easement on Broadway, a forest road in the Mt. Mansfield State Forest, to provide an alternate route in the event the S-Curve culvert on the Bolton Valley Access Road washes out again. In addition, during major floods such as those that occurred during Tropical Storm Irene, portions of Route 2 and Duxbury Road flooded, leaving no way to access or evacuate homes along the Duxbury Road and limiting access to critical facilities, including the town office (emergency operations center) and the town's designated shelters (Smilie School, Fire Station). This would occur again during a 100-year flood event.

SECTION 4: VULNERABILITY ASSESSMENT

As discussed in Section 4 of the County Plan, typical vulnerabilities from common hazards consist primarily of:

- Damage to public infrastructure especially roads and culverts;
- Temporary closures of roads and bridges including from debris;
- Temporary loss of power and/or telecommunications
- Temporary isolation of vulnerable individuals such as the elderly or those in poverty.

More specifically, these vulnerabilities typically occur in association with the Profiled Natural Hazards as follows:

Table 4-1 Town of Bolton: Natural hazards and typical vulnerabilities

Hazard	**Typical vulnerabilities**	**Occasional additional vulnerability**
Severe Winter Storm	-temporary closures of roads and bridges from snow, ice and debris; -temporary loss of power and/or telecommunications, and -temporary isolation of vulnerable individuals	-budget impacts from cleanup
Flooding	-temporary closures of roads and bridges from inundation, washouts and debris; -temporary loss of power and/or telecommunications, and -temporary isolation of vulnerable individuals -damage to public infrastructure	-budget impacts from road/bridge closures and repairs to public infrastructure -damages to individuals' properties and businesses
Fluvial Erosion	-temporary closures of roads and bridges from slides, debris; -temporary loss of power and/or telecommunications, and -temporary isolation of vulnerable individuals -damage to public infrastructure	-budget impacts from road/bridge closures and repairs to public infrastructure -damages to individuals' properties and businesses
Severe Rainstorm	-temporary closures of roads and bridges from flash flooding, washouts and debris; -temporary loss of power and/or telecommunications, and -temporary isolation of vulnerable individuals -damage to public infrastructure	-budget impacts from road/bridge closures and repairs to public infrastructure -damages to individuals' properties and businesses

Extreme Temperatures	-damage to public infrastructure -loss of water service	-budget impacts due to needed repairs
Wildfire	-damage to public and private property, including state parks and forestland	

Relative to the County as a whole the Town of Bolton has a higher vulnerability to:

- Severe Rainstorms, Fluvial Erosion due to mountainous terrain, including steep slopes, steep road grades, and roads located along mountain streams, amount of gravel roads.
- Major flooding along the Winooski River.
- Wildfires, including upland forest fires, due to the amount of forest cover, high elevation exposure to lightning strikes.

Vulnerabilities with regards to Technological Hazards are harder to project as these incidents occur with less frequency and less predictability.

Table 4-2 Town of Bolton: Technological hazards and typical vulnerabilities

Hazard	**Typical vulnerabilities**	**Occasional additional vulnerability**
Major Transportation Incident	-temporary closures of transportation infrastructure -injuries, deaths	-if major event, potential long term closure of infrastructure.
Power Loss	-temporary loss of electrical service -temporary impacts to vulnerable individuals -damage to public infrastructure	-if extended event, damage to perishable goods or business income. -if extensive loss, potential budget impacts to service providers.
Hazardous Materials Incident	-temporary closures of roads and bridges during cleanup. -propane storage facility incident could affect town office, school, rail line, US 2	-if large event, potential high cleanup costs. -injuries to persons
Water Service Loss	Primarily applicable to Bolton Valley Resort, Fernwood Mobile Home Park. -temporary loss of service -temporary impacts to vulnerable individuals	-if extensive loss, potential budget impacts to service providers.
Gas Service Loss	No natural gas service in Town.	N/A

Telecommunications Failure	-temporary loss of service -temporary impacts to vulnerable individuals	-if extensive loss, potential budget impacts to service providers.
Other Fuel Service Loss	-temporary loss of service -temporary impacts to vulnerable individuals	-if extensive loss, potential budget impacts to service providers.
Sewer Service Loss	Primarily applicable to Bolton Valley Resort, Fernwood Mobile Home Park. -temporary loss of service -temporary impacts to vulnerable individuals	-if extensive loss, potential budget impacts to service providers.
Water Pollution	-anticipate budgetary impacts due to Municipal Roads General Permit requirements.	-if repeat events, impacts to tourism-based businesses
Invasive Species	-unknown at this point	-unknown at this point.

Relative to the County as a whole the Town of Bolton has a slightly higher vulnerability to:

- Major Transportation Incident due to the transit of a railroad line, US 2 and Interstate 89 through the Town.
- Power Loss and Telecommunications Failure due to mountainous terrain, high elevation tower facilities (Robbins Mountain)

With regards to Societal Hazards, vulnerabilities are typically more dispersed among individuals and societal sectors compared to the natural environment and to technology which is fixed.

Table 4-3 Town of Bolton: Societal Hazards and typical vulnerabilities

Hazard	**Typical vulnerabilities**	**Occasional additional vulnerability**
Crime	-increased demands on police services and social services	-injuries -deaths
Epidemic	-temporary closures of schools, businesses, places of assembly -increased demand on medical services	-if an epidemic is widespread and long-lasting, impact could be severe
Key Employer Loss	-loss of economic activity -loss of portion of tax base -increased demands on social services	-effects increased if employer is of significant size
Economic Recession	-loss of economic activity -increased demands on social services -some loss of tax revenue	-effects increased if event is of extended duration

Civil Disturbance	-injuries to persons -damage to public and private property	-budget impacts to police services depending upon severity of event -deaths
Terrorism	-injuries to persons -damage to public and private property	-injuries -deaths

Relative to the County as a whole there is insufficient data to conclude whether or not the Town is more vulnerable to one of the Societal Hazards noted above. However, as the Bolton Valley Resort is the Town's only major employer, any closure of this resort would have a significant impact.

With regards to the vulnerability of critical facilities, infrastructure and vulnerable populations, quantitative and locational data for the Town are available as follows.

4.1 Critical Facilities

The Center for Disaster Management and Humanitarian Assistance defines critical facilities as: "Those structures critical to the operation of a community and the key installations of the economic sector." *Figure 1.4* shows the geographic distribution of some critical facilities and utilities. The table below identifies critical facilities in Bolton, excluding critical facilities designated as hazardous materials and petroleum storage sites, which are shown in Section 3.2.5. This list includes all critical facilities, not only the facilities located in designated hazard areas.

Table 4-4 Critical facilities in the Town of Bolton

Facility Type	Number of Facilities
Education Facility	1
Fire Station	1
Emergency Shelters	2
Emergency Operations Center	1
Town Garage	1
Government and Military	3
Information and Communications	2

Source: VCGI, Town Officials

The Town Garage is located in a mapped Flood Hazard Area. Smilie School (the primary shelter) is located in the mapped River Corridor. While a portion of the Smilie School property is located in a mapped River Corridor Protection Area, no buildings are located in a mapped RCPA. It should be noted that although the Town Office/Emergency Operations Center and the Fire Department are not located in any mapped hazard areas, access to them may be blocked by flood waters during a disaster event.

4.2 Infrastructure

4.2.1 Town Highways

The following is a statistical overview of roads in the Town of Bolton. These tables show the range of road types within the town, from highways to unpaved roads. The different road types have different hazard vulnerabilities. Unpaved roads are more vulnerable to being washed out in a flood or heavy storm, while traffic incidents are more likely to occur on large, arterial roads.

Municipal highways, bridges and dams are well mapped in Chittenden County. The following three tables show the diversity of municipal highways and road surface in the Town of Bolton.

The state divides municipal (town) highways into the following classes, for purposes of highway maintenance and state aid:

Class 1 town highways are subject to concurrent responsibility and jurisdiction between the municipality and VTrans. Class 1 town highways are state highways in which a municipality has assumed responsibility for most of the day to day maintenance (pot hole patching, crack filling, etc.). The state is still responsible for scheduled surface maintenance or resurfacing. In Chittenden County Class 1 highways are generally paved. None exist in Bolton.

Class 2 town highways are primarily the responsibility of the municipality. The state is responsible for center line pavement markings if the municipality notifies VTrans of the need. The municipality designates highways as Class 2 with approval from VTrans. These are generally speaking the busier roads in a given town second to Class 1. In Chittenden County, most Class 2 highways are generally paved although in the more isolated areas these are gravel roads. Bolton takes advantage of Class 2 state highway paving grants to maintain the town's three Class 2 roads, Duxbury Road, the Bolton Valley Access Road and the Bolton section of the Nashville Road.

Class 3 town highways are the responsibility of and designated by the municipality. These are to be maintained to an acceptable standard and open to travel during all seasons. In Chittenden County, Class 3 roads are both paved or gravel. Bolton has a few sections of paved Class 3 road, but most of its Class 3 roads are gravel. Because of its steep grade and narrow width, Honey Hollow Road, though a Class 3 road, is officially closed during the winter months.

Class 4 town highways are all other highways and the responsibility of the municipality. However, pursuant to Vermont State Statutes, municipalities are not responsible for maintenance of Class 4 town highways for year-round use but are required to maintain culverts and bridges.. These are generally closed during the winter and minimally maintained and almost exclusively dirt.

Table 4-5 Highway mileage by class, Town of Bolton

Class 1	Class 2	Class 3	Class 4	State Hwy	Fed Hwy	Interstate	Total 1, 2, 3, State Hwy
	8.580	12.010	0.300	11.906	5.669	5.636	32.496

Source: data derived from VTrans TransRDS GIS data – surface class and arc length. Note that the Town is not required to maintain federal and state highways.

Table 4-6 Highway mileage by surface type, Town of Bolton

Paved	Gravel	Soil or Graded	Unimproved	Impassable	Unknown	Total
21.466	7.598	3.032	0.1	0	.3	32.496

Total Known	Total Unpaved	% Paved	% Unpaved
32.196	10.73	66.6%	33.3%

Source: data derived from VTrans TransRDS GIS data – surface class and AOTmiles, 2015

See *Figure 3.2* for locations of paved vs. gravel and/or dirt roads.

4.2.2 Bridges, Culverts, and Dams

There are a number of bridges and culverts located in the municipality. The following bridges are contained in a 2016 inventory maintained by VCGI, VTrans, CCRPC and the town. A GIS intersection was performed to determine which bridges are located in the designated flood hazard area (aka Special Flood Hazard Area or 100-year floodplain.) and /or the River Corridor Protection Area (aka Fluvial Erosion Hazard Area).

Bolton also contains a number of culverts and bridges within state forests. While these are not the responsibility of the town to repair, damage to them can affect the town, and public access to these areas. Similarly, any closures or damage to Interstate 89 or US 2 or to bridges and culverts owned by the railroad can cause impacts to Town residents and businesses.

Table 4-7 Bridges located in the SFHA and/or RCPA

Bridge Type / Number	Location	Route Name	Year Built	SFHA?	RCPA?	Stream
ROLLED BM W TMBR DK (Town Long Structure)	0.1 MI TO JCT W CL2 TH3	Cemetery Road	1919	No	Yes	Mill Brook RMPSFEH 091210
CONCRETE T-BEAM (Town Long Structure)	0.08 MI TO JCT W US2	Joiner Brook Road	1919	Yes	Yes	Joiner Brook RMPSFEH 011409
CONCRETE (Town Long Structure)	Just east of JCT HONEY HOLLOW RD.	Duxbury Road	1939	No	Yes	Preston Brook
ROLLED BEAM (State Long structure)	6.4 MI W JCT VT.100 N	US2	1961	Yes	Yes	Joiner Brook RMPSFEH 011409
4 SPN CONT WGIR/RB (State Long structure)	6.8 MI N EXIT 10	I89	1961	No	Yes	Joiner Brook RMPSFEH 011409
5 SP CONT WELDED PL (State Long structure)	6.5 MI W JCT VT 100 N	US2	1961	No	Yes	Joiner Brook RMPSFEH 011409
5 SPN CONT WGIR/RB B36B – (State Long Structure)	6.8 Miles N Exit 10 on I-89	I-89N	1961	Yes (part)	Yes	Joiner Brook
Railroad Bridge	Crosses Joiner Brook	railroad		Yes	Yes	Joiner Brook
6 SPN CONT WGIR/RB Bridge No. 0051S	6.8 Miles N Exit 10 on I-89	I-89S	1961	Yes (part)	Yes (part)	Joiner Brook
Pedestrian suspension bridge (Green Mountain Club)	1.2 Miles east of JCT Cochran & Duxbury roads	Long Trail	2015	Yes	Yes	Winooski River

As noted in Section 4 of the County Plan, a large portion of the County's streams have had detailed Phase II Stream Geomorphic Assessments conducted. With regards to Bolton, two studies identify specific stream reaches where fluvial erosion is a concern, as well as where infrastructure, primarily culverts, is at risk (see table below).

Table 4-8 Culverts with geomorphic compatibility rating of "Mostly Incompatible" or "Incompatible"from Phase II Stream Geomorphic Assessments (Joiner and Mill Brooks)

Bankfull Width	Compatibility Score	Location	Road Name	Owner	Stream Name
36.84	7	Directly above Bolton Valley Access Road culvert	Catamount Ski Trail	Private	Trib to Joiner Brook
50.00	8		US ROUTE 2	State	Duck Brook
36.84	8	@ intersection for catamount ski trail	BOLTON VALLEY ACCESS RD	Town	Trib to Joiner Brook
44.12	8	Just down the road from sugar shack looking building on left	BOLTON VALLEY ACCESS RD	Town	Trib to Joiner Brook

26.32	8	Second culvert on the Catamount Ski Trail System	Catamount Ski Trail	Private	Trib to Joiner Brook
43.36	8	Bolton Valley Cross Country Ski parking/start lot	Parking Lot	Private	Joiner Brook
58.82	10	Just above turn to West Bolton Country Club & down from West Bolton four corners	NASHVILLE RD	Town	Trib to Mill Brook
66.13	10	Sharp bend 1/2 way up steep hill	BOLTON VALLEY ACCESS RD	Town	Joiner Brook
62.01	**13**	**Near Boulder Wood Lane**	**Duxbury Rd**	**Town**	**Gleason Brook**

Mostly incompatible *5<GC<10*
% Bankfull Width + Approach Angle scores < 2

Fully incompatible *0<GC<5*
% Bankfull Width + Approach Angle scores < 2 ***AND*** *Sediment Continuity + Erosion and Armoring scores < 2*

Structure mostly incompatible with current form and process, with a moderate to high risk of structure failure. Re-design and replacement planning should be initiated to improve geomorphic compatibility.
Structure fully incompatible with channel and high risk of failure. Re-design and replacement should be performed as soon as possible to improve geomorphic compatibility.

Information on dams is available from two sources: a database of dams regulated by the Vermont Department of Environmental Conservation and the National Dam Inventory maintain by the U.S. Army Corps of Engineers. There are no DEC-inventoried dams within the municipality.

While the National Dam Inventory shows no dams located in the municipality, there are two dams of concern upstream from Bolton. Green Mountain Power operates a hydroelectric dam (Bolton Falls #1) on the Winooski River a half mile east of the Bolton/Waterbury town line. The Little River, which flows into the Winooski River roughly two miles east of the Waterbury line, is dammed roughly three miles upstream from its confluence with the Winooski. The Waterbury dam, owned by the VT DEC, created the 830-acre Waterbury Reservoir. The US Army Corps of Engineers Dam-Break Flood Analysis shows that Bolton's Route 2 corridor on both sides of the Winooski River would be inundated in the event of a dam failure. Peak flooding would occur within 2.1-2.6 hours of the dam's failure.

4.2.3 Water, Wastewater and Natural Gas Service Areas

The Town currently has no water, wastewater or natural gas service areas. However, both the Bolton Valley Resort and the Fernwood Mobile Home Park have privately owned community water and wastewater disposal system, and several other small community systems exist throughout town.

4.2.4 Electric Power Transmission Lines and Telecommunications Land Lines

VELCO high-tension electric transmission lines bisect the Town of Bolton, running southeast-northwest on the north side of the Winooski River Valley. A substation owned by Green Mountain Power (Bolton #1) is located along this corridor, at the end of Green Mountain Drive. Above ground distribution and telecommunication land lines run mostly along roads. Telecommunications towers are located on exposed ridgelines, on Robbins and Ricker Mountains.

4.3 Estimating Potential Losses in Designated Hazard Areas.

A simple GIS intersection of e-site data with the 2010 FIRM floodplain data *(cf. Figure 2-1)* indicates the following with regards to structures located in mapped flood hazard areas:

- There are 539 total structures located in the municipality.
- 28 residential structures and 6 commercial/industrial structures are located within the 100-year floodplain, including the Bolton Town Garage.
- Based on the 2014 median grand list values, the estimated potential loss due to a major flood event inundating the floodplain is $6,399,753.

A simple GIS intersection of e-site data with the 2016 River Corridor Protection Area data *(cf. Figure 2-1)* from Vermont ANR indicates the following with regards to structures vulnerable to fluvial erosion.

- There are 539 total structures located in the municipality.
- There are 3 residential or commercial/industrial structures located in the River Corridor Protection Area.
- Based on the 2014 median grand list values, the estimated potential loss due to a major flood event inundating the floodplain is $492,644.

These estimates only take structures into account. They do not account for potential crop, livestock, personal property or business losses.

At this time, a more detailed analysis of potential losses to structures, infrastructure, and agricultural lands cannot be made. Such an analysis would require individual site visits and analysis conducted by both river geomorphologists and structural engineers which is beyond the capacity of the CCRPC due to funding limitations.

4.4 Vulnerable Populations

Like most of the County's rural communities, census data more detailed than the town boundaries are not available to see if there are concentrations of either elderly populations or low-income populations. In other words, the town's boundaries form one single census tract. Demographic information on the relative percentages of vulnerable populations is as follows:

Table 4-9 Vulnerable populations, Bolton

	Bolton	Chittenden County	Vermont	National
Percent Minority (non-white)[1]	4.1%	7.7%	4.8%	26.7%
Children <18 in poverty[1]	2.6%	11.1%	14.8%	21.6%
Families w/children in poverty[1]	3.1%	10.5%	13.4%	17.8%
Families w/ female householder, no	18.6%	37.0%	37.4%	40%

husband present w/children in poverty[1]				
Population, age 65+ in poverty[1]	1.6%	6.5%	7.5%	13.4%

[1]*US Census Bureau, 2010-2014 5-Year Estimates, American Community Survey*

Fernwood Manor Mobile Home Park, located of off US 2 outside of the floodplain *(see Figure 1.2)*, includes a local concentration of elderly and lower income households in town. Given the coarseness of the available census data, CCRPC is not able to determine other specific locations with a concentration of vulnerable individuals within the municipality. However, a useful analysis known as a Social Vulnerability Analysis has been prepared by the Vermont Department of Health. Data for the Town is shown in *Figure 4.1*.

The Social Vulnerability Index (SVI) draws together 16 different measures of vulnerability in three different themes: socioeconomic, demographic, and housing/transportation. The 16 individual measures include poverty, unemployment, per capita income, educational attainment, health insurance, children/elderly, single parent households, disability, minority, limited English, location of apartment buildings, mobile homes, crowding, no vehicle access, and population living in group quarters. The measures are combined to create relative vulnerability index. For every vulnerability measure, census tracts above the 90th percentile, or the most vulnerable 10%, are assigned a flag. The vulnerability index is created by counting the total number of flags in each census tract.

It is important to remember that this Social Vulnerability Index is just a first step in screening for populations that may be more or less vulnerable to a variety of hazard. Depending on the situation, different measures could be more or less important and should be looked at more closely. These data are NOT saying that one census tract is more vulnerable than another. Rather it is saying that there is a higher concentration of various vulnerable populations living within a tract and seeks to identify the conditions that make a population vulnerable.

4.5 Land Use and Development Trends Related to Mitigation

As noted at the introduction, due to its mountainous terrain, Bolton remains largely forested and undeveloped. An analysis of GIS data shows the following percentages for land use and the percentages of land allocated to each zoning district. The ski resort and its trail system accounts for the high percentage of developed commercial, leisure land use.

Table 4-10 Structures compared to zoning, Town of Bolton

Bolton Structures	Percent		**Bolton Zoning**	Percent
Residential	87.38%		Conservation	42.56%
Commercial	4.08%		Forest	21.32%
Industrial	1.11%		Resort Residential	1.33%
Institutional / Infrastructure	0.74%		Resort Village	0.32%
Mass Assembly	0.74%		Rural 1	9.72%
Leisure / Recreation	1.11%		Rural 2	24.51%
Natural Resources	0.74%		Village	0.26%
Unclassified	4.08%			

Source: 2015 e911 Data and 2010 Town of Bolton Land Use and Development Regulations. Note: The structure categories relate to the Land Based Classification System (LBCS) used in the 2011 AHMP not E-911 site types. E-911 site types were assigned to each LBCS category to create synergy between the 2011 AHMP and 2017 AHMP.

4.5.1 Conserved or Undevelopable Parcels

Much of Bolton's land is conserved or undevelopable (see Table 4-7). There are several large conserved parcels in Bolton. Most parcels have been conserved for their scenic, agricultural or natural resource values. The State of Vermont owns roughly 2,400 acres of the Mount Mansfield State Forest in the northeastern and eastern corners of the Town. Camel's Hump State Park comprises some 4,500 acres in the southern part of town. The Robbins Mountain Wildlife Management Area, in the southwestern corner of town, represents 540 acres of state-managed conserved land. The Ethan Allen Firing Range, operated by the VT National Guard, includes 2,230 acres in the northwestern corner of town.

Table 4-11 Conserved Land in Bolton

Town Name	Acres	Acres of Public Land	Percent Public	Acres of Conserved Land	Percent Conserved	Total Public & Conserved	Percent Conserved Land
Bolton	26,982.39	12,880.68	49%	3,198.81	12%	16,079.49	61%

Source: Bolton Grand List Data, 2016.

Additionally, as noted below in Table 5.1, the Town's zoning bylaws include a Flood Hazard Overlay District which, outside of Bolton's designated "Village" area, effectively precludes the construction of new homes or businesses within the mapped floodplain.

4.5.2 Recent and Future Development

Development potential for single family and vacation homes is highest in Bolton Valley, in areas served by water and sewer infrastructure (though system capacity is limited), and in West Bolton which has the capacity for additional in-ground systems. Scattered single-family homes will likely continue to be built in the Rural I and II districts on parcels with road frontage.

At this time, the main way CCRPC has to predict future development is by analysis of municipal zoning bylaws. Bolton participates in the NFIP, and the town's flood hazard area zoning bylaws heavily regulate development within mapped flood hazard areas within its Village District, and limit new development outside of this district. As a result, little development is likely to take place in flood hazard areas outside of the Village, as regulated by the town. In the Village district, development that is flood-proof and does not increase risk of flooding is allowed as a conditional use, but at present there is no existing or planned infrastructure that can support higher densities of development in this area. Development is also limited by stream setbacks and steep slope/high elevation building restrictions. These zoning requirements mitigate flood and fluvial erosion hazards to future structures.

From 2011 through 2014, there has been one house and one new commercial/ industrial building constructed in town. Neither of these was constructed in the Special Flood Hazard Area or River Corridor Protection Area. During this period, within the mapped floodplain the town approved

the construction of a small accessory structure (barn), and a small addition to an existing commercial garage – both subject to wet flood-proofing and venting, to be used only for storage – as well as the elevation of an existing single family dwelling above the base flood elevation, funded through a Hazard Mitigation Grant. The town also approved, subject to flood hazard review by the town and state, a new pedestrian bridge across the Winooski River, constructed by the Green Mountain Club in association with their relocation of the Long Trail through Bolton.

As best can be ascertained based upon data maintained by the Chittenden County RPC and the Town of Bolton, since the adoption of the last municipal AHMP in 2011, development activity in the Town has not significantly increased vulnerability. Additionally, through at least 2021, there is no known or projected development of new buildings or infrastructure anticipated to be constructed in areas known to be particularly vulnerable to Natural Hazards.

SECTION 5: MITIGATION STRATEGY

The Town considered a range of mitigation actions across the categories of Planning and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, and Education and Awareness Programs. As is demonstrated in the discussion that follows, many of the Town's day-to-day operations fit within these categories and serve to mitigate the impacts of various hazards. The section concludes within an analysis of which vulnerabilities need additional attention and therefore stipulates discrete tasks to be carried out by the Town during the 5-year period this plan is in effect to address these vulnerabilities.

5.1 Existing *Bolton Town Plan (2012)* Goals and Policies That Support Hazard Mitigation

These tasks are described in the 2012 Town of Bolton Town Plan. The following selected excerpts illustrate how mitigation planning and associated activities are formally promoted and supported through the Town Plan.

5.1.1 Purpose and Goals

Section 1.1: Community Development Goals

f. Encourage the development of a Community Watch program to reduce crime in the community.

Section 1.2 Capital Improvement Goals

a. Provide services and facilities deemed necessary for the orderly and rational development of the Town.

5.1.1.3 Public Participation Goals

b. Continue to solicit input regarding planning issues from town residents and from other entities which can help to offer solutions and insight into the problems the Town faces both now and in the future.

5.1.1.4 Regulatory Devices Goals

a. Maintain zoning and other bylaws, regulations and ordinances that are based on goals, data and concepts set forth in this plan for the purpose of ensuring that future growth and development are in the best interests of town residents.

b. Adopt and maintain a Capital Expense Budget and Program for the purpose of ensuring that Bolton's rate of growth does not outstrip the Town's ability to pay for the associated necessary services such as roads, schools, police and fire protection, solid waste etc.

5.1.2 Land Use

5.1.2.1 Flood Hazard Overlay District

The Flood Hazard Area Overlay District includes all designated flood hazard areas. The purpose of the Flood Hazard Area Overlay District is to (1) protect public health, safety, and welfare by preventing or minimizing hazards to life and property due to flooding, and (2) to ensure that private property owners within designated flood hazard areas are eligible for flood insurance under the National Flood Insurance Program (NFIP).

5.1.3 Natural Resources

5.1.3.1 Natural Resources Goals

c. Ensure that the existing health ordinance is enforced to maintain protection of both surface and groundwater supplies.

d. Ensure that permits issued for development near sensitive areas, such as steep slopes, high elevations, wetlands, scenic vistas and wildlife habitats, contain conditions assuring conformance to the goals set forth in this plan.

i. The Conservation Commission should work with the Planning Commission to continue the process of identifying the Town's land conservation priorities, and to the degree possible, link them to broader regional conservation work such as the Chittenden County Uplands Conservation Project.
j. The Conservation Commission shall also be an active participant in the local management plans for Bolton's Natural Areas.

5.1.3.2 Policies

a. Include the following in Bolton Town bylaws that implement this plan:
Encourage and maintain naturally vegetated shorelines, buffers and setbacks for all rivers, ponds and streams.
Allow higher density or cluster development in existing and designated settlement areas and low density development in the remaining areas.
Protect sensitive habitat and water resources with strict regulations governing land at elevations above 1500 feet, and especially above 2500 feet.
Reduce flood hazard and repetitive road and driveway washout, through strict regulations governing development on steep slopes (15% slope) and prohibiting development on slopes of 25% or more, and through investigation of the impact of stormwater run-off on flood hazards.
b. Identify and manage pollution, flooding and fluvial erosion hazards along rivers and streams, especially Duck Brook and Joiner Brook, with first priority to portions of Joiner Brook upstream of the Smilie School.

5.1.4 Transportation Plan

5.1.4.1 Transportation Goals

a. Maintain safe operating conditions on the present system of town roads through design to keep traffic at appropriate speeds and timely maintenance, including consideration of additional paving (though only on portions of roads prone to damage) should state funding become available.
b. Protect existing town roads from flood damage and uncontrolled storm water runoff.
Town land use regulations shall require adequate and specific storm water management practices and plans that maintain natural drainage patterns and/or follow state-recommended design standards & practices.
Consider increasing culvert size and bridge protections as town resources allow.
c. Preserve the capacity of town roads and maintain adequate traffic flows and safety.
Town land use regulations shall ensure safety and prevent congestion or increased delays.
New private roads proposed to serve subdivisions or commercial activities shall be designed consistent with state standards in force at the time an application is submitted for local zoning or subdivision permits.
New private roads, driveways and rights-of-way shall be designed to ensure adequate access for emergency vehicles.
d. Support eventual public transit
Town land use regulations should enable permit conditions that would prepare for such operations with bus "pull-outs" and other design features.
Work with the Agency of Transportation and the CCMPO to encourage commuter rail service such as the route between Montpelier & Essex Junction.
h. Support the road maintenance crew through Town-provided training sessions.
i. Ensure that owners and managers of recreational areas provide and maintain adequate and safe parking facilities.
j. Investigate long term access opportunities to gravel and sand deposits for future road maintenance use.

5.1.5 Utilities and Facilities Plan

5.1.5.1 Utilities and Facilities Goals

a. Maintain current relationships with the Vermont State Police and Richmond Rescue for police and emergency medical services respectively.

b. Promote Neighborhood/Community Watch to provide a basic level of local crime prevention.

c. Identify effective locations for tanker truck access to water in portions of town that currently do not have adequate supplies. The Bolton Valley Fire Department and Planning Commission shall be responsible for this task.

e. Promote high-speed internet access throughout town to assist and encourage local businesses to reside in Bolton.

f. Identify an aquifer suitable for a community water supply to be developed for future generations and take steps in the Zoning Bylaw to protect it from potential contamination or depletion.

g. Ensure adequate provision of water sources for fire suppression by requiring dry hydrants, fire ponds, water storage at Bolton Valley, or other measures as conditions on town land use permits where appropriate. The Development Review Board will work with developers and property owners on this task.

5.1.6 Educational Facilities

5.1.6.1 Educational Goals

c. The School Board should work with the Select Board and the Bolton Volunteer Fire Department to ensure that the necessary equipment exists at the Smilie School for its use as an emergency shelter.

5.2 Existing Town of Bolton Actions That Support Hazard Mitigation

The following table illustrates how mitigation activities and plans are carried out by various municipal departments and whether such capabilities are adequate to address hazard vulnerabilities and whether the department, if needed, has the ability to improve policies and programs and programs to unmitigated vulnerabilities.

Table 5-1 Existing municipal capabilities addressing hazard mitigation, Town of Bolton

Type of Programs & Policies	**Description / Details / Comments**	**1) Adequacy of municipal capabilities to address hazards 2) and ability to expand upon or improve policies & programs**
Highway Department	Town Highway Department (2 FTE personnel)	1) Generally adequate with regard to mitigating the impacts of common hazards, including winter storms and minor flooding. 2) However, the Highway Department, through the strategies noted below is also taking on a stronger role to mitigate against damages caused by Severe Rainstorm, Fluvial Erosion and Water Pollution.
Water / Sewer Department	n/a	n/a
Water / Sewer Personnel	m/a	n/a
Planning and Zoning personnel	.25 FTE zoning administrator; volunteer	1) Town considers staffing levels to be minimally adequate with regard to planning for, mitigating the impacts of common hazards. 2) No immediate need to expand upon or improve policies and

	Planning Board and DRB	programs with regard to hazards under its purview although additional staff will likely be needed in the future.
Residential Building Code / Inspection	No local building code. State health code regulated through local health officer	1) Generally adequate with regard to mitigating the impacts of common hazards. New construction within flood hazard areas must obtain a zoning permit. 2) No need to expand upon or improve policies and programs under its purview. 3) Note that commercial properties open to the public and all multi-family buildings of 3-units or more must be inspected and permitted by the Vermont Division of Fire Safety.
Town / Municipal Comprehensive Plan	2012	1) As noted at the start of Section 5, several elements of the municipal comprehensive plan address hazard mitigation. 2) The Town is currently updating its Plan and will be incorporating this 2017 AHMP accordingly.
Zoning Bylaws and Subdivision Regulations	2010	1) Generally adequate with regard to mitigating the impacts of common hazards. 2) No need, at this time, to expand upon or improve policies and programs with regard to hazards under its purview.
Hazard Specific Zoning (slope, wetland, conservation, industrial, etc.)	Conservation, stream setbacks, wetlands and steep slopes	1) Generally adequate with regards to mitigating the impacts of common hazards. 2) No need, at this time, to expand upon current flood hazard bylaws. 3) Over the next 5 years, town may consider adoption of River Corridor or River Corridor Protection Area zoning regulations.
Participation in National Flood Insurance Program (NFIP) and Floodplain/ Flood Hazard Area Ordinance	Yes / Yes	1) New DFIRMS adopted in 2010 (in effect in 2011). The Town Zoning Administrator and the Town's Development Review Board (DRB) monitor compliance with the National Flood Insurance Program. The DRB reviews and adjudicates applications for development within the floodplain, in consultation with the State of Vermont, which assists with technical review. 2) No need, at this time, to expand upon NFIP participation however the Town's draft 2017 Plan calls for a review and analysis of Base Flood Elevations along US2.
Open Space Plans; Conservation Funds	Conservation Fund	1) Yes 2) Municipality considers regulatory programs and voluntary conservation efforts as adequate to address any hazard mitigation concerns. Much of Bolton's steep slopes and floodplain areas are conserved through easements, public ownership and regulations.

The following table illustrates how Emergency Preparedness, Response & Recovery actions are carried out in the Town.

Table 5-2 Existing municipal emergency services & plans, Town of Bolton

Type of Existing Protection	**Description /Details/Comments**
Emergency Services	Emergency response personnel may have

	overlapping responsibilities with other town response organizations.
Police Services	Vermont State Police
Police Department Personnel	n/a
Fire Services	Bolton Volunteer Fire Department; Jericho/Underhill VFD for parts of West Bolton
Fire Department Personnel	-0 FTE, ~14 volunteers
Fire Department Mutual Aid Agreements	FD participates in the Chittenden County Mutual Aid compact
EMS Services	Richmond Rescue (private, town supported) Colchester, Waterbury, and Stowe Technical Rescue provide assistance with mountain and/or water rescue
EMS Personnel	3 paid FTE personnel, ~38 volunteers
EMS Mutual Aid Agreements	No formal agreements, however, agencies cooperate as needed
Dispatching Services	Contracted through Shelburne Police Dept.; currently under regional review
Emergency Plans	
Local Emergency Operations Plan (LEOP)	2016
Emergency Operations Center	Bolton Town Office
Replacement Power, backup generator	No
Primary Shelter	Smilie Elementary School
Replacement Power, backup generator	No
Secondary Shelter	Bolton Fire Station
Replacement Power, backup generator	Yes

5.3 Town of Bolton All-Hazards Mitigation Goals

The following goals were first approved by the Town in its 2005 and 2011 AHMPs and approved by Town of Bolton officials during the development of this 2017 annex.

1) Reduce at a minimum, and prevent to the maximum extent possible, the loss of life and injury resulting from all hazards.
2) Mitigate financial losses and environmental degradation incurred by municipal, educational, residential, commercial, industrial and agricultural establishments due to various hazards.
3) Maintain and increase awareness amongst the town's residents and businesses of the damages caused by previous and potential future hazard events as identified specifically in

this Local All-Hazards Mitigation Plan and as identified generally in the *Chittenden County Multi-Jurisdictional All-Hazards Mitigation Plan.*

4) Recognize the linkages between the relative frequency and severity of disaster events and the design, development, use and maintenance of infrastructure such as roads, utilities and stormwater management and the planning and development of various land uses.
5) Maintain existing municipal plans, programs, regulations, bylaws and ordinances that directly or indirectly support hazard mitigation.
6) Consider formal incorporation of this Local All-Hazards Mitigation Plan into the municipal comprehensive plan by reference as described in 24 VSA, Section 4382(12), as well as incorporation of proposed new mitigation actions into the municipality's/town's bylaws, regulations and ordinances, including, but not limited to, zoning and subdivision bylaws..
7) Consider formal incorporation of this Local All-Hazards Mitigation Plan, particularly the recommended mitigation actions, into the town's operating and capital budgets and improvement programs especially as they relate to public facilities and infrastructure, utilities, highways and emergency services.

With regards to a more formal process by which the Town will integrate the requirements of this mitigation plan into the Town's Comprehensive Plan, as required by Vermont law, municipalities must update their Comprehensive Plans every eight years. During any update process undertaken while this Plan document is in effect, the Town will review the recommended actions detailed below, and in subsequent updates of this plan, to see if formal incorporation is warranted. Note that the Town is currently updating its municipal plan.

Additionally, as the CCRPC is tasked with also reviewing and approving each such municipal comprehensive plan for consistency with various requirements in state stature and consistency with the Chittenden County Regional Plan (aka the *ECOS 2013 Plan*). This review includes a detailed staff critique with recommendations for improvement. This CCRPC review provides another opportunity to formally integrate elements of this local AHMP into the Town's Comprehensive Plan.

With regards to a more formal process by which the Town will integrate the requirements of this mitigation plan while developing the Town's annual capital improvement plans/budgets, for periods, the Town will review the recommended Actions detailed below to see if formal incorporation within these annual capital plans is warranted prior to annual review and voting by Town residents. Additionally, CCRPC staff can assist the town with drafting grant applications to fund mitigation projects.

5.4 Mitigation Actions

The table below records the strategies from the 2011 Plan and progress on their implementation. This table also encapsulates the Town's decision making with regards to which Actions to continue, which to establish as new actions and which to discontinue. During the development of this Municipal AHMP and its parent Multi-Jurisdictional AHMP, FEMA staff indicated to the CCRPC a need to separate out or remove strategies which are more properly considered to be Preparedness, Response or Recovery strategies rather than Mitigation. Additionally, upon

revisiting and reviewing the 2011 actions and devising action for this 2017 local AHMP, CCRPC staff and municipal staff and boards thought it would be best to focus on known and likely actions with a high likelihood of implementation versus consideration of more expansive but largely aspirational strategies.

Table 5-3 Progress on the actions of the 2011 Bolton All-Hazards Mitigation Plan

Action **Primary Responsible Entity**	**Task**	**Brief Description**	**Progress since 2011 and recommendations for 2017 Plan**
Complete fluvial geomorphology assessment and develop strategies in response to identified risk			
CCRPC, VT ANR	Fluvial Geomorphic Assessments	Conduct Phase I and Phase II fluvial geomorphic assessments on streams and waterways in Bolton.	Phase I SGA has been completed for Duck Brook, Gleason Brook and Preston Brook and the Winooski River, and Phase II SGA has been completed for Joiner Brook and Mill Brook. A Phase 2 SGA based River Corridor Protection Area (formerly Fluvial Erosion Hazard Area) was developed for the portion of Joiner Brook where SGA was completed.
CCRPC, VT ANR	Fluvial Erosion Hazard Mapping	Rate the fluvial erosion hazard for each assessed reach and develop a fluvial erosion hazard map for the waterway using SGAT. Create map of all assessed reaches. Submit to VT ANR for QA/QC.	Completed.
TBD, determined by funding.	River Corridor Management Plans	Where Phase I and II assessments are complete, develop a River Corridor Management Plan.	A river corridor plan has been developed for the Joiner Brook.
Bolton Planning Commission	Fluvial Erosion Hazard Mitigation Implementation	Develop strategies to mitigate losses from identified fluvial erosion hazards.	Ongoing

Bolton Planning Commission	Flood Insurance Rating Map Updates	Review draft FIRM data. Update floodplain regulations/zoning.	FIRM data were reviewed in 2010 and the Town's floodplain zoning was updated accordingly.
Evaluate capabilities of existing road and stormwater management infrastructure and Continue and improve highway, culvert and bridge maintenance programs.			
Road Foreman	Infrastructure Assessment for Stormwater Vulnerability	Assess the vulnerability and operational capability of municipal roads, culverts and stormwater infrastructure.	Ongoing **TO BE REMOVED FROM 2017 PLAN AS FEMA DOES NOT CONSIDER "ASSESSMENT" TO BE CONSIDERED MITIGATION.**
Road Foreman	Infrastructure Assessment for Fluvial Erosion/Landslide Vulnerability	Assess the vulnerability and operational capability of municipal roads, culverts, bridges and other infrastructure to fluvial erosion.	All culverts are upsized when they need to be replaced. All driveways in the Town must install culverts at least 18 inches in size, as per the AOT Better Roads Manual. **THIS UPSIZING TASK WILL BE ROLLED INTO CATEGORY A ACTION BELOW PLAN AS FEMA DOES NOT CONSIDER "ASSESSMENT" TO BE CONSIDERED MITIGATION.**
Road Foreman	Culvert Upgrades	Upgrade culverts and ditching along roads to mitigate against repeated damages from stormwater or spring snowmelt.	Ongoing **CONTINUE. SEE CATEGORY A BELOW**
Road Foreman	Continued Monitoring of Vulnerable Infrastructure	Monitor bridges and culverts with erosion and scouring concerns.	The Town receives bridge status reports annually from the State of Vermont on all bridges and culverts over five feet wide. Bridges and culverts are monitored by the road foreman. **NEED TO REMOVE FROM 2017 PLAN AS FEMA DOES NOT CONSIDER "MONITORING" TO BE MITIGATION.**

Select Board	Road Improvement	Consider re-engineering certain road sections to lower overall maintenance costs, improve snow plowing speeds and improve overall capability of roads to handle current and projected traffic volumes.	The Town is discussing relocation of a section of Honey Hollow Road, which is being eroded by Preston Brook. May requires right-of-way negotiation with state and legislative approval. **CONTINUE. SEE CATEGORY A BELOW**
Select Board	Erosion/Landslide Mitigation	Undertake erosion or landslide mitigation projects where roads regularly incur damage from adjacent rivers/streams and hillsides.	The road crew has undertaken initial slope stabilization projects on portions of Duxbury Road and Bolton Notch Road that are prone to landslides. **CONTINUE. SEE CATEGORY A BELOW**
Conduct landslide hazard assessments, and develop strategies in response to identified risk.			
Vermont Geological Survey	Landslide Hazard Assessment Protocol	Develop a landslide hazard protocol to evaluate county slopes and waterways.	Protocol completed and preliminary analysis conducted at Joiner Brook. **NO NEED TO CONTINUE IN 2017 PLAN.**
Vermont Geological Survey, other appropriate entities TBD	Landslide Hazard Assessment and Mapping	Funding available, landslide hazards should be assessed and mapped in participating municipalities.	No mapping has been undertaken due to a lack of funding. **TOWN MAY PURSUE FUNDING UNDER 2017 PLAN. SEE CATEGORY D BELOW.**
Bolton Planning Commission	Landslide Hazard Mitigation Implementation	Develop strategies to mitigate losses from identified landslide hazards.	Steep slope development is prohibited in Bolton. There are no landslide specific regulations due to the lack of mapped landslide hazard areas. **DO NOT INCLUDE AS DISCRETE ACTION FOR 2017 PLAN AS FORMAL LANDSLIDE HAZARD STUDY MUST BE COMPLETED**

			FIRST.

5.4.1 Current Capabilities and Need for Mitigation Actions

The Town Comprehensive Plan's policies and programs that support hazard mitigation and the progress noted above demonstrate the variety of policies and actions forming the foundation of this All Hazards Mitigation Plan. As detailed in the Table below, town official consider the town's existing capabilities, regulatory structure and programs adequate to address typical, known hazards; however ongoing mitigation actions, and a few new actions are warranted for the 5-year period this plan is in effect.

Table 5-4 Town of Bolton: Capabilities to address vulnerabilities from natural hazards

Hazard	**Adequacy of Municipal Capabilities to address associated vulnerabilities (Excellent, Good, Average, Below Average)**	**Additional expansion or improvement in policies & programs needed to address hazard given long-term vulnerability**
Severe Winter Storm	Good	No
Flooding	Good	**Yes, see actions below**
Fluvial Erosion	Average	**Yes, see actions below**
Severe Rainstorm	Average	**Yes, see actions below**
Extreme Temperatures	Average	No, rare occurrence and extent, impact & vulnerabilities are limited
Wildfire	Average	No, extent, impact & vulnerabilities are limited

Table 5-5 Town of Bolton: Capabilities to address vulnerabilities from technological hazards

Hazard	**Adequacy of Municipal Capabilities to address vulnerabilities (Excellent, Average, Below Average)**	**Additional expansion or improvement needed to address hazard given long-term vulnerability**
Major Transportation Incident	Average There are two emergency access gates to the interstate in Bolton (NB and SB lanes) specifically for use by the Bolton Fire	No, rare occurrence and extent, impact & vulnerabilities are limited. Town has no police services to assist. A very high percentage of the Bolton Volunteer Fire Department's calls are on the interstate.

	Department. + State agencies provide support	
Power Loss	Average. Private utilities are primarily responsible	No. Town has no role in utility management outside of town rights-of-way. Utilities are responsible for maintenance and repair.
Hazardous Materials Incident	Average+ State agencies provide support	No, rare occurrence and extent, impact & vulnerabilities are limited. Primarily responsibility of BVFD, which has limited capacity, training and resources. Would require outside assistance/response.
Water Service Loss	N/A	N/A
Gas Service Loss	N/A	N/A
Telecommunications Failure	Private utilities are primarily responsible	No. Town has no role in utility manage-ment outside of town rights-of-way.
Other Fuel Service Loss	Private businesses are primarily responsible	No, rare occurrence and extent, impact & vulnerabilities are limited.
Sewer Service Loss	N/A	N/A
Water Pollution	Average	**Yes, see actions below**
Invasive Species	Average	No, rare occurrence and extent, impact & vulnerabilities are considered to be limited at this point but further research is needed.

Table 5-6 Town of Bolton: Capabilities to address vulnerabilities from societal hazards

Hazard	**Adequacy of Municipal Capabilities to address vulnerabilities (Excellent, Average, Below Average)**	**Additional expansion or improvement in policies & programs needed to address hazard given long-term vulnerability**
Crime	No formal municipal role -State agencies provide support	No.
Economic Recession	Average -State Agencies provide support	No. Town has limited ability to actively promote economic development. Diversity of county economy mitigates vulnerabilities.
Terrorism	No formal municipal role -State & Federal agencies provide support	No, rare occurrence.
Civil Disturbance	No formal municipal role -State agencies provide support	No, rare occurrence
Epidemic	Average	No, rare occurrence. The Town's abilities

	+State & Federal agencies provide support	to mitigate an epidemic are limited The Town relies on state and school efforts related to epidemic preparedness, prevention and mitigation, and medical facilities and services in neighboring communities for response.
Key Employer Loss	Average -State agencies provide support	No. Town has limited staff capacity to engage in targeted economic diversification efforts. Town only has one major employer, Bolton Valley Resort.

Note that this Plan does not recommend a discrete mitigation action regarding "future development." Our justification for this is as follows:

- The municipality's regulations, programming and staffing have prevented and will continue to prevent, or where allowed, adequately regulate new buildings and infrastructure being constructed in areas vulnerable to hazards. As documented in detail in section 4.6.2, no new principal structures and infrastructure subject to municipal regulation, other than the Green Mountain Club's new pedestrian bridge (Long Trail) over the Winooski, have been constructed in either Special Flood Hazard Areas or mapped River Corridor Protection Areas.
- For the next five years, there are NO known or anticipated plans to construct municipal infrastructure in areas vulnerable to hazards.
- There is no evidence that unwise or poorly regulated development in recent years in the municipality has put people or property in harm's way.

In comparison to the 2011 Plan, the priorities for this 2017 Plan have not changed. Identified hazards and vulnerabilities essentially remain the same. Indeed, the only real change is that there is a more heightened awareness of the hazards the town faces on an increasingly frequent basis, given the number and relative severity of more recent disasters including, but not limited to flooding from Tropical Storm Irene in 2011.

Proposed Mitigation Actions for the next five years represent a more achievable list of actions focused on those common hazards (e.g. Winter Storm, Severe Rainstorm, Flooding, Fluvial Erosion that occur most frequently, that regularly result in some damage, and that must be managed by the town . This includes the need to prepare for and mitigate hazards associated with winter storms and other storm events, including ongoing highway maintenance and planned upgrades to overtime develop a road network that is more resilient to flash flooding, and that minimizes stormwater runoff and erosion from local roads. These types of hazard deserve more local attention than identified hazards that could hypothetically cause a tremendous amount of damage but which are rare and the benefit-to-cost ratio of potential mitigation actions is small (e.g. Major Transportation Incident, Hazardous Material Incident, Terrorism). No new discrete action is recommended with regard to "Education & Awareness" as the Town does not have adequate funds or staff to undertake large public outreach efforts, nor is such an effort warranted given the identified vulnerabilities. Bolton will continue to promote local education and awareness of common hazard through available municipal outlets, including the town website.

5.4.2 Specific Mitigation Actions

The Town plans to pursue the following mitigation actions during the 5-year period this Plan is in effect, as staffing, budgets and available project funding and outside sources of technical assistance allow.

CATEGORY A: Develop and Implement a Roads Stormwater Management Plan

Hazards Addressed: Water Pollution, Fluvial Erosion, Severe Rainstorm,
Vulnerabilities Addressed: damage to public infrastructure especially roads and culverts; impairment of local waterways and Lake Champlain, budgetary impacts

Status: Ongoing

Lead Responsible Entities: Bolton Highway Foreman, Select Board

Potential Partner Entities: VT ANR; Vermont Agency of Transportation (VTrans); CCRPC

Timeframe: Month 2017 through March 5, 2022 (update after FEMA adoption)

Funding Requirements and Sources: State Clean Water Act Funding (to be determined); federal and State (e.g., VTrans Better Roads Grant, VANR Ecosystem Restoration Grant); municipal operating and reserve funds for required matching funds, as necessary.

Rationale / Cost-Benefit Review: The Vermont Clean Water Act, signed into law in the summer of 2015, authorized the development of a new Municipal Roads General Permit (MRGP) to lessen erosion from roads that have "hydrologically-connected" segments. This action is required by the Act. Additionally, the plans and their implementation will assist municipalities in mitigating erosion of connected infrastructure.

Specific Identified Actions:

Action A-1 Develop Roads Stormwater Management Plan

Complete an Inventory of Priority Road Segments (PRS) [aka "hydrologically-connected" road segments] that currently meet or do not meet MRGP standards. The CCRPC conducted an initial erosion inventory of Bolton roads in the summer of 2016, and hired a consultant to develop cost estimates for priority erosion-reduction projects. The Town must apply for MRGP permit coverage starting in July 2018. After issuance of the permit by the State, the Town will then use this information, with outside assistance, to develop a Roads Stormwater Management Plan for submission to the VTDEC in 2019. The Plan must include a remediation plan (capital budget and program), including an implementation schedule for each site not currently meeting standards.

Action A-2 Implement Stormwater Management Plan

Complete priority projects identified in the Roads Stormwater Management Plan as available federal, state and municipal funding permits. Submit required reports to DEC documenting remediation efforts as required for compliance with the MRGP. Reports will briefly describe which segments have been improved, practices installed, and whether segments now meet MRGP standards. The MRGP standards must be implemented on all priority road segments no later than 20 years from permit issuance.

CATEGORY B: Secure funds and complete projects to protect vulnerable highway infrastructure and municipal buildings.

Hazards Addressed: Flooding, Fluvial Erosion and Severe Rainstorm

Vulnerabilities Addressed: Damage to new/existing public infrastructure and buildings; temporary closures of roads and bridges including from debris; temporary loss of power and/or telecommunications and temporary isolation of vulnerable individuals such as the elderly or those in poverty.

Status: Ongoing

Primary Responsible Entity: Bolton Highway Foreman, Select Board

Timeframe: Month 2017 through March 5, 2022 (update after FEMA adoption)

Funding Requirements and Sources: FEMA or other hazard mitigation grants; FHWA grants; VTrans grants; Municipal Operating and Capital budgets. Contingent on available resources and funding.

Rationale / Cost-Benefit Review: These areas such as low-lying roads and steep roads suffer consistent damage during heavy rains and snowmelt. Mitigating against these problems (such as road washouts, destroyed culverts, etc.) would reduce short and long term maintenance costs, improve the flow of traffic for personal and commercial purposes during damage events, and reduce damage to existing buildings.

Specific Identified Actions:

Action B-1: Projects to mitigate inundation flooding

Seek grant and matching funds to elevate existing buildings located in the floodplain, and to flood proof existing buildings in the flood plain that cannot be elevated. Specific projects include:

- Flood proofing the Bolton Town Garage. The town garage was built to be above the BFE at the time of construction, but due to changes to the DFIRM now lies at least 5 feet below the current BFE.
- , Complete the elevation of existing residential structures in the Village District above the Base Flood Elevation, under the town's current Hazard Mitigation Grant, subject to securing required matching funds, in association with participating homeowners.

Action B-2: Culvert Upgrades

Upgrade culverts and ditching along town roads to mitigate against repeated damages from stormwater runoff. These types of improvements are done every year as town staff make improvements on discrete sections of roads.

Action B-3: Seek funds for scoping and construction of upgrades to infrastructure vulnerable to erosion and scouring

Seek funding for engineering, cost estimates, and construction for needed relocations or upgrades of town highways, bridges and culverts and associated streambank stabilization projects. Specific project locations may include:

- Sections of the Notch Road, Honey Hollow Road, Mill Brook Road and the Bolton Valley Access Road that are subject to washout and erosion during storm events.
- Relocation of the lower section of Honey Hollow Road, which is eroding into Preston Brook.
- Sections of Duxbury Road along the Winooski River that are subject to flooding, bank erosion and failure.
- Other locations where municipal roads regularly incur damage from adjacent rivers and streams such as culverts and bridges identified in Section 4 and/or under future culvert and road erosion inventories (scheduled for completion in 2017).

CATEGORY C: Based on completed fluvial geomorphology assessments and River Corridor & River Corridor Protection Area maps from VANR, develop strategies in response to identified risks.

Hazards Addressed: Fluvial Erosion and Flooding

Vulnerabilities Addressed: Damage to new/existing public infrastructure and buildings; temporary closures of roads and bridges including from debris; temporary loss of power and/or telecommunications and temporary isolation of vulnerable individuals such as the elderly or those in poverty.

Status: Ongoing

Primary Responsible Entities: Bolton Planning Commission, Select Board (for bylaw changes, administration and enforcement).

Potential Partner Entities: VT ANR; CCRPC; Consultant; Property Owners

Timeframe: Month 2017 through March 5, 2022 (update after FEMA adoption)

Funding Requirements and Sources: Work will be undertaken by the volunteer Planning Commission and Select Board. The Town will also seek grant funding, such as a Municipal Planning Grant or Hazard Mitigation Planning Grant, to be able to hire a consultant to assist with these projects.

Rationale / Cost-Benefit Review: Because of past work to identify fluvial erosion hazard (FEH) zones (now termed "River Corridor Protection Areas") and to map the broader River Corridors, Bolton now has a better understanding of the Fluvial Erosion hazard areas in the community, where they are located and what structures or infrastructure are impacted by them. Devising a River Corridor/Fluvial Erosion Hazard Zone is a relatively low-cost, highly effective strategy to mitigate fluvial erosion hazards. Additionally, undertaking streambank stabilization will prevent the destruction of existing buildings and infrastructure in areas prone to erosion.

Specific Identified Actions:

Action C-1: Explore adoption of River Corridor / River Corridor Protection Area Zoning Overlay District

The Bolton Select Board and Planning Commission, in consultation with ANR and the CCRPC, will work with a qualified consultant to review and update ANR River Corridor maps, to include known FEHAs along Joiner and Mill Brook, and to consider the development and adoption of a River Corridor or River Corridor Protection Area overlay zoning district to further restrict

development and disturbance in areas threated by fluvial erosion. If funding is secured, this work is anticipated to take place starting in 2018 and be completed by early 2020.

Action C-2: Streambank Stabilization

Bank erosion is also threatening existing homes and septic systems. The Town will seek funds to stabilize streambanks as necessary to protect infrastructure, life and property in known hazard areas. If funds and necessary permits are obtained, potential project locations include:

- The lower reaches of Gleason Brook (Duxbury Road, Boulder Wood Lane)
- Along Mill Brook (Mill Brook Road).

CATEGORY D: Complete mapping of landslide hazards

Hazards Addressed: Fluvial Erosion and Severe Rainstorm

Vulnerabilities Addressed: Damage to new/existing public infrastructure; temporary closures of roads and bridges; and temporary isolation of vulnerable individuals such as the elderly or those in poverty.

Status: Ongoing

Lead Responsible Entities: Conservation Commission or Planning Commission; Select Board

Potential Partner Entities: VT ANR; Vermont State Geological Survey,

Timeframe: Month 2017 through March 5, 2022 (update after FEMA adoption)

Funding Requirements and Sources: Vermont State Geological Survey, in-kind match required.

Rationale / Cost-Benefit Review: Landslides remain a serious concern in Bolton, especially along streams and rivers and other areas with steep slopes and shallow soils that may be identified for development. Damage from landslides along town roads is a particular concern; resulting in the need to identify and stabilize slopes located outside of highway rights-of-way, with landowner permits, and potentially to also include the acquisition of associated access and drainage easements, ***** *For purposes of analysis, the proposed landslide hazard mapping task is being considered within the overall hazard category of Fluvial Erosion..*

Specific Identified Tasks:

ACTION D-1: Seek funds for mapping of landslide hazards

The Town will seek funds for additional landslide hazard mapping using the protocol previously developed by the Vermont State Geological Survey (see Appendices of Multi-Jurisdictional Plan).

5.4.3 Prioritization of Mitigation Strategies

The above mitigation actions were listed in order of priority. Descriptions of specific projects, where available, are listed in below. Because of the difficulties in quantifying benefits and costs, it was necessary to utilize a simple "Action Evaluation and Prioritization Matrix" in order to effect a simple prioritization of the mitigation actions identified by the jurisdiction. The following list identifies the questions (criteria) considered in the matrix so as to establish an order of priority. Each of the following criteria was rated according to a numeric score of "1" (indicating poor), "2" (indicating below average or unknown), "3" (indicating good), "4" (indicating above average), or "5" (excellent).

- Does the action respond to a significant (i.e. likely or high risk) hazard?
- What is the likelihood of securing funding for the action?
- Does the action protect threatened infrastructure?
- Can the action be implemented quickly?
- Is the action socially and politically acceptable?
- Is the action technically feasible?
- Is the action administratively realistic given capabilities of responsible parties?
- Does the action offer reasonable benefit compared to its cost of implementation?
- Is the action environmentally sound and/or improve ecological functions?

The ranking of these criteria is largely based on best available information and best judgment, as many projects are not fully scoped out at this time. The highest possible score is 45.

It is anticipated that, as municipalities begin to implement the goals and actions of their Mitigation Strategies, they will undertake their own analysis in order to determine whether or not the benefits justify the cost of the project. Also, all proposed FEMA mitigation projects will undergo a benefit-cost analysis using a FEMA BCA template and approved methodology.

Based on feedback from FEMA, CCRPC staff and municipal staff and boards have concluded that several strategies previously identified in 2011 by the Town of Bolton as mitigation strategies are more accurately classified as preparedness, response and recovery strategies. These strategies are not intended to mitigate against the hazards identified in Section 3, and should not be evaluated as such. As such, these strategies are not included in the prioritization below. However, they are discussed at the end of the plan to serve as a record of the strategies being undertaken by the Town in order to prepare for, respond to and recover from damage caused by hazards.

Other than the reclassification of some strategies as non-mitigation strategies, there have not been significant changes in the prioritization of strategies between 2011 and now.

Note that these priorities are within categories as this is more appropriate than ranking specific projects intended to address identified hazards.

Table 5-7 Town of Bolton mitigation action evaluation and prioritization matrix

Mitigation Category & Actions	Responds to significant (likely or high risk) hazard	Likelihood of funding	Protect threatened infra-structure	Implemented quickly	Socially / Politically acceptable	Technically Feasible	Administra-tively Realistic	Reasonable cost to be nefit	Environmen-tally sound	TOTAL SCORE
CATEGORY A: Implement Roads Stormwater Management Plan										
Action A-1: Develop Roads Stormwater Management Plan	5	5	5	5	5	5	5	5	5	**45**
Action A-2: Begin Roads Stormwater Management Plan implementation	5	5	5	3	5	4	4	4	5	**40**
CATEGORY B: Secure funds and complete projects to mitigate damages to vulnerable infrastructure and buildings.										
Action B-1: Projects to mitigate inundation flooding	5	3	5	4	5	5	5	5	5	**42**
Action B-2: Culvert Upgrades	5	3	5	4	5	5	5	4	5	**41**
Action B-3: Seek funds for scoping and construction of upgrades to infrastructure vulnerable to erosion and scouring	5	3	5	3	5	5	4	5	5	**40**
CATEGORY C: Based on completed fluvial geomorphology assessments and River Corridor & River Corridor Protection Area maps from VANR, develop strategies in response to identified risks.										
Action C-1: Explore adoption of River Corridor / River Corridor Protection Area Zoning Overlay District	5	4	5	4	3	5	4	5	5	**40**
Action C-2: Streambank Stabilization	4	4	4	3	5	5	4	4	5	**38**
CATEGORY D: OBTAIN FUNDS TO ENABLE MAPPING OF LANDSLIDE HAZARDS										
ACTION D-1: Seek funds for mapping of landslide hazards	4	3	4	3	5	4	4	3	5	**35**
5 = Excellent; 4=Good; 3=Average; 2=Below Average or Uknown; 1=Poor										

5.5 Implementation and Monitoring of Mitigation Strategies

The following Table is intended to aid town officials in implementing mitigation actions under this plan, and to facilitate the annual monitoring and evaluation, as outlined in Section 1.7.4 above.

Table 5-8 Town of Bolton Mitigation Actions: Implementation Monitoring Worksheet

CATEGORY A: Implement Roads Stormwater Management Plan to mitigate Severe Rainstorm, Fluvial Erosion and Water Pollution and their associated vulnerabilities of: • **Damage to new/existing public infrastructure** • **Impairment of local waterways and Lake Champlain** • **Budgetary impacts**	
Action **(Primary Responsible Entity)**	**Report on Progress since Plan adoption** *See Section 5.4 for details on locations identified during Plan development.*
Action A-1 Develop Roads Stormwater Management Plan (Town Select Board & Highway Foreman)	MRGP obtained from State? -Inventory completed, priority projects identified? -Associated engineering, costs estimates completed? -Management plan, capital improvement program completed? -Roads Stormwater Management Plan filed with State
Action A-2 Begin Roads Stormwater Management Plan implementation (Town Highway Foreman)	-note which RSMP projects underway/completed -note MRGP reports filed with State
CATEGORY B: Secure funds and complete projects to protect infrastructure and buildings to mitigate Flooding, Fluvial Erosion and Severe Rainstorm and their Associated Vulnerabilities of • Damage to new/existing public infrastructure and buildings • Temporary road and bridge closure • Budgetary impacts • Temporary loss of power and/or telecommunications • Temporary isolation of vulnerable individuals	
Action **(Primary Responsible Entity)**	**Report on Progress since Plan adoption** *See Section 5.4 for details on locations identified during Plan development.*
Action B-1: Projects to mitigate inundation flooding (Town Selectboard & Highway Foreman)	-note efforts to floodproof the Town garage -note progress on home elevation projects
Action B-2: Culvert Upgrades (Town Selectboard & Highway Foreman)	-note annual # of culvert upgrades & on which roads
Action B-3: Seek funds for scoping and construction of upgrades to infrastructure vulnerable to erosion and scouring (Town Selectboard & Highway Foreman)	-note efforts on grants investigated, applied for and/or obtained -note any options scoped/costed out particularly with relocating section of Honey Hollow Road.

CATEGORY C: Based on completed fluvial geomorphology assessments and River Corridor & River Corridor Protection Area maps from VANR, develop strategies in response to identified risks so as to mitigate Rainstorm, Flooding, Fluvial Erosion and Water Pollution and their associated vulnerabilities of: • Damage to new/existing public infrastructure and buildings • Temporary road and bridge closure • Budgetary impacts • Temporary loss of power and/or telecommunications • Temporary isolation of vulnerable individuals	
Action **(Primary Responsible Entity)**	**Report on Progress since Plan adoption** *See Section 5.4 for details on locations identified during Plan development.*
Action C-1: Explore adoption of River Corridor / River Corridor Protection Area Zoning Overlay District (Town Select Board & Planning Commission)	-note Select Board and/or Planning Commission meetings in which District map amendments and proposed bylaws were discussed, developed, and/or warned for public vote -note whether district map and bylaw amendments were adopted
Action C-2: Streambank Stabilization *(Town Select Board & Highway Foreman)*	-note any grants investigated, applied for and/or obtained to address streambank stabilization

CATEGORY D: Obtain funds to enable mapping of landslide hazards to mitigate Fluvial Erosion and Severe Rainstorm and their associated vulnerabilities of: • Damage to new/existing public infrastructure • Temporary road and bridge closure • Budgetary impacts • Temporary isolation of vulnerable individuals	
Action **(Primary Responsible Entity)**	**Report on Progress since Plan adoption** *See Section 5.4 for details on locations identified during Plan development.*
Action D-1: Seek funding for mapping of landslide hazards	-note any grants investigated, applied for and/or obtained to conduct this mapping

5.6 Implementation of Preparedness, Response and Recovery Strategies

Based on feedback from FEMA, CCRPC Staff have concluded that several strategies previously identified in 2011 by the Town of Bolton as mitigation strategies are more accurately classified as preparedness, response and recovery strategies. These strategies are not intended to mitigate against the hazards identified in Section 3, and should not be evaluated as such. Rather, they are included here to serve as a record of the strategies being undertaken by the Town in order to prepare for, respond to and recover from damage caused by those hazards. The first table records the strategies from the 2011 Plan and progress that has been made to date. The second table outlines the strategies that have been developed for implementation from 2017 through 2021.

Table 5-9 Town of Bolton: Progress on Preparedness, Response and Recovery Strategies since 2011

Action Primary Responsible Entity	**Task**	**Brief Description**	**Progress**
#1 Review and modify evacuation and sheltering plans based on the results of drills and exercises or procedures implemented in an actual incident			
Emergency Management Coordinator, Bolton Fire Chief, Smilie School	Evacuation and Sheltering Exercises	Conduct evacuation drills or exercises and evaluate performance.	Ongoing
Emergency Management Coordinator, Bolton Fire Chief, Smilie School	Evacuation and Sheltering Plans	Review evacuation, sheltering, and relocation plans based on results of drills, exercises, and actual incidents.	In response to Irene, the Town recognizes the need to more frequently review and update evacuation, emergency operations center and shelter plans and preparation to better respond to major disaster events.
#2 Ensure town and school emergency plans are fully coordinated			
Emergency Management Coordinator, School Principal, Bolton Fire Chief	Maintain Communications	Maintain good communication between school and town officials regarding plans and safety issues, so that any changes are known to all parties.	Discussions between the Fire Chief, Road Foreman, Emergency Management Coordinator, Smilie School Principal and School Superintendent regarding improved notification processes, especially with regard to road and school closures during emergencies, is ongoing.
Emergency Management Coordinator, School Principal, Bolton Fire Chief	Monitor Exercises	When evacuation drills and other exercises are carried out, monitor coordination between school and town officials.	There have been discussions between the Fire Chief, Emergency Management Coordinator, and Smilie School Principal regarding scheduling future safety drills and school evacuation exercises.

#3 Raise public awareness of hazards, hazard mitigation and disaster preparedness.			
Emergency Management Coordinator; Bolton Fire Chief	School Programs	Continue school programs to raise student awareness of hazards, safety, preparedness and prevention.	The Fire Department conducts regular program to raise children's awareness of fire safety.
Emergency Management Coordinator; Bolton Fire Chief	Family Programs	Continue family programs, such as car safety seat and bike safety programs, to raise family awareness of hazards, safety, preparedness and prevention.	The Fire Department, and Richmond Rescue, , conduct workshops on car seat fitting, smoke detectors, etc.
Emergency Management Coordinator; Bolton Fire Chief	Fire Prevention Programs	Continue National Fire Prevention Week and other programs to raise public awareness of fire hazards, safety, preparedness and prevention.	The Fire Department conducts programs in schools during National Fire Prevention Week.

Table 5-10 Town of Bolton: Preparedness, Response and Recovery Strategies: 2017-2022

(Primary Responsible Entity)	**Task**	**Brief Description**
Category #1: Review and modify evacuation and sheltering plans based on the results of drills and exercises or procedures implemented in an actual incident		
Bolton Fire Chief, Emergency Management Coordinator, School Principal and School District	Evacuation and Sheltering Exercises	Conduct evacuation drills or exercises and evaluate performance.
Emergency Management Coordinator, Bolton Fire Chief, School Principal and School District	Evacuation and Sheltering Plans	Review evacuation, sheltering, and relocation plans based on results of drills, exercises, and actual incidents; especially for residents within designated flood hazard areas (US2, Duxbury Road).

Bolton Fire Chief, Emergency Management Coordinator	Dam failure preparedness	Clarify notification procedures and requirements for dam releases during major flood events and/or in the event of a dam failure, in association with state emergency management, dam owners/utilities, and neighboring towns
Category #2: Ensure town and school emergency plans are fully coordinated		
Emergency Management Coordinator, School Principal, Bolton Fire Chief	Maintain Communications	Maintain good communication between school and town officials regarding plans and related safety issues,
Bolton Fire Chief Emergency Management Coordinator, School Principal	Monitor Communication, Coordination	Monitor and evaluate communication and coordination between town and school officials during evacuation drills and other exercises.
Category #3 Raise public awareness of hazards, hazard mitigation and disaster preparedness.		
Bolton Fire Chief, Fire Department	School Programs	Continue school programs to raise student awareness of hazards, safety, preparedness and prevention.
Bolton Fire Chief, Fire Department, Richmond Rescue	Family Programs	Continue family programs, such as car safety seat and bike safety programs, to raise family awareness of hazards, safety, preparedness and prevention.
Bolton Fire Chief, Fire Department	Fire Prevention Programs	Continue National Fire Prevention Week and other programs to raise public awareness of fire hazards, safety, preparedness and prevention.
Emergency Management Coordinator; Bolton Fire Chief	Other hazard awareness programs	Develop and post emergency contact, emergency preparedness, and evacuation and shelter information on the town's website.
Category #4 Maintain and improve capabilities of existing and potential public shelters		
Emergency Management Coordinator, school principal and superintendent	Maintain and Improve Existing Shelter Capability	Maintain and improve existing shelter facilities, including purchasing emergency generators where warranted .