

# *Town of Cavendish, Vermont: All Hazard Mitigation Plan*

*2016-2021*

*Prepared by the Town of Cavendish  
And  
Southern Windsor County Regional Planning  
Commission*

Adopted: April 10, 2017

Town of Cavendish 2016-2021 All Hazard Mitigation Plan

4-10 - 2017

**CERTIFICATE OF ADOPTION**

Town of Cavendish, VT  
Selectboard

**A Resolution Adopting the  
Town of Cavendish 2016-2021 All Hazard Mitigation Plan**

WHEREAS, the Town of Cavendish has worked with the Southern Windsor County Regional Planning Commission to prepare an updated hazard mitigation plan for the town, to identify natural hazards, analyze past and potential future damages due to natural and man-made caused disasters, and identify strategies for mitigating future damages; and

WHEREAS, duly-noticed public meetings were held by the Cavendish Selectboard to present and receive public comment on the draft Plan; and

WHEREAS, the updated 2016-2021 Cavendish All Hazard Mitigation Plan was submitted to the Division of Emergency Management and Homeland Security and the Federal Emergency Management Agency for review on August 24, 1016; and

WHEREAS, the update 2016-2021 Reading All Hazard Mitigation Plan **demonstrates the community's** commitment to implementing the mitigation strategy and authorizes responsible agencies to execute their actions; and

NOW, THEREFORE BE IT RESOLVED that the Town of Cavendish Selectboard hereby adopts the 2016-2021 Cavendish All Hazard Mitigation Plan for municipal use and implementation.

Duly adopted this 10 day of April, 2017.

Cavendish Selectboard:



Chair, Cavendish Selectboard



Member

Member



Member



Member

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## **1. INTRODUCTION**

The goal of this stand-alone Hazard Mitigation Plan is to help the community identify risks and provide local mitigation strategies it can take to make Cavendish more disaster resilient.

*What is Hazard Mitigation?*

Hazard mitigation is an action taken to reduce or eliminate the long-term risk to human life and property from both natural and man-made hazards. The work done to minimize the impact of hazard events to life and property is called Hazard Mitigation Planning.

## **2. PURPOSE**

The Federal Emergency Management Agency (FEMA), the Vermont Division of Emergency Management and Homeland Security (DEMHS), and local towns have come to recognize that it is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where the hazards are most severe, what is most likely to occur and identify what local actions can be taken to reduce the severity of the hazard and reduce their impacts on the community.

Hazard mitigation planning and strategies include the following benefits:

- structural or land improvements
- increased public education and awareness of hazards
- altering the hazard area to remove the hazard occurrence
- reducing the hazard frequency through structure or land treatment
- increased community support for specific actions to reduce future losses
- reduction in financial and physical losses caused by hazard events
- eligibility for hazard mitigation grants and aid
- strengthened partnerships

The Town of Cavendish All Hazard Mitigation Plan is a stand-alone plan to assist the town in identifying hazards within the town and identify strategies to reduce or eliminate these hazard risks.

Previously, the Town of Cavendish All Hazard Mitigation Plan was an annex to the Southern Windsor County Regional Planning Commission Multi-Jurisdictional All Hazard Mitigation Plan. The updated plan is intended to serve as a 'stand-alone' plan for the Town of Cavendish and will focus on the hazards and mitigation programs best suited for the town.

A partial list of revisions that have been made include:

- Reorganization/restructuring of the plan
- Revaluation of hazards using new methodology
- Update of data, tables and charts
- Review and update status of mitigation strategies
- Incorporation of new state initiatives on river corridor and fluvial erosion mitigation
- Identification of current mitigation strategies
- Maps

## **3. TOWN PROFILE**

The Town of Cavendish is located within Windsor County in southeastern Vermont, bordered by the towns of Weathersfield, Reading, Plymouth, Ludlow, Chester and Baltimore. Regional highways, including VT Routes 131 and 103, connect with large population areas outside Cavendish. VT Route 103 and VT Route 131 are part of the National Highway System and are utilized by many heavy trucks traveling through the town. A short segment of VT Route 106 runs through the northeastern corner of Cavendish. Evacuation routes are detailed in the Cavendish Basic Emergency Operations Plan.

The Green Mountain Railroad runs through Cavendish on the route that extends from Bellows Falls to Rutland. Currently the tracks are used mainly for freight traffic, although an excursion train, the Green Mountain Flyer, runs from Bellows Falls to Ludlow during the fall foliage season.

Current land use in the Town of Cavendish follows patterns of traditional Vermont villages. The villages of Cavendish and Proctorsville have a mixture of commercial, industrial, residential uses, and services such as post offices, health care, the elementary school and municipal offices. The village centers are served by municipal water and sewer service, while outlying areas are served by private wells and on-site septic systems. Residential areas outside the village centers are primarily rural in nature, and of low- or moderate-density.

The majority of the land area in the town is forested, much of which is owned by the State. Steep slopes, undeveloped ridgelines and large wetland areas not only add to the scenic beauty of the landscape, but are also important habitat areas for deer, moose and bear. Although only one dairy farm is still in operation in the town, many open fields and agricultural lands are also important assets to the town and add to its rural character.

Of Cavendish's 25,140 acres, 1,766 acres are pasture land, 971 are crop land and 18,826 are forested. The remaining 3,577 acres have been developed for residential, commercial, industrial or other planned uses. Of the forested lands, roughly 4,040 acres are state-owned lands – 2,420 acres by the Department of Fish and Wildlife and 1,620 by the Department of Forests, Parks and Recreation.

The climate is generally temperate with moderately cool summers and cold winters; as in the rest of Vermont. Average annual precipitation is around 40 inches, and snowfall generally ranges from a minimum of 70 inches to as much as 200 inches in the Green Mountains. The weather is unpredictable, and large variations in temperature, precipitation, and other conditions may occur both within and between seasons.

Elevations in town rise to a high point of 2,092 feet at the summit of Hawks Mountain near the Baltimore town line. The Black River runs easterly along Route 131 through the Village Centers of Cavendish and Proctorsville, to the confluence with Twenty Mile Stream, a major tributary which drains from the north.

The U.S Census Bureau indicates a 2010 population of 1,367, resulting in a -7% percent growth rate since the 2000 census. This is significantly lower than the -1.3% percent growth rate for Windsor County and significantly lower than the 2.8% growth rate for the state during the same period. The negative growth rate coupled with adopted regulatory tools prevent future development in identified hazard areas. Although a decrease in development has occurred, mitigation priorities remain unchanged.

The ongoing growth and expansion of Okemo Mountain Resort and other ski areas may put some development pressure on the town of Cavendish. In light of this development pressure, the residents of Cavendish have expressed a desire to maintain traditional patterns of development in the town; although there are no zoning bylaws or subdivision regulations in effect in Cavendish at this time.

#### **4. PLANNING PROCESS**

The local planning process used to develop this hazard mitigation plan follows guidance by the Federal Emergency Management Agency (FEMA) and the Vermont Division of Emergency Management and Homeland Security (DEMHS). Beginning in the spring of 2014, Southern Windsor County Regional Planning Commission (SWCRPC) staff reviewed the 2013 Cavendish All Hazard Mitigation Plan, which at the time was an annex to the 2012 Southern Windsor County Regional Planning Commission Multi-Jurisdictional All Hazard Mitigation Plan to identify key areas for updates. The State of Vermont also recently adopted an updated Hazard Mitigation Plan in November of 2013 (Vermont HMP 2013), which was consulted during this update.

Previously, the Town of Cavendish All Hazard Mitigation Plan was an annex to the Southern Windsor County Regional Planning Commission Multi-Jurisdictional All Hazard Mitigation Plan. This updated plan is intended to serve as a ‘stand-alone’ plan for the Town of Cavendish and will focus on the hazards and mitigation programs best suited for the town.

##### **4.1 Public Process**

The Town of Cavendish in partnership with the Southern Windsor County Regional Planning Commission established a plan of completion for the Cavendish All Hazard Mitigation Plan which included public meetings to discuss and complete the following:

- Complete hazard analysis and hazard extent
- Review hazard history and identify additional data to be included
- Review plan and identify mitigation strategies to address each high hazard
- Review past completed or on-going mitigation projects and actions
- Identify new mitigation projects and actions

##### **4.2 Plan Update Process**

On October 1<sup>st</sup> 2014, SWCRPC staff met with the Cavendish Planning Commission to begin the town process for this plan.<sup>1</sup> Participants discussed the purpose and timeline for updating the plan and groups/individuals that should be invited to meetings and made aware of the plan update. Most were familiar with the process, as the previous plan had been adopted only two years prior. Changes discussed with the Town included new grouping of some hazards, new identified hazards, and new methodology for assessing and scoring each hazard which is described below in Section 5.1- Hazard Identification and Analysis. Attendees of the meeting collaborated in creating the hazard analysis seen in **Table 2: Hazard Identification and Analysis**. Hazards scoring below 7 are identified but not covered in this plan.

In the winter of 2014-2015, SWCRPC staff began the process of writing the new plan update by reviewing and updating hazard data used in the previous version of the Hazard Mitigation Plan. Revisions include updates to the town profile section; all data charts, tables and maps; incorporation of hazard events that occurred since the last plan revision, and integration of new relevant reports and documents including the Black River Phase 1 and Phase 2 Stream Geomorphic Assessments, Black River Corridor Management Plan, and the proposed draft update of the Town of Cavendish-Flood Hazard Area Regulations.

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<sup>1</sup> See Sign-in sheet 10.1, Agenda 10.1, Minutes 10.1

Following the draft completed by SWCRPC, a publicly noticed meeting was held at Cavendish Town Hall on March 25, 2015<sup>2</sup>. SWCRPC opened the meeting with a review of the prior plan and major changes in the update. Those present, including members of the Town Hazard Mitigation Committee, discussed the current status of each of the Hazard Mitigation and Preparedness Project and Actions identified in the previous plan (see **Table 1** below), updated the list of Resources for Hazard Mitigation (see **Section 6**), and discussed recovery projects from Tropical Storm Irene, other current mitigation efforts and foremost hazard concerns.

As part of the process in determining mitigation strategies, the group reviewed mitigation ideas from the FEMA Mitigation Ideas guidebook, the State of Vermont Hazard Mitigation Plan, the Black River Corridor Management Plan and earlier planning discussions. New goals, objectives and potential future actions were identified, discussed, and prioritized, based on need, feasibility, cost/benefit and effectiveness in reducing hazard impact. The Hazard Mitigation Committee followed up with a meeting to consolidate this input and determine a list of specific goals and associated objectives and actions for this update which are identified in **Section 6**.

SWCRPC incorporated input from these meetings into a revised draft plan which was submitted to the Planning Commission for review and comment prior to their meeting on April 1, 2015.<sup>3</sup> Planning Commission member comments were discussed and incorporated into the draft. This revised draft plan was distributed to the Cavendish Selectboard for review on April 3, 2015, prior to their meeting on April 13, 2015.<sup>4</sup> Simultaneously, the revised draft plan was put out for public comment and review by adjacent towns including Reading, West Windsor, Ludlow, Plymouth, Baltimore, Chester and Weathersfield. This was done by posting an electronic copy on the town and SWCRPC websites and having a hard copy of the plan advertised and made available at the town office. The draft was distributed to adjacent towns for comment via email.

Input was solicited by SWCRPC staff through meetings, email and digital postings in order to reach as many members of the community as possible including members of the Cavendish Planning Commission, Selectboard, Town Manager, Emergency Management, Fire Department Chief, town personnel, school principal, and members of the Cavendish public and surrounding towns. The meeting agendas included a section by section review of the previous plan with an emphasis on identifying the highest hazards facing the town and mitigation actions specific to the town. The previous version of the Cavendish Hazard Mitigation Plan, Cavendish Town Plan, a draft plan from a neighboring town, and the recently updated SWCRPC Regional Plan, were provided as examples to facilitate the discussion.

Participants were given an opportunity to voice their concerns and discuss areas of town most likely to be affected by these hazards, and comment on future goals and mitigation strategies that may be undertaken to reduce the risk of future harm and cost to the town. Changes in priorities, development, and local mitigation efforts were also considered throughout the revision process. The implementation schedule at the end of this document in **Table 8**, reflects the **2016-2021 Mitigation and Preparedness Actions and Projects** as determined during this process. Following the meetings, SWCRPC staff made the revisions and drafted a new, updated plan which is available for review at the Cavendish Town Office and posted

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<sup>2</sup> See Sign-in sheet 3.25, Agenda 3.25

<sup>3</sup> See Sign-in sheet 4.1, Agenda 4.1

<sup>4</sup> See Sign-in sheet 4.13, Agenda 4.13



on the SWCRPC website ([www.swcrpc.org](http://www.swcrpc.org)). The final adopted Cavendish Local Hazard Mitigation Plan will also be posted on the SWCRPC website and available at the Cavendish Town Offices.

**Table 1** lists the mitigation and preparedness actions and projects from the previous 2013 Multi-Jurisdictional All Hazard Mitigation Plan for Cavendish. Mitigation actions, listed in order of priority set at that time, are shown here with an additional column to indicate the status of each as identified by the Town. Some of these action items have not been implemented or have been reevaluated and/or carried over to the 2016-2021 Projects and Actions in **Table 8, Section 6.3**.

The Hazard Mitigation Committee also chose to create an additional table to keep a running record of all mitigation projects from previous plans that have been completed, tabled, dropped or have become an established on-going Town program (**Table 9, Section 6.3**). This table includes completed actions from the 2013 Plan and the two proposed actions which have been dropped. The land purchase off Winery Road, on closer look, was determined to be ineffective for flood storage and the retrofitting of municipal buildings for low hazard mitigation was determined to be of low cost/benefit.

**Table 1: Status of Actions and Projects in Prior 2013 All Hazard Mitigation Plan for Cavendish**

| MITIGATION ACTION   | TYPE OF ACTION            | HAZARD ADDRESSED                        | RESPONSIBLE PARTY                                     | TIME FRAME | FUNDING SOURCE                    | STATUS   |
|---|---------------------------|---|---|------------|-----------------------------------|--|
| Upsize and replace known undersized culverts                  | Mitigation                | Flooding, Transportation Disruption     | Road Foreman, Town Manager                            | Annually   | Town Budget                       | Work continues. Carry-over and add prioritization schedule |
| Develop a hazardous materials response plan                   | Preparedness              | Hazardous Material Incident, Earthquake | Fire Departments, SWCRPC                              | 2013-2015  | SWCRPC EMPG funds                 | Completed  |
| Provide back-up power supply for town EOC/Shelter             | Preparedness              | High Wind, Severe Winter Weather        | Emergency Management, Town Manager, Selectboard Chair | 2012-2015  | HMGP, VEM Generator Grant         | Not done. Funds not available. Carry-over                  |
| Identify high hazard trees and remove to reduce power outages | Mitigation / Preparedness | High Wind, Severe Winter Weather        | Town Manager, GMP, Tree Warden                        | 2014-2018  | Utilizing Existing Town Resources | Not Complete. Carry-over and add a structured schedule     |
| Purchase land along Winery Road for flood storage             | Mitigation                | Flooding                                | Town Manager  | 2012-2016  | HGMP, PDM-C                       | Reconsidered. Action not effective.                        |
| Revise flood hazard regulations to                            | Mitigation                | Flash Flooding                          | Town Manager, Planning                                | 2012-2014  | Utilizing Existing Town           | Completed. New FHR, to be adopted                          |



|   |            |   |  |           |  |   |
|---|------------|---|--|-----------|--|---|
| include data from River Corridor Studies  |            |   | Commission, SWCRPC   |           | Resources, SWCRPC                      | 2015, includes river corridor overlay and flood resiliency measures |
| Retrofit critical facilities for greater protection from earthquake, high winds, and snow load capacity | Mitigation | Earthquake, High Winds, Winter Weather          | Town Manager, Selectboard Chair                              | 2014-2019 | HMGP, Town Capitol Budget              | Reconsidered. Low cost/benefit for low priority hazards             |
| Provide outreach materials on safe home heating during winter   | Mitigation | Structure fire                                  | Selectboard, SWCRPC  | 2013-2015 | Utilizing Existing Town Resources      | Completed. Procedures are in place for annual program               |
| Review SWCRPC Commodity Flow Study for incorporation into response planning                             | Mitigation | Hazardous Materials, Transportation Disruption  | Fire Departments, Town Manager, Road Foreman, SWCRPC         | 2013      | Utilizing Existing Town Resources      | Not done. Carry-over.   |
| Participation by the town in Firewise programs is recommended   | Mitigation | Wildfire, Structure Fire, Severe Winter Weather | Selectboard, Fire Departments                                | 2013      | Utilizing Existing Town Resources      | Completed. School fire education program is ongoing.                |
| Provide Firewise 'Be Firewise Around Your Home' brochure to property owners                             | Mitigation | Structure fire, Wildfire                        | Fire Departments   | Ongoing   | Utilizing Existing Town Resources      | Completed. Distribution to homes through school district.           |
| Install additional dry hydrants as needed   | Mitigation | Structure fire, Wildfire                        | Emergency Management Director, Fire Departments, Selectboard | 2014-2015 | Town budget, dry hydrant grant program | Not complete. 2 installed. Carry-over.                              |
| Tie down all non-anchored structures  | Mitigation | Earthquake, High Wind, Flood                    | Homeowners, Planning Commission                              | 2013-2015 | Utilizing Existing Town Resources      | Completed Addressed in FHR Update to be adopted 2015                |
| Develop a policy to ensure all non-secure propane tanks are tied down                                   | Mitigation | Earthquake, Flooding                            | Selectboard, Planning Commission                             | 2012-2014 | Utilizing Existing Town Resources      | Completed Addressed in FHR Update to be adopted 2015                |

### **4.3 Plan Maintenance Process**

The future method for monitoring and evaluating the Cavendish All Hazard Mitigation Plan will be two-fold. First, strategies will be grouped by responsible party and presented at the monthly (or other) group meetings of that party as an agenda item for discussion or update. Second, annual meetings will be held of the identified Hazard Mitigation Review Committee in partnership with the SWCRPC. The purpose of these meetings will be to formally note status or progress in implementing strategies. An opportunity to provide public input will also be scheduled for a Selectboard meeting in April or May each year. These efforts will be coordinated by the Emergency Management Director and Town Manager. An effort will be made to involve representatives from the Town Selectboard, Planning Commission, Cavendish and Proctorsville Volunteer Fire Department, along with local volunteer boards and interested members of the public, including local business owners.

Additional outreach will continue to garner input from community members and businesses which have not been included in previous hazard mitigation planning efforts. The Town of Cavendish and SWCRPC recognize the importance of public participation in hazard mitigation planning and will continue to provide opportunities for public comment and review during future plan revisions and updates.

The Hazard Mitigation Committee, with assistance from SWCRPC, will be responsible for monitoring this plan to ensure that progress is made on identified mitigation actions and that resources and funding opportunities are sought. To accomplish this, the Hazard Mitigation Committee has included an action item in **Table 8** to formalize the process for monitoring and evaluating the Hazard Mitigation Plan. This may include the following tasks following plan adoption:

- Coordinate responsible parties to review adopted plan action items and implementation process.
- Outline chronological tasks and timeline for implementing each action.
- Confer with SWCRPC to compile a comprehensive list of all available funding opportunities.
- Seek guidance on matching funding options with the Town's mitigation plan.
- Request assistance with grant applications where appropriate.

The Hazard Mitigation Committee, with assistance from SWCRPC, will be responsible for monitoring plan progress on a yearly basis and provide these updates to the Selectboard and Planning Commission annually. These discussions will cover the progress and next steps for implementing the Hazard Mitigation Plan actions and projects. Monitoring may result in the addition of new projects, a revision of some strategies or a change in time frame or priorities as the cost/benefit of a project is further evaluated and funding becomes available. The Hazard Mitigation Committee will also be responsible for reviewing the Hazard Mitigation Plan during other planning activities to ensure proposed mitigation actions remain in line with current town goals, strategies, and policies. Plan progress will be reported to the general public through a noticed Planning Commission meeting on an annual basis.

The plan will be assessed by the Hazard Mitigation Committee for effectiveness based on the following:

- Whether progress had been made toward each goal with the implementation of at least one associated action item as identified in **Table 8**, and

- Percentage of strategies fully implemented compared to prior plan period following adoption of plan. Over the prior plan period, approximately 50% of identified strategies were fully implemented.

Three years into the five year plan revision process, the SWCRPC and Local Emergency Planning Committee 3 (LEPC3) will assist the Cavendish Hazard Mitigation Committee in revising and updating this plan to incorporate issues which have been identified during the ongoing mitigation meetings. The Cavendish All Hazard Mitigation Plan update process will begin in July 2020 assuming a July 2016 plan adoption, with the first public meeting of the Hazard Mitigation Committee. All public meetings will be warned following town protocols.

Following the meeting, a draft plan will be made available for public comment. The plan will be available on the SWCRPC website [www.swcrpc.org](http://www.swcrpc.org), Cavendish town website <http://www.cavendishvt.com/>, and paper copies will be available at the town office. A second publicly warned meeting will be held no later than November 2019 in which any substantial revisions gathered during the public input period will be discussed. The SWCRPC will make all necessary edits to the plan and provide the Hazard Mitigation Committee with a revised version for final review. Subsequently, the plan will be sent to the Vermont State Hazard Mitigation Officer for referral to FEMA for Approval Pending Adoption (APA). Following APA, the town may then adopt the Cavendish All Hazard Mitigation Plan and forward a copy of the adoption resolution for FEMA to complete the plan approval and adoption process.

#### ***4.4 Plan Integration Process***

It is the intent of the town, once this plan is formally approved by FEMA, to incorporate recommended mitigation strategies in the town's future planning activities and planning resources as indicated in **Table 7: Existing Cavendish Resources for Mitigating Hazards** under 'Opportunities for Improving Effectiveness'. The Cavendish Hazard Mitigation Committee will encourage the assimilation of hazard mitigation strategies by providing guidance through cross-board communication in the development and implementation of updates to the Town Plan, Basic Emergency Operations Plan, annual capital budget planning, road standards and maintenance programs, and in the update of town bylaws and ordinances. Additionally, SWCRPC will assist the Town of Cavendish in incorporating hazard mitigation, in general, and these specific mitigation actions, in particular, into the next Town Plan rewrite.

It is anticipated that formal and effective communication on the implementation of these mitigation actions, as proposed under Plan Maintenance Process in Section 4.3, will not only help to ensure their completion but will serve to increase awareness of the importance of mitigation, as well as preparedness, in dealing with natural hazards

### ***5. RISK AND VULNERABILITY ASSESSMENT***

The following assessment addresses the Town of Cavendish's vulnerability to all of the hazards identified by the Hazard Mitigation Committee during the hazard analysis. The likelihood of occurrence and impact to the town were used to assess the town's vulnerability to each hazard.

#### ***5.1 Hazard Identification and Analysis***

A hazard vulnerability assessment for the town began with an inventory of all possible hazards, both natural and man-made. The assessment considers the frequency of occurrence, the anticipated amount of warning time and potential impact to the community of each hazard to determine the relative risk each poses. The ranking methodology used for the analysis ranked the frequency of occurrence, warning time, and potential impact on a scale from 1 to 4, as detailed below the table. The overall hazard score provided is a sum of these scores. Due to limited personnel resources, the Hazard Mitigation Committee agreed to concentrate mitigation efforts for this plan on the most critical hazards which scored a seven, or greater, in the Hazard Analysis below. This is a change from the process used in the previous plan. Some hazards were identified as low vulnerability and rare occurrence to the town during this update process. These hazards, which scored below seven, are not covered in this plan but may still occur. The results of this analysis is shown in **Table 2: Cavendish Hazard Identification and Analysis** on the next page.

A discussion of each of these hazards is given in the proceeding subsections including regional and local data records with a narrative description and its historical impact on Cavendish.

**Table 2: Cavendish Hazard Identification and Analysis**

| Hazard   | Frequency of Occurrence             | Warning Time | Potential Impact | Hazard Score | Section   |
|--|-------------------------------------|--------------|------------------|--------------|-----------|
| Flash Flood/Inundation<br>Flood/Fluvial Erosion                          | 3                                   | 4            | 3                | <b>10</b>    | 5.2b      |
| Severe Weather (Thunderstorm, Lightning, High Wind, Hail, and Flooding)* | 3                                   | 2            | 2                | <b>7</b>     | 5.2e      |
| Hurricane/Tropical Storm   | 3                                   | 1            | 4                | <b>8</b>     | 5.2c      |
| Wildfire   | 2                                   | 4            | 2                | <b>8</b>     | 5.2a      |
| Bushfire   | 3                                   | 4            | 3                | <b>10</b>    | 5.2a      |
| Structural Fire  | 4                                   | 4            | 4                | <b>12</b>    | 5.2a      |
| Dam Failure  | 3                                   | 3            | 3                | <b>9</b>     | 5.2f      |
| Ice Jams   | 3                                   | 3            | 2                | <b>8</b>     | 5.2d      |
| Extreme Cold/Snow/Ice Storm  | 4                                   | 1            | 2                | <b>7</b>     | 5.2h      |
| Microburst/Tornado   | 2                                   | 4            | 3                | <b>9</b>     | 5.2c,5.2e |
| Hazardous Material Spill   | 3                                   | 4            | 2                | <b>9</b>     | 5.2g      |
| Transportation Incidents   | Considered a Low Hazard / scored <7 |              |                  |              |           |
| Landslides/Mudslides/Rockslides  | Considered a Low Hazard / scored <7 |              |                  |              |           |
| Drought/Extreme Heat   | Considered a Low Hazard / scored <7 |              |                  |              |           |

|                            |                                     |  |
|----------------------------|-------------------------------------|--|
| Water Supply Contamination | Considered a Low Hazard / scored <7 |  |
| Earthquake                 | Considered a Low Hazard / scored <7 |  |

\*Note: We have defined 'Severe Weather' to include two or more of the hazards identified

### **Methodology Used For Hazard Analysis**

- Frequency of Occurrence
  - 1 = Unlikely
    - <1% probability of occurrence in the next 100 years (less than 1 occurrence in 100 years)
  - 2 = Occasionally
    - 1-10% probability of occurrence per year, or at least 1 chance in the next 100 years (1 to 10 occurrences in 100 years)
  - 3 = Likely
    - >10% but <100% probability per year (at least 1 chance in the next 10 years)
  - 4 = Highly Likely
    - 100% probable in a year (annual occurrence)
- Warning Time
  - 1 = More than 12 hours
  - 2 = 6 – 12 hours
  - 3 = 3 – 6 hours
  - 4 = None / Minimal
- Potential Impact
  - 1 = Negligible
    - Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries
  - 2 = Minor
    - Isolated occurrences of moderate to severe property damage, brief disruption of critical facilities and infrastructure, and potential for injuries
  - 3 = Moderate
    - Severe property damage on a neighborhood scale, temporary shutdown of critical facilities, and/or injuries or fatalities
  - 4 = Severe
    - Severe property damage on a town-wide or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities

## 5.2 Detailed Hazard Analysis

While the town may be affected by many hazards, the detailed hazard analysis and potential loss estimates listed in this plan have been identified as having a ‘high’ likelihood of occurrence within Cavendish. The types of hazards having the greatest impact can be gleaned from **Table 3**, a listing of **FEMA Disaster Declarations for Windsor County** since 1990.

Less significant hazards did not have occurrence frequencies or levels of impact that would necessitate a more detailed level of analysis. Human losses are also not calculated in this plan, but may be expected to occur depending on the type and severity of the hazard.

The following hazards have been identified as having a relatively ‘high’ total impact score based on the methodology above\*:

| <u>SCORE</u> | <u>HAZARD</u>                                    |
|--------------|--|
| 12           | Structural Fire                                  |
| 10           | Flash Flood / Inundation Flood / Fluvial Erosion |
| 10           | Brush Fire                                       |
| 9            | Microburst/Tornado                               |
| 9            | Hazardous Material Spill                         |
| 9            | Dam Failure                                      |
| 8            | Wildfire   |
| 8            | Hurricane/Tropical Storm                         |
| 8            | Ice Jams   |

*\*For hazards that did not rank “7” or higher, and are not profiled in this plan, the reader is directed to the Vermont State Hazard Mitigation Plan. Hazards that ranked low in the above table are not detailed as they are not likely to occur in Cavendish or are a way of life in Vermont and handled well by the Town.*

When possible, previous occurrence data specific to Cavendish has been provided, however, for all high hazards this was not possible and the best available information has been provided. Much of the available hazard data was found to be on a county, regional or state level. Throughout the life span of this Cavendish All Hazard Mitigation Plan, both the town and the SWCRPC will strive to continually gather local hazard information.

**Table 3: Federal Disaster Declarations for Windsor County VT**

| Federal Disaster Declarations: Windsor County 1990 – 2015 (2/13) |                     |                                     |
|--|---------------------|-------------------------------------|
| FEMA Disaster Number   | Date of Declaration | Description                         |
| 4207   | February 3, 2015    | Severe Winter Storm                 |
| 4140   | August 2, 2013      | Severe Storms and Flooding          |
| 4120   | June 13, 2013       | Severe Storms and Flooding          |
| 4066   | June 22, 2012       | Severe Storm, Tornado, and Flooding |
| 4043   | November 8, 2011    | Severe Storms And Flooding          |
| 4022   | September 1, 2011   | Tropical Storm Irene                |
| 4001   | July 8, 2011        | Severe Storms And Flooding          |
| 1995   | June 15, 2011       | Severe Storms And Flooding          |

|      |                    |  |
|------|--------------------|--|
| 1951 | December 22, 2010  | Severe Storm                             |
| 1790 | September 12, 2008 | Severe Storms and Flooding               |
| 1784 | August 15, 2008    | Severe Storms, Tornado, and Flooding     |
| 1778 | July 15, 2008      | Severe Storms and Flooding               |
| 1715 | August 3, 2007     | Severe Storms and Flooding               |
| 1698 | May 4, 2007        | Severe Storms and Flooding               |
| 1559 | September 23, 2004 | Severe Storms and Flooding               |
| 1488 | September 12, 2003 | Severe Storms and Flooding               |
| 1428 | July 12, 2002      | Severe Storms and Flooding               |
| 1358 | January 18, 2001   | Severe Winter Storm                      |
| 1336 | July 27, 2000      | Severe Storms And Flooding               |
| 1307 | November 10, 1999  | Tropical Storm Floyd                     |
| 1228 | June 30, 1998      | Severe Storms and Flooding               |
| 1184 | July 25, 1997      | Excessive Rainfall, High Winds, Flooding |
| 1124 | June 27, 1996      | Flooding                                 |
| 1101 | February 13, 1996  | Storms and Flooding                      |
| 1063 | August 16, 1995    | Heavy Rain, Flooding                     |
| 990  | May 12, 1993       | Flooding, Heavy Rain, Snowmelt           |
| 938  | March 18, 1992     | Flooding, Heavy Rain, Ice Jams           |
| 875  | July 25, 1990      | Flooding, Severe Storm                   |

#### a) Structural Fire and Wildfire/Brush Fire

Fires, including structure fires, wildfires and brushfires, were identified during the hazard analysis and vulnerability assessment as relatively high hazards to the Town of Cavendish with scores of 12, 10 and 8, respectively.

**Structural fires** were specifically identified as having the highest possible risk to the town, with a Score of 12, due to their high probability of occurrence, short warning time and potential for catastrophic loss. Structure fires are common throughout Vermont during the winter months as residents heat their homes with wood or wood pellet burning stoves. With little or no warning, these fires can affect a single residential structure or spread to other homes, businesses or apartment complexes and can result in loss of property and life.

In Vermont, during 2013, there were 45,689 emergency incidents to which fire departments responded. National Fire Protection Association (NFPA) estimates show, while residential structure fires account for only 25 percent of fires nationwide, they account for a disproportionate share of losses: 83 percent of fire deaths, 77 percent of fire injuries, and 64 percent of direct dollar losses.

According to the 2013 Vermont Annual Fire Marshal Report, although the fire death rate in Vermont has improved significantly over the past few years, historically, it has been disproportionately high based on population. This is due, in part, to the large percentage of residents that live in small rural communities where emergency response time is delayed. Other characteristics of Vermont that lend toward greater loss from fire compared to other states are-

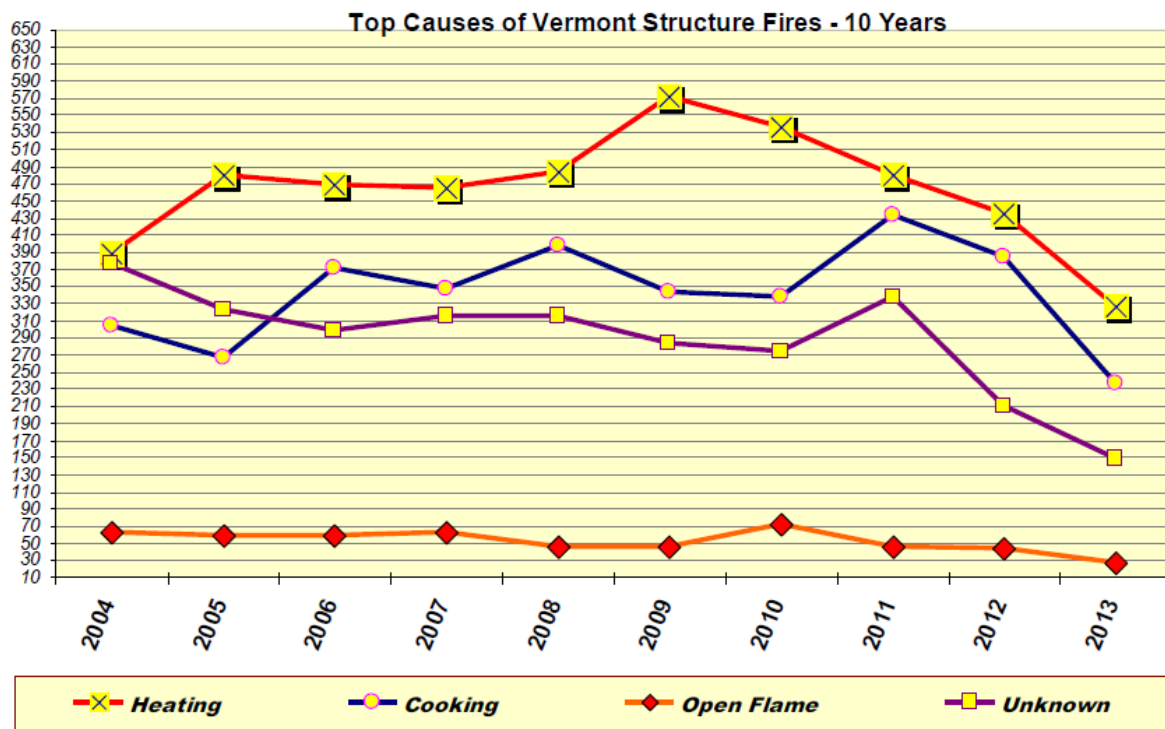
- 2<sup>nd</sup> highest percent of housing built before 1940



- 7<sup>th</sup> coldest state
- 2<sup>nd</sup> oldest median age where elderly are at higher risk
- 1<sup>st</sup> for per capita use of wood for heating

In 2013, Vermont reported a total of 2,739 incidences relating to structure and wildland (forest and brush) fires, 77% of which were structural fires. The leading cause of structure fires in Vermont are the result of heating incidents (39%) followed closely by cooking incidents (28%). Windsor County reported a total of 315 related fires, 73% of which were structure fires. Fires can be caused by improperly disposing of ashes with live coals from wood stoves or by faulty electrical wiring. The most significant common factor in fire fatalities in Vermont continues to be the absence of a functioning smoke detector in the sleeping area of residential structures.

The chart below depicts the top causes of Vermont Structure Fires over a 10 year period, which clearly shows Vermont heating is the number one cause of structure fires followed by cooking.<sup>5</sup>



**Wildland Fires**, which include forest, brush, crop or grassland fires, are relatively uncommon events in the State of Vermont, particularly large wildfire events. A wildfire is defined as ‘An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.’<sup>6</sup>

The State Hazard Mitigation Plan’s analysis of wildfire threat states that “Wildfire conditions in Vermont are typically at their worst either in spring when dead grass and fallen leaves from the previous year are dry and new leaves and grass have not come out yet, or in late summer and early fall when that year’s growth is dry”.

<sup>5</sup> 2013 Vermont Annual Report of the State Fire Marshal

<sup>6</sup> 2013 Vermont Annual Report of the State Fire Marshal

In addition to precipitation, a particular town's vulnerability to large wildfires is directly related to the proportion and continuity of acreage that is forested, pasture and cropland. In Cavendish, this represents 86% of total town land cover. It can be anticipated that small brush and wildfires will continue to occur throughout the Town of Cavendish at a similar rate in coming years, however, given the current land cover and correct seasonal conditions the threat of a large wildfire remains. Uncontrolled surface wildfires that endanger either the Village of Cavendish or Proctorsville would be the worst anticipated wildfire event within the Town of Cavendish. The Hawk Mountain Wildlife Management Area and the Proctor/Piper State Forest are within close proximity to both village areas and present a large, uninterrupted source of wildfire fuel.

Both structure fires and wildland fires are reported in the annual Vermont State Fire Marshal Report which provides yearly fire statistics from reporting departments and by county. Windsor County Fire Responses are shown in **Table 4**. The Town of Cavendish has two departments, Cavendish and Proctorsville. Fire responses for each are shown below in **Table 5**.

**TABLE 4: 'Annual Report of the State Fire Marshal' for Windsor County<sup>7</sup>**

| YEAR | Windsor County           |                         |       |
|------|--------------------------|-------------------------|-------|
|      | Structure Fire Responses | Wildland Fire Responses | Total |
| 2009 | 177                      | 68                      | 245   |
| 2010 | 181                      | 70                      | 251   |
| 2011 | 181                      | 70                      | 251   |
| 2012 | 201                      | 101                     | 302   |
| 2013 | 229                      | 86                      | 315   |
| 2014 | 205                      | 61                      | 266   |

**TABLE 5: 'Annual Report of the State Fire Marshal' for Cavendish Reporting Fire Departments<sup>8</sup>**

| YEAR | STRUCTURE FIRE RESPONSES |                  |       | WILDLAND FIRE RESPONSES |                  |       | TOTAL FIRE RESPONSES |
|------|--------------------------|------------------|-------|-------------------------|------------------|-------|----------------------|
|      | Cavendish FD             | Proctorsville FD | Total | Cavendish FD            | Proctorsville FD | Total |                      |
| 2007 | 2                        |                  | 2     | 2                       |                  | 2     | 4                    |
| 2008 | 8                        |                  | 8     | 4                       |                  | 4     | 12                   |
| 2009 | 2                        | 8                | 10    | 1                       | 0                | 1     | 11                   |
| 2010 | 4                        | 10               | 14    | 1                       | 5                | 6     | 20                   |
| 2011 | 5                        | 12               | 17    | 9                       | 11               | 20    | 37                   |
| 2012 | 3                        | 14               | 17    | 7                       | 6                | 13    | 30                   |
| 2013 | 1                        | 8                | 9     | 3                       | 3                | 6     | 15                   |
| 2014 | 6                        | 16               | 22    | 2                       | 5                | 7     | 29                   |

Data to support the extent of fire hazards for Cavendish is not available but can be estimated. 2014 data compiled by the National Fire Incident Reporting System (NFIRS) for Vermont shows in the table below, a

<sup>7</sup> Vermont Annual Report of the State Fire Marshal

<sup>8</sup> Vermont Annual Report of the State Fire Marshal

total Estimated Dollar Loss Reported by Fire Departments of \$30,048,139 from 2,114 reported structure fires, which is an average of \$14,213 per fire incident. Applying this average to Cavendish structure fire reporting would estimate the extent of annual Town loss of, approximately, \$242,000 based on a recent maximum of 17 structure fires. A report from the *2015 Spring Fire Season Summary* published by the Vermont Department of Forests, Parks, and Recreation provided Fire Statistics below for the State of Vermont which indicates that the average number of acres burned per wildfire incident over a 10 year period (2005-2014) was 2.2 acres. Using this average to estimate the extent of wildfire hazard for Cavendish would give an annual loss of about 45 acres. This can be compared with large fire activity in the spring of 2015 including a 26-acre forest fire in Andover, caused by a re-kindled brush fire; a 47-acre forest fire in Brattleboro, sparked by a downed powerline; and a 137-acre forest fire in Norwich, also caused by a downed powerline. These incidents occurred during a moderately dry spring for Windsor County when red flag warnings were issued by the National Weather Service.

### Fire Statistics

|  | 2015 Fire Statistics |        | 10-Year Average 2005-2014 |        |
|--|----------------------|--------|---------------------------|--------|
| Official reports – reports have been verified by warden or FPR |                      |        |                           |        |
|  | #Fires               | #Acres | #Fires                    | #Acres |
| March  | 2                    | 1      | 9                         | 29     |
| April  | 38                   | 50     | 62                        | 142    |
| May  | 51                   | 284    | 19                        | 30     |
|  |                      |        |                           |        |
| Year to date   | 91                   | 335    | 90                        | 201    |

*From 2015 Spring Fire Season Summary/Vermont Dept. of Forests, Parks and Recreation.*

| Year | Fire Departments Reporting | Structure Fires Reported | Estimated Dollar Loss by Fire Departments | Insurance Companies Reporting/ Total | Fire Claims Reported | Reported Dollar Loss by Insurance Companies |
|------|----------------------------|--------------------------|---|--------------------------------------|----------------------|---|
| 2010 | 175                        | 1,956                    | \$ 18,504,174                             | 534                                  | 1175                 | 47,286,258                                  |
| 2011 | 191                        | 2,366                    | \$ 21,266,173                             | 566                                  | 1127                 | 87,575,447                                  |
| 2012 | 194                        | 2,233                    | \$ 17,840,192                             | 860                                  | 839                  | 44,510,095                                  |
| 2013 | 194                        | 2,116                    | \$ 24,797,552                             | 615                                  | 878                  | 50,911,724                                  |
| 2014 | 228                        | 2,114                    | \$ 30,048,139                             | -                                    | -                    | -   |

*From 2014 Annual Fire Marshal Report, p10.*

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

### b) Flash Flood/Flood/Fluvial Erosion

Flash floods and Fluvial Erosion are significant natural hazard events in the Town of Cavendish, and Windsor County, including inundation flooding events, ice jams, and potential dam failures. The town is susceptible to both flash flooding, frequently caused by summer thunderstorms and spring snow runoff, and the fluvial erosion which often accompanies these events. Flash flooding is further aggravated by fluvial erosion from previous damaging flood events. The damage from spring flooding events can vary greatly depending upon the amounts of precipitation, snow cover, spring melt, soil saturation, existing erosion and topography.

**Flash flooding** typically occurs during summer when a large thunderstorm or a series of rain storms result in high volumes of rain over a short period of time. Higher-elevation drainage areas and streams are particularly susceptible to flash floods. The National Weather Service describes a flash flood as:

*“A flood caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through river beds, urban streets, or mountain canyons sweeping everything before them. They can occur within minutes or a few hours of excessive rainfall. They can also occur even if no rain has fallen, for instance after a levee or dam has failed, or after a sudden release of water by a debris or ice jam<sup>9</sup>”.*

The 2012 SWCRPC Multi-Jurisdictional All Hazard Mitigation Plan provides a detailed history of past flooding. **Table 3** above shows FEMA Disaster Declarations for Windsor County from 1990-2015. The table shows that, of the 28 disaster declarations for Windsor County, 25 were related to flooding. Not all of these events had an impact on Cavendish and some less severely than on other towns.

The Federal Emergency Management Agency (FEMA) has designated floodplain areas along the Black River main stem, Twenty Mile stream, and other small streams and river tributaries. Vermont Agency of Natural Resources has recently mapped river corridors for these stream segments along with special flood hazard areas which can be found on-line.<sup>10</sup> The river corridor for the Black River has been recently mapped and is shown on **Map #5: Water Resources**. Areas within the 100-year flood zone lie mainly along the Black River and Twenty-Mile Stream. There are some small areas of a 500-year flood zone along the Black River as well.

Currently, Cavendish is a participatory, non-sanctioned member of the National Flood Insurance Program and regulates development in the floodplain through the enforcement of the Town of Cavendish Flood Hazard Area Regulations. Cavendish is currently in the final stages of updating these regulations to include the recently mapped Black River Corridor overlay and a stronger focus on flood resiliency. These new FHA regulations are expected to be adopted in 2015.

For the Town of Cavendish, damage from a 100-year flood is influenced by the following factors:

- Estimated number of residential buildings in 100-year flood zone: 51 structures in town are within the 100-year floodplain as mapped by FEMA of which 12 are located within the floodway.
- Estimated number of commercial buildings in 100-year flood zone: 14 structures in town are within the 100-year floodplain as mapped by FEMA of which 2 are located within the floodway
- Estimated number of bridges and culverts within Cavendish from the Vermont Online Bridge and Culvert Inventory Tool as of 2014 are 13 Town Bridges, 10 State Bridges, and 733 (79% town

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<sup>9</sup> National Weather Service <http://www.srh.noaa.gov/mrx/hydro/flooddef.php>

<sup>10</sup> The ANR FLOOD READY link below shows river corridors overlays comparable to FEH zones [http://maps.vermont.gov/ANR/Html5Viewer/Index.html?configBase=http://maps.vermont.gov/Geocortex/Essentials/ANR/REST/sites/Focus\\_on\\_Floods/viewers/FocusOnFloodsHTML/virtualdirectory/Resources/Config/Default](http://maps.vermont.gov/ANR/Html5Viewer/Index.html?configBase=http://maps.vermont.gov/Geocortex/Essentials/ANR/REST/sites/Focus_on_Floods/viewers/FocusOnFloodsHTML/virtualdirectory/Resources/Config/Default)

owned) Culverts. Approximately 37% of culverts are in poor or worse shape, 33% are less than 18 inches in diameter.

- There are 8 dams, including 5 along the Black River main stem including the CVPS dam at Cavendish Gorge.
- A number of hazardous waste sites/facilities are close to or within the flood zone including the town power plant.
- Several of the high risk populations are located in close proximity to the flood zones with the town.
- Many of the primary evacuation routes are either completely or partially within the flood zones.

Infrastructure and structures along higher elevation streams and drainage areas are often the most vulnerable to damage from flash flooding. The Black River and Twenty Mile Stream are areas of town known to be susceptible to flash flooding. Although flash floods are not frequent events, hazards posed can be significant as seen with the state-wide flooding from Tropical Storm Irene in the summer of 2011. Tropical Storm Irene brought much devastation to the Town of Cavendish. Several roads were completely washed away, bridges were destroyed and culverts were washed downstream. Reparations continue.

The total damage sustained by the Town of Cavendish from Tropical Storm Irene is estimated at, approximately, \$4.0 million. Many of the Town's roads were impacted by the storm and required repairs. In addition, numerous culverts required either replacement or repair. Below is a listing of major, non-road projects in Cavendish directly affected by Tropical Storm Irene (See **Map 1: Road Network Damage from Tropical Storm Irene**). A narrative excerpt from the 2011 Cavendish Town Report highlighting damage from Tropical Storm Irene is given under Hurricanes/Tropical Storms in section 5.2c.

#### **Damaged Town Infrastructure**

- Whitesville water main
- Mill Street water main
- Vermont Route 131 water main
- Vermont Route 131 sewer main
- Cavendish Waste Water Treatment Facility
- Sewer lift station
- Whitesville Bridge replaced (2014)
- Brook Road Bridge replaced (2014)
- Winery Road Bridge repaired (2014)
- Davis Road Bridge/Culverts to be replaced (2015)

Prior to Tropical Storm Irene in 2011, residents of Cavendish experienced three major floods within the last 100 years: one in 1927, one in 1973, and Tropical Storm Floyd in 1999. In 1927, the largest flood on record in Vermont destroyed much of lower Cavendish Village and many houses and barns. Long sections of road and buildings were washed away due to a quarter mile channel avulsion bypassing the Cavendish Gorge. The 1973 flood washed out mainly roads and bridges and damaged the waste water treatment facility.

During the comment period some citizens expressed concern that future flooding above the hydroelectric dam at Cavendish Gorge will cause another avulsion and asked whether the hydraulics around the dam should be studied. Community entities have produced an informational pamphlet on the topic which is distributed during town events. Also noted was discussion regarding an old, non-functional, stone culvert on the Black River under Hwy 131 that is several feet in diameter. During Irene, river water backed-up through that culvert into town causing extensive flood damage.

**Fluvial Erosion** is erosion caused by rivers and streams, and can range from gradual bank erosion to catastrophic changes in river channel location and dimension during high flow conditions. While some flood losses are caused by inundation (i.e. waters rise, fill, and damage low-lying structures), most flood losses in Vermont are caused by “fluvial erosion”. Reasons are Vermont’s geography, extreme climate, deep snows, destructive ice jams and intense rainstorms. Centers of commerce in villages and towns became concentrated along river banks, forests were cleared, and many rivers moved or channelized to accommodate this development rendering them unstable and prone to fluvial erosion.<sup>11</sup>

Fluvial erosion is often associated with flash flooding and can result in catastrophic damage to property and infrastructure when a rapid adjustment of a stream channel occurs. Severe damage from fluvial erosion caused by Tropical Storm Irene have widened river beds and stripped river banks bare of natural vegetation making them more susceptible to additional erosion and landslides.

Cavendish, like many other towns within Southern Windsor County, is at risk for fluvial erosion hazard flooding events. The “Cavendish Chasm” along State Highway 131 required over a million yards of fill to repair following Irene. Extent data in the form of acres/feet from the most severe historical flooding event is unavailable. Erosion is exacerbated by failure of infrastructure including roads, culverts, bridges and dams. This secondary hazard as a result of flooding can be costed by the capital required to repair and replace these structures, however, these reparation costs from past fluvial erosion events are not specifically identified as separate from the flooding event that caused it.

Stream geomorphic assessments for the Black River and its major tributaries have been completed and Fluvial Erosion Hazard (FEH) Zones have been mapped and are available online.<sup>12</sup> SWCRPC is in the process of providing information on fluvial erosion hazard and river corridor bylaws, to further limit development and minimize risks, to local zoning officials and municipalities. The revised Flood Hazard Area Regulations to be adopted in 2015 include a river corridor and setback overlay. New structures within these overlays are now prohibited.

Some options listed below for mitigating fluvial erosion hazards are addressed in this plan:

- Environmentally-friendly river restoration techniques
- Natural channel design
- Remove or relocate threatened structures
- Erosion and landslide hazard maps
- Limiting new investments in river corridors
- Meet with State Geologist to inspect landslide activity and receive structural appraisal of landslide damaged embankments
- Fluvial erosion/river corridor bylaws

One of the worst widespread flood disasters recorded in the State of Vermont that occurred in November, 1927, dropped nearly 10 inches of rain on frozen ground causing extensive damage statewide. Relatively recent widespread flooding occurred in June, 1973, when up to 6 inches of rain fell resulting in \$64 million in damage. However, over the past several years, flooding has occurred in limited areas from intense,

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<sup>11</sup> Municipal Guide to Fluvial Erosion Hazard Mitigation, Vermont Agency of Natural Resources  
<sup>12</sup>

The ANR FLOOD READY link below shows river corridors overlays comparable to FEH zones  
[http://maps.vermont.gov/ANR/Html5Viewer/Index.html?configBase=http://maps.vermont.gov/Geocortex/Essentials/ANR/REST/sites/Focus\\_on\\_Floods/viewers/FocusOnFloodsHTML/virtualdirectory/Resources/Config/Default](http://maps.vermont.gov/ANR/Html5Viewer/Index.html?configBase=http://maps.vermont.gov/Geocortex/Essentials/ANR/REST/sites/Focus_on_Floods/viewers/FocusOnFloodsHTML/virtualdirectory/Resources/Config/Default)



scattered storm events and ground saturation from persistent and excessive rainfall. This characterized the pattern of flooding in 2011 in Vermont during which there were four regional disaster declarations issued in Vermont in 2011 due to flooding and fluvial erosion. The fourth was Tropical Storm Irene in late August when up to 11 inches of rain fell in some areas of the State and up to 8 inches in the Cavendish area. Tropical Storm Irene is also covered under the “Tropical Storms/Hurricanes” (Section 5.2c) hazard with additional discussion on the variation in rainfall amounts throughout the State with this storm. According to the *2013 State of Vermont Hazard Mitigation Plan*, studies show that areas of the State can expect a greater frequency of flooding with an increase in extreme rainfall amounts.<sup>13</sup>

### **Cavendish Watershed Background**

The Town of Cavendish is located within Basin 10, a sub-watershed of the Connecticut River Drainage Basin. Basin 10 is comprised of two watersheds drained by the Black and Ottauquechee Rivers. Black River Watershed Phase 1 and Phase 2 Stream Geomorphic Assessments were completed in 2007 and 2010, followed by the Black River Corridor Management Plan, compiled in 2011 by Southern Windsor County Regional Planning Commission, and a Basin 10 Water Quality Management Plan in 2012. These watershed assessments and management plans focus primarily on hazard mitigation, local water quality and resource conservation. It should be noted that the recommendations outlined to address these concerns are intertwined, as strategies for protecting or improving water quality also serve to minimize the impact of hazard events.

Although only 6.2% of the Basin 10 land area is developed, much of this development is typically found in valleys and along waterways which is the case for Cavendish. Areas of high population concentration and services, namely the Villages of Cavendish and Proctorsville, are nestled along both banks of the Black River with sections that lie either within floodways, Special Hazard Flood Zones, river corridors, Fluvial Erosion Hazard areas or are surrounded by floodplains (**See Map #5: Water Resources**). A significant flood event in this area would disrupt evacuation routes, and could impact many residences, special population areas, town services, and hazardous waste storage sites (**Map #4: High Hazard Vulnerable Sites**).

The Black River Corridor Management Plan outlines watershed, town and local level strategies for future river corridor management. The overarching strategy is to protect the river corridor by giving the stream/river the space needed to find its own natural equilibrium which will minimize, in the long run, hazards related to flooding, flash flooding, fluvial erosion and ice jams. Identified protection strategies relevant to hazard mitigation are listed below:

- Allow floodwaters to access their natural floodplains
- Preserve/restore channel-contiguous wetlands
- Stabilize stream banks and establish vegetative buffers
- Establish a local River Corridor overlay district & buffer
- Remove or replace Infrastructure including bridges, culverts and dams
- Incorporate hazard mitigation into local waterway regional planning regulations

The Phase 2: Stream Geomorphic Assessments and the Black River Corridor Plan have identified locations and site specific projects within Cavendish where protection opportunities exist to provide room for natural river channel movement and fluvial geomorphic stability. Designated River Corridor Protection

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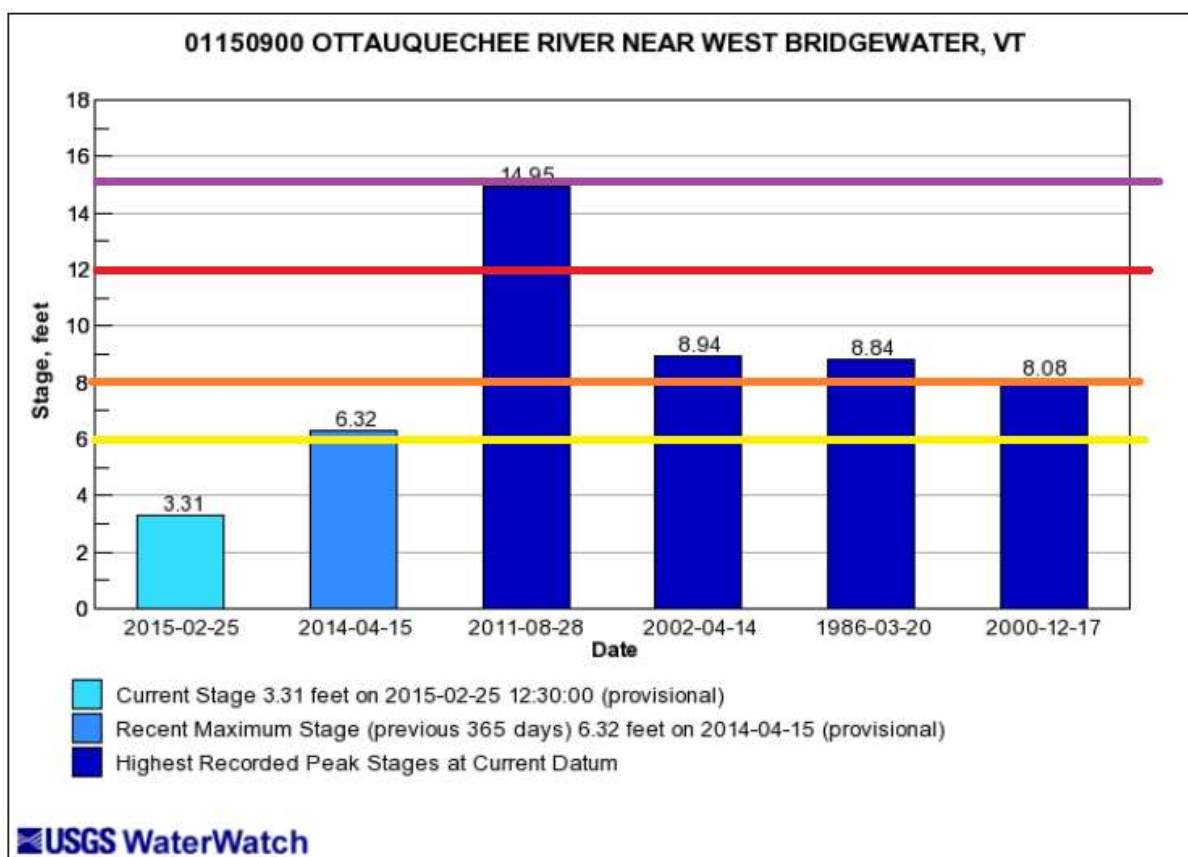
<sup>13</sup> 2013 State of Vermont Hazard Mitigation Plan, p 4-9



Areas and Fluvial Erosion Hazards (FEH) within Cavendish have been mapped for the Black River main stem and the Twenty Mile Stream tributary.

The USGS maintains a river gauge on the Ottauquechee River in West Bridgewater, site #01150900, located within Basin 10, northwest of the Town of Cavendish and is the closest daily monitored gauge location unimpeded by instream structures. The information obtained from the USGS for this gauge site is described below. While this data is not specific to the Town of Cavendish, the data may be used to estimate the worst case scenario flooding for Cavendish as these towns are located in close proximity and share similar topographical characteristics. The stream gauge on the Black River is downstream from Cavendish in North Springfield below impoundments and, therefore, not representative of river flow in Cavendish.

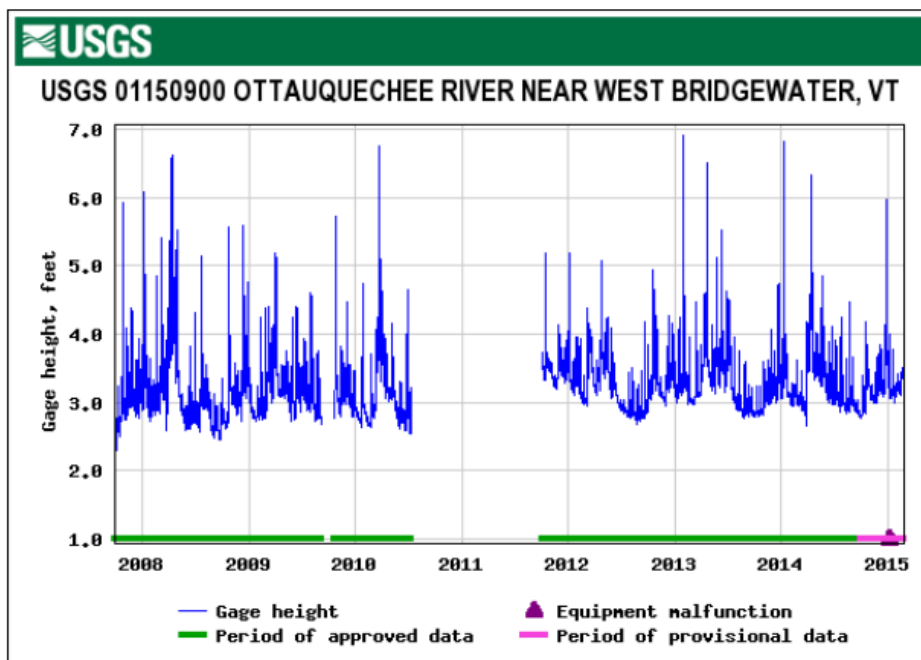
The bar chart below is a “Flood Tracking Chart” for gauge site #01150900 from USGS WaterWatch (<http://waterwatch.usgs.gov>) which displays historic peak data for gauge height, or stage (height of the water in the stream above a reference point). National Weather Service Flood Levels are shown below on next page.



*\*Note the gauge height approached 'Major Flood Stage' of 15 feet during Tropical Storm Irene. Prior to Tropical Storm Irene in 2011 and since 2000, the next highest recorded peak stages were at 'Flood Stage' in the range of 8 to 9 feet. Highest recorded stage at this gauge site since 2011 was 6 feet.*

|                       |    |
|-----------------------|----|
| Major Flood Stage:    | 15 |
| Moderate Flood Stage: | 12 |
| Flood Stage:          | 8  |

The graph below plots historical daily gauge height since 2008 obtained from the USGS National Water Information System (<http://waterdata.usgs.gov/nwis/si>). Although daily data was not available during 2011 it can be seen from this graph that levels during periods of spring melt regularly exceed Action Stage or 6 feet above reference height.



\* The site was discontinued during WY2011 due to a lack of funding, hence the missing data. USGS did survey and publish a peak stage and discharge for West Bridgewater. The peak for TS Irene was 14.95 ft and 9,070 cfs. The discharge was computed on basis of a contracted-opening and flow-over-road measurement of the peak flow. US Geological Survey, New Hampshire-Vermont Office.

The table below was extracted from a 2014 USGS Scientific Investigations Report on flood analysis of the Ottauquechee River (<http://pubs.usgs.gov/sir/2014/5214/>). Discharge or streamflow is the volume of water flowing past a given point in the stream in a given period of time. The table compares data during Tropical Storm Irene to AEP flood levels. According to this chart Irene flood levels were comparable to .2% AEP or a "500-yr flood".

**Table 5.** Stages and water-surface elevations for the streamgage at USGS Ottauquechee River near West Bridgewater, Vt. streamgage (sta. no. 01-150900), with corresponding discharge estimates at the USGS Ottauquechee River at North Hartland, Vt. streamgage (sta. no. 01-151500).

[AEP, annual exceedance probability; %, percent; ft, feet; NAVD 88, North American Vertical Datum of 1988]

| Location  | 10% AEP flood | 2% AEP flood | 1% AEP flood | 0.2% AEP flood | Tropical storm Irene flood |
|---|---------------|--------------|--------------|----------------|----------------------------|
| Streamgage 01150900 at Ottauquechee River near West Bridgewater, Vt.  |               |              |              |                |                            |
| Stage, in feet above streamgage datum of 1,148.59 feet NAVD 88  | 10.96         | 12.65        | 13.28        | 14.73          | 14.95                      |
| Elevation, in feet above NAVD 88  | 1,159.55      | 1,161.24     | 1,161.87     | 1,163.32       | 1,163.54                   |
| Discharge, in cubic feet per second   | 2,140         | 3,910        | 4,960        | 8,390          | 9,070                      |
| Corresponding estimated unregulated discharge at streamgage 01151500 at Ottauquechee River at North Hartland, Vt. |               |              |              |                |                            |
| Discharge, in cubic feet per second   | 18,700        | 34,300       | 43,400       | 72,200         | 38,200                     |

*\*From USGS Scientific Investigations Report 2014-5214: 'Analysis of Floods, Including the Tropical Storm Irene Inundation, of the Ottauquechee River Vermont' by Robert H. Flynn.*

The following definition of “River Corridor” have been used by the State of Vermont:

*The “River Corridor includes the channel; floodplains and the adjacent land; and the area identified in many communities as the Fluvial Erosion Hazard Area (FEH). The purpose of the zone is to identify the space a river needs to re-establish and maintain stable “equilibrium” conditions. In other words, if the river has access to floodplain and meander area within this corridor, the dangers of flood erosion can be reduced over time.*<sup>14</sup>

### c) Hurricanes/Tropical Storms/Micro-Bursts

Hurricanes and Tropical Storms are infrequent event in Windsor County and Vermont. More often, Vermont experiences localized Micro-Bursts and wind shears that tend to knock down trees and blow the roofs off barns and other structures. These hazards often cause serious flooding and widespread power

| Saffir-Simpson Hurricane Scale |            |         |
|--------------------------------|------------|---------|
| Category                       | Wind Speed |         |
|                                | mph        | knots   |
| 5                              | ≥156       | ≥135    |
| 4                              | 131-155    | 114-134 |
| 3                              | 111-130    | 96-113  |
| 2                              | 96-110     | 84-95   |
| 1                              | 74-95      | 65-83   |
| Non-Hurricane Classifications  |            |         |
| Tropical Storm                 | 39-73      | 34-64   |
| Tropical Depression            | 0-38       | 0-33    |

outages from downed trees. This is a function of Vermont’s very rural nature with a large segment of its population living in remote locations dependent upon long extensions of the power grid. Prior to Tropical Storm Irene in August 2011, Cavendish was impacted by Tropical Storm Floyd in November, 1999.

Below is a narrative excerpt from the 2011 Cavendish Town Report highlighting damage from Tropical Storm Irene:

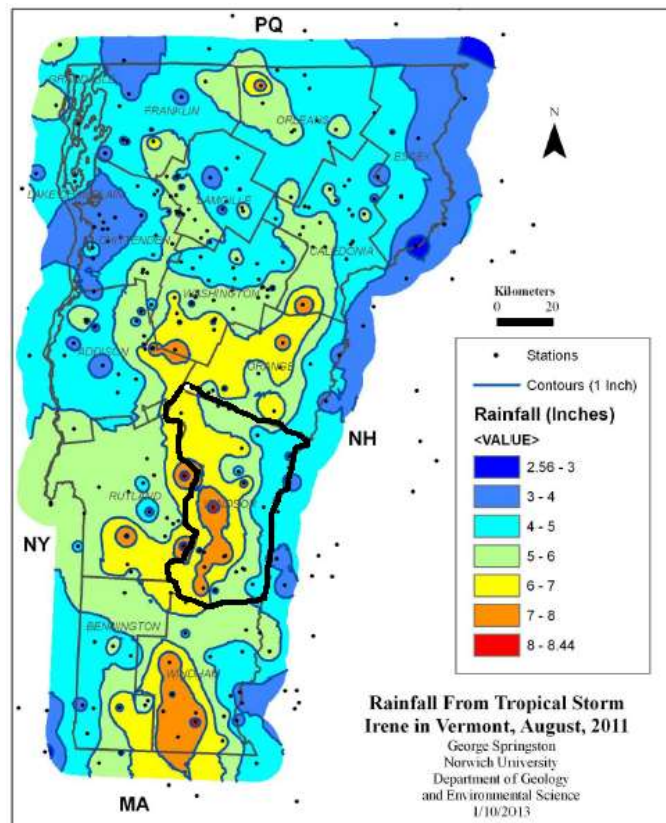
*“All over Cavendish: from Newton Road to Greven Road Extension; from Felchville Gulf Road to Cavendish Gulf Road; from Twenty Mile Stream Road to Greenbush Road and virtually all points in between there was severe flooding which wiped out roads, bridges, driveways, utility poles, yards, houses, commercial buildings and churches. The low lying parts of the villages of Proctorsville and Cavendish became inundated and wracked by devastating currents. We had known there was a storm coming, but we were still*

*absolutely astounded by the height and the rapidity of the flood water’s rise. The anticipated high winds turned out to be less than was forecast – a blessing as the flood damage, in and of itself, was totally devastating.*

*Cavendish found itself alone – literally cut off from the rest of the world by State highways, town roads, culverts and bridges which were impassable in all directions! Power outages were widespread and many lost telephone service. What a mess! Both villages soon found themselves without water as there were three sections of municipal water main and a section of municipal sewer main which were literally blown apart. There simply was no water left in the system. The Town of Cavendish was indeed in dire straits! “*

<sup>14</sup> ([http://floodready.vermont.gov/flood\\_protection/river\\_corridors\\_floodplains/river\\_corridors#What\\_is\\_an\\_FEH\\_or\\_RCPA](http://floodready.vermont.gov/flood_protection/river_corridors_floodplains/river_corridors#What_is_an_FEH_or_RCPA))

Damage sustained by the Town of Cavendish from Tropical Storm Irene, estimated at \$4.0 million, was due primarily to flooding and fluvial erosion. The devastation caused by this storm to the Town of Cavendish is described in detail under Flooding (Section 5.2b). The counties that fared the worst were located in sub-watersheds with the heaviest rainfall. The map below shows the great variation in rainfall amounts for Vermont from Tropical Storm Irene from 2 to 9 inches, with as much as 8 inches in the Cavendish area.<sup>15</sup> It can be seen that Windsor County endured some of the highest rainfall amounts.



A **microburst** is a small downburst with an outflow less than 2½ miles (4 kilometers) in horizontal diameter and last for only 2-5 minutes. Despite their small size, microbursts can produce destructive winds up to 168 mph (270 km/h). Also, they create hazardous conditions for pilots and have been responsible for several disasters. For example...

1. As aircraft descend (above) into the airport they follow an imagery line called the "glide slope" (solid light blue line) to the runway.
2. Upon entering the microburst, the plane encounters a "headwind", an increase in wind speed over the aircraft. The stronger wind creates additional lift causing the plane to rise above the glide slope. To return the plane to the proper position, the pilot lowers the throttle to decrease the plane's speed thereby causing the plane to descend.
3. As the plane flies through to the other side of the microburst, the wind direction shifts and is now a "tailwind" as it is from behind the aircraft. This decreases the wind over the wing reducing lift. The plane sinks below the glide slope.
4. However, the "tailwind" remains strong and even with the pilot applying full throttle trying to increase lift again, there may be little, if any, room to recover from the rapid descent causing the plane to crash short of the runway.

<sup>15</sup> 2013 State of Vermont Hazard Mitigation Plan, p 4-61

Since the discovery of this effect in the early to mid 1980's, pilots are now trained to recognize this event and take appropriate actions to prevent accidents. Also, many airports are now equipped with equipment to detect microbursts and warn aircraft of their occurrences.

A **macroburst** is larger than a microburst with a horizontal extent more than 2½ miles (4 km) in diameter. Also a macroburst is not quite as strong as a microburst but still can produce winds as high as 130 mph (210 km/h). Damaging winds generally last longer, from 5 to 20 minutes, and produce tornado-like damage up to an EF-3 scale<sup>16</sup>.

#### d) Ice Jams

Though not identified as a high hazard, ice jams may be a secondary event of flooding and threaten many of the same properties located within the FEMA Special Flood Hazard Area. When broken river ice begins to flow downstream, ice can build up against bridge abutments, undersized structures, and other obstructions to create a temporary dam impounding water which has the potential to flood surrounding areas. Ice jams threaten many of the same properties as inundation flooding and the damage can be expected to be similar.

Ice jams are common in New England and occur during winter and spring months when river ice begins to break up and flow downstream. Such ice flows can build up against bridge abutments or other obstructions and create a temporary dam impounding large volumes of water that have the potential to flood the surrounding areas and damage infrastructure, including the many bridges within the town. The loss of a bridge could disrupt transportation corridors and isolate residential areas. The most devastating winter floods have been associated with a combination of heavy rainfall, warm temperatures, rapid snowmelt and resulting ice jams. Winter weather with less than average snowfall can result in greater ice buildup on streams and rivers, potentially resulting in greater ice jam damage.

Ice jams are likely on the Black River and have occurred in town historically but are not typically recorded. Rain and warm weather either during a winter thaw or in the spring often create a number of ice jams on the Black River. In January 2014, a sudden warming created ice jams which in turn caused flooding for some of the homes in Proctorsville that are close to the river. This hazard would be studied and addressed by the Agency of Natural Resources when rivers are flowing to determine whether there is something in the river that is causing the ice jams to form. However, it is difficult to predict changes in ice conditions due to climate change. "Although there is limited research on how climate change may influence the frequency and magnitude of ice jams . . . more frequent rainfall events during the winter months could lead to more frequent ice jamming occurrences." <sup>17</sup>

The following ice jam events have been recorded by the US Army Corps of Engineers, Cold Regions Research and Engineering Laboratory (CRREL):

|   |         |              |                   |
|---|---------|--------------|-------------------|
| ▪ | 01/1990 | Chester      | Williams River    |
| ▪ | 03/1992 | West Windsor | Mill Brook        |
| ▪ | 03/1992 | Windsor      | Mill Brook        |
| ▪ | 03/1992 | Windsor      | Connecticut River |
| ▪ | 01/1996 | Chester      | Williams River    |
| ▪ | 01/1996 | Cavendish    | Black River       |

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<sup>16</sup> <http://www.srh.noaa.gov/jetstream/tstorms/wind.html>

<sup>17</sup> 2013 State of Vermont Hazard Mitigation Plan, p 4-5

|   |         |             |                             |
|---|---------|-------------|-----------------------------|
| ▪ | 01/1996 | Springfield | Black River                 |
| ▪ | 01/1999 | Chester     | Williams River              |
| ▪ | 12/2000 | Windsor     | Connecticut River           |
| ▪ | 12/2000 | Chester     | Williams River (2 ice jams) |
| ▪ | 01/2001 | Windsor     | Connecticut River           |
| ▪ | 12/2003 | Springfield | Connecticut River           |

#### e) Severe Weather

For the purposes of the Windsor All Hazard Mitigation Plan, severe weather is defined as being two or more of the following hazards occurring together: thunderstorms, power failure, high wind, lightning, hail, and flooding. Flooding is described in greater detail above, this section of the hazard analysis will focus on non-flood events.

**Power failure** is a common secondary hazard caused by severe weather and has an annual frequency within Windsor. Power outages can occur on a town wide scale and are typically the result of power lines damaged by high winds or heavy snow/ice storms but may also result from disruptions in the New England or national power grid as indicated by the widespread outages in 2003. Dead or dying trees in proximity to power lines pose a particular threat for power failure as these trees are often brought down by triggering events such as winter storms.

The hazard extent or potential loss estimates are difficult to predict for power failures, as they are typically isolated in geographic area and short in duration. Therefore, power failures often have only minimal impact to people and property. Power failures usually result in minor inconveniences to residents however, longer duration events may result in the loss of perishable items and business losses. Power outages in winter months may result in the loss of home heating, ruptured water pipes and the resulting structural damage. The loss of home heating may be a contributing factor to the increase in structure fires during the winter months.

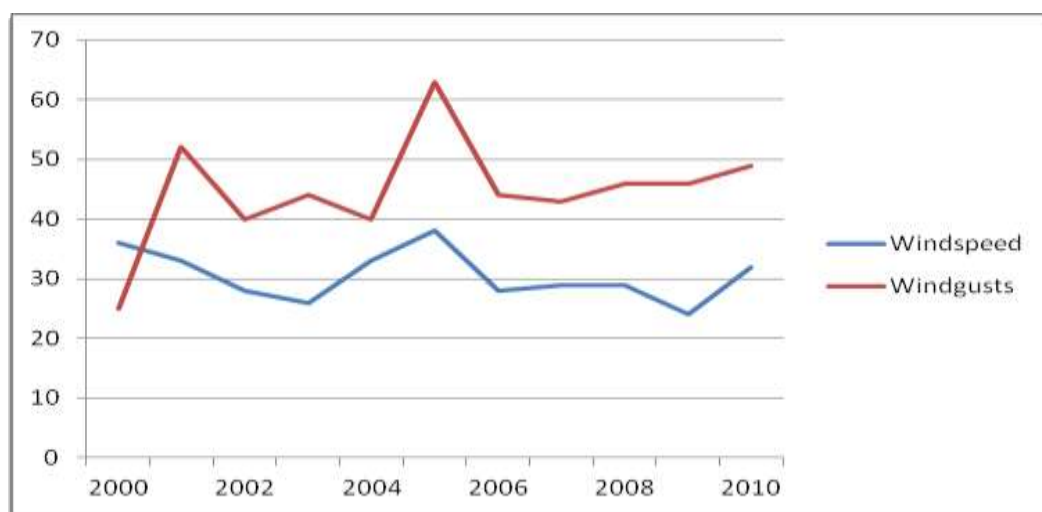
The Town of Cavendish currently addresses power failures from downed trees as events occur and would benefit from being more proactive with tree maintenance. In addition, obtaining back-up generation of power, particularly at the two emergency shelters, including the Emergency Operation Center (EOC) located at the town offices, is a high priority project

**High winds** can result from hurricanes, tropical storms, summer *thunderstorms*, and tornadoes. The 2013 Vermont Hazard Mitigation Plan does not delineate high winds as a separate hazard, the plan states '*high winds pose a threat to the safety of Vermont's citizens and property.*' The National Weather Service issues wind advisories when sustained winds of 31-39 miles per hour are reached for at least one hour or gust between 46-57 miles per hour. Damage from summer thunderstorms in Cavendish has been historically limited in both scope and cost. The Beaufort Wind Scale shown below can be used to predict damage based upon wind speeds.

The following graph displays a historical record of the maximum wind speeds recorded in Cavendish. Over the past decade, the highest recorded wind speed approached 40 miles per hours with gusts reaching over 60 miles per hours.



**Figure 1: Maximum Windspeed (mph) Cavendish Vermont 2000-2010<sup>18</sup>**



**Lightning** is a giant spark of electricity in the atmosphere between clouds, the air, or the ground<sup>19</sup>. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. As lightning can strike up to 50 miles away from a thunderstorm, can carry up to 100 million volts of electricity, and can reach temperatures upward of 50,000 degrees Fahrenheit it proves extremely hazardous to human life. Lightning can also damage infrastructure, plants, and property, and can start forest fires. Lightning is the most unpredictable weather-related event.

**Tornadoes** have the potential to cause more significant damage but occur rarely in our area and their effects, although severe, are very local in extent. The State of Vermont Hazard Mitigation Plan states that “Overall, Vermont has averaged less than one tornado per year since 1950. This ranks the state as 47th out of the 50 states for tornado frequency.” The largest tornado that has occurred within 50 miles of the Town of Cavendish occurred in 1998 and registered as an F3 tornado, with wind speeds over 158 miles per hour<sup>20</sup>. The vast majority of tornadoes that have occurred in our region had wind speeds of less than 113 mph. There are no reported deaths from tornadoes in our region. No high wind hazard areas have been identified or mapped in our region. Cost estimates for high wind events are difficult to predict due to the large range of impacts they can have upon an area.

| Beaufort Wind Scale   |              |  |
|-----------------------|--------------|--|
| Classification Number | Wind Speed   | Land Conditions  |
| 6                     | 25 to 31 mph | Large branches in motion; whistling in telephone wires         |
| 7                     | 32 to 38 mph | Whole trees in motion; inconvenience felt walking against wind |

<sup>18</sup>Historical windspeed data from Wunderground: <http://www.wunderground.com/>

<sup>19</sup> NOAA.gov

<sup>20</sup> <http://www.homefacts.com/tornadoes/Vermont/Windsor-County/Windsor.html>



|          |                |  |
|----------|----------------|--|
| 8 to 9   | 39 to 54 mph   | Twigs break off trees; wind generally impedes progress   |
| 10 to 11 | 55 to 73 mph   | Damage to chimneys and TV antennas; pushes over shallow rooted trees                           |
| 12 to 13 | 74 to 112 mph  | Peels surfaces off roofs; windows broken; mobile homes overturned; moving cars pushed off road |
| 14 to 15 | 113 to 157 mph | Roofs torn off homes; cars lifted off ground   |

For the purposes of the Hazard Mitigation Plan, the scale is only shown above wind force 5; Data from NOAA

The largest tornado to have occurred within 50 miles of Cavendish occurred in 1998 and registered as an F3 tornado, with wind speeds over 158 miles per hour<sup>21</sup>. The majority of tornadoes that have historically occurred within the region have wind speeds of less than 113 miles per hours. There are no reported deaths from tornadoes nor have high wind areas been mapped within the region. Cost estimates are difficult to predict due to the large range of impacts that they can have upon an area.

Using the Cavendish wind data from **Figure 1**, the likely magnitude for future high wind events will fall between 40 and 50 miles per hour or Beaufort scale number 8-9 and will likely result in downed trees, power lines, and small damage. The possibility does remain for larger high wind events such as the 1998 F3 tornado on the Enhanced Fujita Scale.

**Hail** is a form of precipitation that falls as pellets of ice. The pellets can range in size from balls typically 5–50 mm in diameter on average, though can be much larger during severe occurrences. Hail can be especially damaging to crops, homes and cars, and large hailstones can be deadly to livestock and people caught outside during an event. Hail events are considered an infrequent occurrence in Vermont during the summer months and generally accompany passing thunderstorms.

| <b><u>HAIL DIAMETER</u></b> | <b><u>SIZE DESCRIPTION</u></b>       |
|-----------------------------|--------------------------------------|
| <b>1/4"</b>                 | <b>Pea Size</b>                      |
| <b>1/2"</b>                 | <b>Mothball Size</b>                 |
| <b>3/4"</b>                 | <b>Penny Size</b>                    |
| <b>7/8"</b>                 | <b>Nickel Size</b>                   |
| <b>1" (Severe Criteria)</b> | <b>Quarter Size</b>                  |
| <b>1 1/4"</b>               | <b>Half Dollar Size</b>              |
| <b>1 1/2"</b>               | <b>Walnut or Ping Pong Ball Size</b> |
| <b>1 3/4"</b>               | <b>Golf Ball Size</b>                |
| <b>2"</b>                   | <b>Hen Egg Size</b>                  |
| <b>2 1/2"</b>               | <b>Tennis Ball Size</b>              |
| <b>2 3/4"</b>               | <b>Baseball Size</b>                 |
| <b>3"</b>                   | <b>Teacup Size</b>                   |
| <b>4"</b>                   | <b>Grapefruit Size</b>               |
| <b>4 1/2"</b>               | <b>Sotball Size</b>                  |

[http://www.weather.gov/btv/skywarn\\_hailwind](http://www.weather.gov/btv/skywarn_hailwind)

<sup>21</sup> Homefacts: <http://www.homefacts.com/tornadoes/Vermont/Windsor-County/Windsor.html>

Most damage created by Severe Thunderstorms across Vermont and northern New York is from strong downburst winds. Thunderstorms may also produce hail, which indicates strong vertical motion. Most hail reports in our area are generally 3/4 of an inch in diameter or smaller, and rarely larger than a quarter. Remember, if a thunderstorm produces hail that is 1 inch in diameter (quarter size) or larger, it is considered to be a severe thunderstorm<sup>22</sup>. Their extent is difficult to determine but tend to be highly localized, very short in duration with hail size of < 1 inch in diameter, and limited to small relatively small areas.<sup>23</sup>

#### f) Dam Failure

Dams are manmade structures built to impound water for many purposes, including water storage for potable water supply, livestock water supply, irrigation, or fire suppression. Dams can also be built for recreation, flood control and hydroelectric power or can be multifunction, serving two or more of these purposes. Dam failure is when the structure is breeched and potentially can cause inundation of downstream areas and property. Although dam failures can occur at any time in a dam's life, they are most common when water storage for the dam is at or near design capacity. At high water levels or during high flow events the water force on the dam is greater and several of the most common failure modes are more likely to occur. Correspondingly, for any dam, the probability of failure is much lower when water levels are substantially below the design capacity for the reservoir.

There are 8 dams in the Town of Cavendish identified on **Map 5: Water Resources**. There are five dams noted along the Black River main stem including the CVPS dam at Cavendish Gorge. These dams, carry a hazard category of low, meaning failure would likely result in no loss of life and physical/economic damage only to the dam owner. It is suspected that some of these mapped dams may be non-functional, spanning a dried channel, and should be reviewed and updated. Dam Failure was classified during the Hazard Analysis by the Hazard Mitigation Committee with a score of 9, a moderate to high threat to the town due to the potential severity of this type of hazard event. While there are no dams in the town that are of particular concern, there are several dams upstream from the town that pose a hazard if they were to be overtopped or fail outright. Specifically, there are five dams in Ludlow that are on the Vermont Agency of Natural Resources Dam Safety Program's list of high hazard dams<sup>24</sup>. The dams are inspected by a state representative on a rotating basis and are not considered to be "in significant danger of failure."

#### g) Hazardous Materials Spill

The Vermont Agency of Natural Resources Spills Database includes the most comprehensive listing of hazardous materials spills. Table 6 shows reported spills within the Town of Cavendish, including Proctorsville, since the year 2010. The Agency of Natural Resources lists 28 spills within the Town of Cavendish since 1974. These spills, and other historical spill data reveals that the vast majority of transportation related hazardous material incidents in Vermont are car and/or truck related accidents that typically result in a spill of less than 100 gallons of gasoline, oil, or other auto related fluids.

| Table 6: Vermont Agency of Natural Resources - Spills Database; Since 2010 in Cavendish |                        |           |          |
|---|------------------------|-----------|----------|
| Date  | Address                | Quantity  | Material |
| 9/4/2011  | Condos at 51 Depot St. | 5 gallons | Fuel Oil |

<sup>22</sup> [http://www.weather.gov/btv/skywarn\\_hailwind](http://www.weather.gov/btv/skywarn_hailwind)

<sup>23</sup> 2013 State of Vermont Hazard Mitigation Plan, p 4-68

<sup>24</sup> 2013 State of Vermont Hazard Mitigation Plan, p 4-97

|            |                                    |              |                 |
|------------|------------------------------------|--------------|-----------------|
| 6/8/2012   | Between 632 & 582 Main St.         | 1 drum       | unknown         |
| 9/14/2011  | Riprap project on Rt. 103          | 5-10 gallons | Diesel          |
| 9/23/2011  | River bank-Black River Carlton Rd. | 30 gallons   | Transformer Oil |
| 12/20/2011 | Roadside on Rt103, Proctorsville   | 200 gallons  | Diesel          |
| 7/11/2014  | unknown                            | 55 gallons   | Fuel Oil        |

Notable exceptions in the region over the past four decades include truck accidents resulting in the release of 2300 gallons of #2 fuel oil, 200 gallons of sodium hydroxide, and multiple truck accidents that each resulted in thousands of gallons of spilled milk. There are two state highways and railway that pass through Cavendish which make the town more vulnerable to a significant hazardous spill prompting the need for a response plan.

**Transportation Incidents** received a hazard score below 8 and are not addressed in this plan. However, a significant threat to the town posed by transportation incidents is the potential for releasing hazardous materials into the surrounding area, including rivers and streams which typically run alongside major roadways. Major disaster level incidents involving our highways, trains, and airways, although not frequent, could happen at any time, however, adverse weather conditions can be a catalyst for traffic accidents.

The Town of Cavendish currently has one road segment listed as a “high crash site” by the Vermont Department of Transportation. For Cavendish, total crash listings for the period of 1/09-12/13 include 19 crash listings on local roads, and 62 crash listings on State Highway Route 103, as reported by the Vermont Agency of Transportation General Yearly Summaries from 1/09-12/13. This is an annual average of 12 crashes on Route 103. A significant portion of Hazardous Material incidents are instigated by transportation incidents.

#### **h) Extreme Cold/Snow/Ice Storms**

Winter storms and blizzards, with snow, ice, and freezing temperatures in varying combinations, are fairly commonplace in Cavendish and occur town wide. Heavy wet snows of early fall and late spring, as well as ice storms, can result in property damage and in loss of electric power, leaving people without adequate heating capability. Power loss is often the result of downed trees, which can also disrupt traffic and emergency response by making roads and driveways impassable. The recent winters of 2014 and 2015 have brought greater snow totals and colder temperatures. Although these challenging winters are not new to Vermont, continued severity of winters may raise the priority of this hazard. Increase in budgets for additional salt and sand is forecasted.

A winter storm is considered severe when there is a possibility of:

- Six or more inches of snow fall at a given location within 48 hours,
- There is property damage, injuries or deaths, or
- An ice/glaze storm which causes property damage, injuries or death.

**A Nor'easter** is a large weather system traveling from South to North, passing along, or near the Atlantic seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds impact the coast and inland areas from a northeasterly direction. The sustained winds may meet or exceed hurricane force. There are no standard models or methodologies for estimating loss from winter storm hazards, however, extreme winter weather is

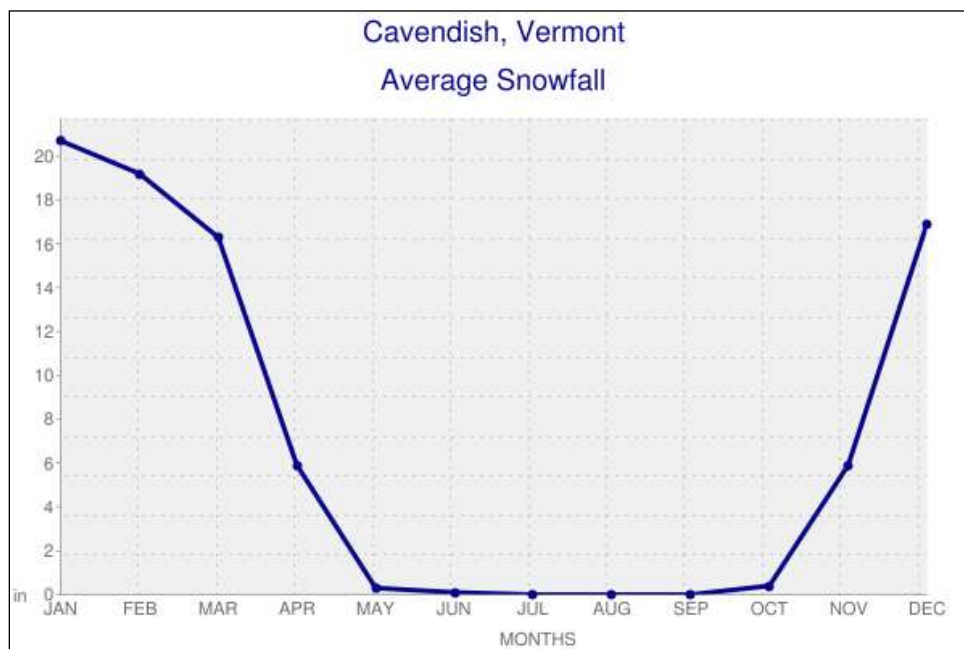
considered a way of life in Vermont and many rural Towns are accustomed and prepared for these events. The Dolan-Davis Nor'easter Classification Scale is utilized to determine the severity of Nor'easters:

### The Dolan-Davis Nor'easter Classification Scale

| CLASS         | % OF STORMS | AVERAGE RETURN INTERVAL | AVERAGE PEAK WAVE IN FEET | AVERAGE DURATION IN HOURS |
|---------------|-------------|-------------------------|---------------------------|---------------------------|
| 1 WEAK        | 49.7        | 3 DAYS                  | 6.6                       | 8                         |
| 2 MODERATE    | 25.2        | 1 MONTH                 | 8.2                       | 18                        |
| 3 SIGNIFICANT | 22.1        | 9 MONTHS                | 10.8                      | 34                        |
| 4 SEVERE      | 2.4         | 11 YEARS                | 16.4                      | 63                        |
| 5 EXTREME     | 0.1         | 100 YEARS               | 23.0                      | 96                        |

**Blizzards** are defined by the National Weather Service as “sustained winds or frequent gusts of 35 mph or greater (and) considerable falling and/or blowing snow reducing visibility frequently to 1/4 mile or less for a period of three hours or more<sup>25</sup>.” Damage from blizzards snow and ice storms can vary depending upon wind speeds, snow or ice accumulation, storm duration, and structural conditions (such heavy snow and ice accumulation on large, flat roofed structures). The following **Figure 2** shows average monthly snowfall amounts for Cavendish. Cavendish residents can expect at least 60 pounds of weight per square foot on their infrastructure during winter months.

**Figure 2: Average Monthly Snowfall Cavendish Vermont**



<sup>25</sup> National Weather Service Glossary

**Ice Storms** are defined by the National Weather Service as “occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually accumulations of ¼" or greater.”<sup>26</sup>

Ice storms have a significant impact on Northern New England, with high elevation locations being the most severely impacted. Multiple sources state that a ¼ inch of ice accumulation from an ice storm can add 500 pounds of weight on the lines between two power lines.

**Extreme Cold** temperatures are part of Vermont’s climate tendency to stray above or below expected temperature values. While long range forecast models are projecting a general temperature increase of 4°F by 2100, with warmer winters, the Cavendish area has experienced recent extreme cold temperatures during winter months which present a greater concern given the heating methods and age and condition of housing structures in rural Vermont. In recent history for Cavendish, during the month of January in 2009, there were 13 days of below 0 F temperatures; -18°F for three consecutive days.<sup>27</sup>

## **6. MITIGATION PROGRAM**

The following sections detail the mitigation goals, objectives, and potential mitigation actions identified by the Town and compiled and organized by the Hazard Mitigation Committee to reduce the impact of the hazards assessed in this plan. The implementation schedule that follows in **Table 8** is a comprehensive list of actions that the town has targeted for implementation during the five year cycle of this plan.

### **6.1 Mitigation Goals and Objectives**

Following the Hazard Analysis and the public involvement process for this update, the Hazard Mitigation Committee then reviewed the prior AHMP goals and strategies (**Table 1**), Existing Resources below (**Table 7**), and the Town Plan recommendations (see below). The intent was to get a better overall sense of whether, and to what extent, hazard mitigation had been incorporated into current Town plan goals and programs. The Hazard Committee then formulated the following overarching goals below. Note that the numbers do not indicate goal priority but are used to identify actions that support it.

#### Hazard Mitigation Goals and Associated Objectives

1. Provide protection to Cavendish community from impact of hazardous events.
  - a. Reduce potential for loss of life, injuries and property damage from hazard events.
  - b. Maintain and enhance Emergencies Operation Plan.
2. Improve efforts to raise municipal awareness of the Hazard Mitigation Plan and incorporate Plan goals, objectives and actions into other Town planning processes and related projects.
  - a. Ensure implementation through improved monitoring of 2016-2021 Hazard Mitigation Plan.
  - b. Recognize and incorporate hazard mitigation in the Cavendish Town Plan, Flood Hazard Area Regulations, Permits, Road Standards and Maintenance Programs.

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<sup>26</sup> National Weather Service Glossary

<sup>27</sup> [www.usclimatedata.com](http://www.usclimatedata.com)

3. Increase community resiliency to hazardous events.
  - a. Increase community awareness of local hazards and the Cavendish Hazard Mitigation Plan.
  - b. Communicate specific recommended mitigation strategies to identified at-risk residents and local businesses.
  - c. Improve efforts to help minimize and address financial losses due to hazard events incurred by residents and business owners.
4. Reduce future economic impact and disruption caused by hazard events on public and historic infrastructure, and municipal programs.

## 6.2 Review of Existing Resources

The following authorities, policies, programs, and resources related to hazard mitigation are currently in place and/or being implemented in the Town of Cavendish in addition to the NFIP. These programs reduce the effects of hazards to new and future buildings, infrastructure, and critical facilities by preventing their location in identified hazard areas and ensuring that infrastructure and buildings are designed to minimize damage from hazard events. The Committee analyzed these programs for their effectiveness and noted any opportunities for improving effectiveness as part of this AHMP update process.

**Table 7: Existing Cavendish Resources for Mitigating Hazards: Authorities, Policies and Programs**

| Resource                           | Description  | Effectiveness in implementing HM Goals   | Opportunities for Improving Effectiveness  |
|------------------------------------|--|--|--|
| Town Plan                          | Plan for coordinated town-wide planning for land use, municipal facilities, etc. | Effective. Revised and re-adopted in 2011. Currently being updated.  | Plan is updated on a five year cycle, the next revision may be strengthened by addressing flood resiliency and incorporating the AHMP goals and strategies |
| Basic Emergency Operations Plan    | Basic municipal procedures for emergency response                                | Outlines procedures for call-outs, evacuations, etc.; last updated in 2014   | Plan is reviewed every year following town meeting; statewide template restricts additional functionality  |
| School Emergency Response Protocol | School procedures for emergency response   | Utilizes template provided by state, provides a checklist for school administrators and first responders for use in an emergency situation | Coordinating response procedure among planning tools may improve effectiveness   |
| LEPC 3 All Hazards Resource Guide  | Outlines resources available to town in emergency situations                     | Effective through providing data and resources to town first responders  | The guide is currently being updated and revised with Town input based on this AHMP update   |
| Mutual Aid – Emergency Services    | Agreement for regional coordinated emergency services                            | Effective in providing additional emergency  | Mutual aid agreements have been formalized   |

|   |   |  |  |
|---|---|--|--|
|   |   | support during atypical events   |  |
| Mutual Aid – Public Works                 | Agreement for regional coordinated emergency highway maintenance services                 | Effective in providing additional highway support and resources during atypical events                         | Mutual aid agreements have been formalized   |
| Town Road Standards                       | Design and construction standards for roads and drainage systems                          | Effective through continued use. Revised in 2014.  | Review of these standards to incorporate the identified strategies in the AHMP will improve effectiveness of these standards   |
| Flood Hazard Area Regulations             | Regulates development in FEMA flood hazard areas  | Effective in limiting development in identified hazard areas.  | Continued updates and enforcement to improve flood resiliency are critical for continued effectiveness   |
| National Flood Insurance Program (NFIP)** | Provides ability for residents to acquire flood insurance                                 | Effective, Cavendish is compliant with NFIP program  | Flood maps should be updated, pursue CRS rating, include FEH language  |
| Maintenance Programs                      | Bridge & Culvert Inventory  | Effective at tracking and planning infrastructure upgrades   | Inventories should be updated when feasible and include  |
| Access Permits                            | Regulates driveway access along town-maintained roads                                     | Effective in limiting the number of road cuts, thereby reducing the potential for traffic accidents            | Enforcement of access permit regulations should include assessment of any impact on road conditions from identified hazards in AHMP  |
| Local Emergency Planning Committee 3      | Volunteer organization involved in regional hazard mitigation efforts                     | Effective and important contributor in the hazard mitigation planning process                                  | Greater town participation at the regional level would be beneficial, as would regional discussions on mitigation of common hazards and progress towns have made   |
| Southern Windsor County RPC               | Regional organization working to further emergency management and hazard mitigation goals | Effective in assisting towns in the adoption of new/updated regulations and the revision of planning documents | The RPC should focus on improving the planning process and investigate additional sources of historical and statistical data for identified hazards and communicate available funding opportunities for hazard mitigation and emergency preparedness |



|  |   |   |   |
|--|---|---|---|
| Black River Watershed Ph1 & Ph2 -Stream Geomorphic Assessments   | Process for identifying stressors to watershed systems                        | Effective at assessing potential mitigation projects in the town  | Can be used to identify or guide future mitigation activities   |
| Black River Corridor Management Plan   | River corridor mapping, Hazard Mitigation Recommendations                     | Effective at identifying and prioritizing sensitivity of delineated segments and at risk in-stream structures | Can be used to identify or guide future mitigation activities   |
| Public Media & Organizations<br>( <a href="http://www.cavendishconnects.com">www.cavendishconnects.com</a> ,<br><a href="http://www.cavendishhistoricalsocietynews.blogspot.com">www.cavendishhistoricalsocietynews.blogspot.com</a> ,<br><a href="https://www.facebook.com/cavendishhistoricalsocietynews">facebook</a> ) | Provides local news, announcements and educational outreach for the citizenry | Effective at reaching and communicating with various public sectors   | Local Public media can be used to maintain awareness and communicate hazard mitigation initiatives and progress |

*\*\*The town currently participates in the NFIP program and will continue to regulate floodplain use through the Cavendish Flood Hazard Area Regulations, adopted on September 24<sup>th</sup>, 2007, and currently being updated. The town has also adopted FEMA floodplain maps that were last revised in 2007 and are currently being updated. The town will continue to enforce these regulations to maintain future NFIP compliance. The town manager is in charge of implementing and advising residents on floodplain development as well as NFIP compliance. No structures within Cavendish have been identified as repetitive loss properties.*

### **Town Plan Review**

A review of the 2012 Cavendish Town Plan, adopted August 28, 2012, identifies the following actions, policies and recommendations which directly support hazard mitigation, enhance local appreciation and awareness which indirectly support hazard mitigation, or need to be considered in conjunction with hazard mitigation goals and strategies. In general, there needs to be better integration of hazard mitigation planning in the Town Planning process.

- *Development that creates negative impacts shall be prohibited in headwaters of watersheds or areas supplying recharge water to aquifers.*
- *Development shall be prohibited in areas where soil conditions and topography will cause pollution of ground or surface waters.*
- *Development shall be prohibited on steep slopes where erosion is likely to occur.*
- *The Black River is valued as both a scenic and recreational resource; in order to protect that resource, development is prohibited along the Black River corridor when such values will be negatively impacted.*
- *Naturally vegetated buffer strips of at least 50-100 feet should be left next to all rivers, lakes, and ponds, and at least 50 feet next to streams and wetlands, so as to filter pollution, prevent erosion, and protect fisheries and wildlife habitat.*
- *Development projects shall provide continued public access for recreational purposes to the*

*Black River.*

- *Development shall not degrade the water quality of the Black River and its tributaries.*
- *The town shall advocate for the protection of existing swimming and fishing holes along the river.*
- *Sewage treatment plans shall maximize opportunities to treat waste effectively and minimize the length of the C zone (mixing zone) in the Town of Cavendish in order to maximize swimming and recreational opportunities.*
- *The legislative body and the Planning Commission of the Town of Cavendish will actively participate, as appropriate, in reviews of the Ludlow Sewage Treatment System to restore and improve the quality of water in the Black River in Cavendish to maximize opportunities for swimming, boating, fishing and other water activities.*
- *Develop regulations that include an overlay district for aquifer protection areas.*
- *Identify potential, new public access areas along the Black River and encourage design and construction of such areas.*
- *Town officials should continue working with local sportsman organizations and the State Fish and Wildlife Department to develop a plan for stream and river habitat management and to assure a continued program of game fish stocking.*
- *Development plans for lands subject to periodic flooding must comply with local, state and federal flood hazard regulations in order to protect the health, safety and welfare of the public.*
- *Update and readopt the Town's Flood Hazard Regulations.*
- *Developments and sub-divisions shall utilize cluster development to effectively preserve the productivity of prime agricultural and forest soils.*
- *Require maintenance and enhancement of forest resources and implementation of sustainable forest management practices that provide habitat for diverse natural species, avoid high grading of timberlands, and follow Acceptable Management Practices.*
- *Use Acceptable Management Practices (AMPs), farming methods that prevent water pollution, prevent soil erosion and degradation, and protect public health and safety.*
- *While earth and mineral resources are important commodities and provide materials necessary for construction and public infrastructure needs, their extraction can potentially be damaging to aesthetics and natural resources. Of particular concern include degradation of surface and groundwater quality through site erosion and discharges of contaminants into exposed surface areas.*
- *Earth extraction operations and associated vehicular traffic must not compromise pedestrian or driving safety by increased volume of traffic and large trucks traveling on minor or major roads. Earth extraction vehicular traffic must not be routed through village areas when other reasonable alternative routes can be used.*
- *Cavendish, as well as other bodies of water such as lakes, streams, and ponds and all require protection.*
- *It is the Town's intention to maintain the scenic values along Route 131 while maintaining high standards of safety. Scenic corridors, including the Black River Corridor and 20-Mile Stream Corridor shall be considered as a valuable town resource and shall be protected.*
- *Upgrade public water and sewer systems as needed to maintain efficiency, ensure environmental soundness, and provide quality product and service.*
- *Research potential sites for new Town water supplies.*

- *Delineate aquifer protection areas for the Town water supplies.*
- *Waste material, whether from agricultural, industrial, household, mining or other sources, should be limited at the source and managed to prevent environmental damage, to avoid negative impacts on natural resources, and prevent nuisance to neighbors.*
- *Coordinate open space plans and river preservation plans to protect the Black River as a valuable scenic and recreational resource.*
- *Institute measures to reduce the speed at which vehicles travel through our town, especially village areas. These measures may include reducing the posted speeds, posting speed limits, enforcing the limit and introducing traffic calming measures.*
- *Seek out and apply for federal and state grants that would improve our village pedestrian walkways and tree plantings.*
- *Keep most of the roads as local town roads. Improve them only as needed for negotiability in winter, protection from washout and economy of maintenance. Minimize any damaging effects of such improvements to scenery, trees, plant life, surface waters, and wildlife areas.*
- *Special considerations should be observed for development on high elevations and steep slopes to avoid development that would cause soil erosion.*
- *Special Considerations regarding development are resources which merit special attention and protection. They include: Public Water Supply Source Protection Areas; floodplains, vegetated areas next to surface waters, wetlands, the Black River and corridor, Natural Heritage Inventory sites, critical deer wintering habitat and bear habitat as defined by the Vermont Agency of Natural Resources, regionally significant historic sites, and other locally defined sensitive natural areas and scenic resources. Development should avoid and minimize negative impacts to these resources.*

### 6.3 2016-2021 Mitigation and Preparedness Actions and Projects

The Cavendish Hazard Mitigation Committee along with input from subsequent public meetings have identified the following **Mitigation and Preparedness Actions and Projects** for Implementation during the 2016-2021 planning period. These mitigation actions have been chosen by the town as the most cost/effective and feasible actions to be taken during this plan period to lessen the impacts of both known and potential hazards identified in **Section 5**. A new column has been added to identify the related goal and objective. It was determined that some of the strategies from the previous plan were still relevant and have been carried-over here with some modifications.

The Committee determined that the method of prioritizing mitigation actions be changed from a specific priority order of individual action items to a ‘categorizing’ of priorities based on three categories – High, Moderate and Low. This change should improve overall progress by broadening focus and having several implementation programs progress simultaneously. The actions in **Table 8** have been prioritized by the Hazard Mitigation Committee together with the Selectboard and Town Manager using the colored categories below.

|                   |
|-------------------|
| High Priority     |
| Moderate Priority |
| Low Priority      |

Proposed Mitigation Actions are prioritized on an ad-hoc basis by considering all of the following:

- Severity of need in terms of safety and previous hazard event experience
- Projects with the greatest potential impact in terms of number of community members that would benefit.
- Availability of Town funding and Town personnel and/or availability of needed assistance from other groups.
- Availability of grant funding, and application assistance.
- Favorable cost/benefit based on logic or FEMA methodology. Higher priority projects would be those requiring low capital but have high community outreach potential for a high scored hazard, projects more likely to be eligible for grant funding, and projects where the estimated cost of repairs following a potential disaster (the benefit) is apparent, or likely higher than the cost of mitigation based on past experience. For example, the dollar benefit over the cost of proactively prioritizing and implementing culvert upgrades would include the cost of otherwise having to replace a washed out road.

The mitigation measures performed in the last several years have been a result of major events such as Tropical Storm Irene. It can be expected that an unforeseen disaster would most likely change these priorities.

**Table 8: 2016-2021 Mitigation and Preparedness Actions and Projects for Implementation**

| MITIGATION ACTION   | TYPE OF ACTION | HAZARD ADDRESSED                             | RELATED GOAL/ OBJECTIVE | RESPONSIBLE PARTY  | TIME FRAME | FUNDING SOURCE                       | HAZARD SCORE |
|---|----------------|--|-------------------------|--|------------|--------------------------------------|--------------|
| Consider VTculvert.org data, VT Road & Bridge Standards, Geomorphic Assessments, and Resident Input to Prioritize Culvert Replacement | Mitigation     | Flooding, Erosion, Transportation Disruption | 1a, 2b, 4               | Road Foreman, Town Manager   | 2016-2017  | Utilizing Existing Town Resources    | 10           |
| Replace and Upgrade Known Undersized Culverts based on above  | Mitigation     | Flooding, Erosion, Transportation Disruption | 1a, 3c, 4               | Road Foreman, Town Manager, SWCRPC                                     | On-going   | Town Budget, Better Back Roads Grant | 10           |
| Actively seek funding to provide back-up power supply for town EOC/Shelter  | Preparedness   | High Wind, Severe Winter Weather             | 1b                      | Emergency Management Director, Town Manager, Selectboard Chair, SWCRPC | 2016-2021  | HMGP, VEM Generator Grant            | 9            |

|  |                             |   |               |  |                   |  |    |
|--|-----------------------------|---|---------------|--|-------------------|--|----|
| Put in place a schedule to Identify and remove high hazard trees to reduce power outages                           | Mitigation/<br>Preparedness | High Wind,<br>Severe Winter<br>Weather                  | 1a, 3c, 4     | Town Manager,<br>GMP, Tree<br>Warden                                     | 2016-<br>2021     | Utilizing<br>Existing<br>Town<br>Resources         | 9  |
| Enhance outreach on safe winter home heating to homeowners, in addition to school program                          | Mitigation                  | Structure fire  | 1a, 3a-c      | Selectboard,<br>SWCRPC, Fire<br>Departments                              | 2017,<br>Annually | Utilizing<br>Existing<br>Town<br>Resources         | 12 |
| Engage SWCRPC in Commodity Flow Study Review for incorporation into response planning                              | Mitigation/<br>Preparedness | Hazardous<br>Materials,<br>Transportation<br>Disruption | 1a-b, 2b, 4   | Fire<br>Departments,<br>Town Manager,<br>Road Foreman,<br>SWCRPC         | 2018              | Utilizing<br>Existing<br>Town<br>Resources         | 9  |
| Review and Implement other recommended activities in the 'Firewise' Program  | Mitigation,<br>Preparedness | Structure fire,<br>Wildfire                             | 1a, 3a-c      | Fire<br>Departments  | 2017,<br>Ongoing  | Utilizing<br>Existing<br>Town<br>Resources         | 12 |
| Install additional dry hydrants as needed and as funding becomes available   | Mitigation,<br>Preparedness | Structure fire,<br>Wildfire                             | 1a-b          | Emergency<br>Management<br>Director, Fire<br>Departments,<br>Selectboard | 2016-<br>2021     | Town<br>budget, dry<br>hydrant<br>grant<br>program | 12 |
| Conduct a site review of identified dam structures and determine if remedial work is needed                        | Mitigation                  | Flood, Erosion  | 1a, 2a, 3a, 4 | Town Manager,<br>ANR-Dam<br>Safety                                       | 2016-<br>2018     | Utilizing<br>Existing<br>Town<br>Resources         | 9  |
| Work with State to Mediate High Hazard Stone Culvert (ID-Singleton's)  | Mitigation                  | Flood, Erosion  | 1a, 3c, 4     | Selectboard,<br>State, SWCRPC  | 2016-<br>2021     | State<br>Funding                                   | 10 |
| Implement Erosion Hazard Prevention Measures to protect Identified Critical Town Infrastructure- Sewer Lift        | Mitigation                  | Flood, Erosion  | 1a, 4         | Selectboard,<br>ANR, SWCRPC  | 2016-<br>2021     | Hazard<br>Mitigation<br>Grant                      | 10 |
| Public Outreach Program on Newly Adopted FHR with Focus on Awareness of Structures in River Corridor and FEH areas | Mitigation                  | Flood, Erosion  | 1a, 2b, 3a-c  | Selectboard,<br>Emergency<br>Management,<br>Planning<br>Commission       | 2016-<br>2019     | Utilizing<br>Existing<br>Town<br>Resources         | 10 |
| Improve Flood Resiliency in Davis Road Bridge Replacement Project (in-progress, see below)                         | Mitigation                  | Flood, Erosion  | 1a, 2b, 3a,4  | Town Manager,<br>VT ANR, USACE,<br>VT RMP, FEMA                          | 2016-<br>2019     | Utilizing<br>Existing<br>Town<br>Resources         | 10 |

|   |            |                |                   |  |           |   |    |
|---|------------|----------------|-------------------|--|-----------|---|----|
| Review Sensitive Areas Identified in River Corridor Plans for Consideration in Future Planning, Maintenance, and Mitigation                       | Mitigation | Flood, Erosion | 1a, 2b, 3c, 4     | Selectboard, Emergency Management, Planning Commission, SWCRPC | 2016-2019 | Utilizing Existing Town Resources           | 10 |
| Complete Black River Streambank Restoration Project (in-progress, see below)  | Mitigation | Flood, Erosion | 1a, 2b, 3a, 3c, 4 | Town Manager, Town Volunteers                                  | 2016-2017 | Ecosystem Restoration Grant Program         | 10 |
| Identify Properties within the River Corridor or Setbacks and Provide Information on new FHAR, NFIP, and on Flood and Fluvial Erosion Hazard Risk | Mitigation | Flood, Erosion | 1a, 3a-c, 4       | Planning Commission  | 2016-2021 | Utilizing Existing Town Resources           | 10 |
| Develop a Plan to Address Citizens' Concerns Regarding Flood Risk at Impoundment Above Cavendish Gorge w/ Hydrology Studies                       | Mitigation | Flood, Erosion | 1a, 3a-c, 4       | Selectboard, Town Manager                                      | 2016-2021 | Utilizing Existing Town Resources, HM Grant | 10 |
| Determine and Formalize Process for Implementing Mitigation Actions   | Mitigation | All Hazards    | 2a                | Hazard Mitigation Committee                                    | 2016-2017 | Utilizing Existing Town Resources           | NA |

### **Mitigation Actions In-Progress**

#### **Black River Streambank Restoration Project:**

This project will provide protection for flood resiliency and flood mitigation along a crucial reach on the Black River mainstem just upstream from the area which suffered the most devastation from the storm. Similar to the events of the 1927 flood, a ¼ mile channel avulsion formed bypassing the gorge when flood waters overwhelmed the impoundment at the hydroelectric dam. The avulsion caused major damage to State Highway 131, a scouring of over a million cubic yards of sediment, and a loss of water supply and waste water services to both villages, Cavendish and Proctorville. This project, to be funded by Vermont Ecosystem Restoration Grant funds, will allow the Town to acquire key flood-prone properties and development rights upstream from this most heavily impacted section and restore a critical buffer to prevent further erosion. The acquired area is to remain undeveloped in perpetuity. This river segment lies within section M30 in the Phase 2 Geomorphic Stream Assessment and had been recognized by the study as “High Sensitivity” and a high priority for corridor protection and increased vegetated buffers.<sup>28</sup>

<sup>28</sup> Black River Corridor Management Plan, pg. 25

### Improve Flood Resiliency in Davis Road Bridge Replacement Project:

Since the destruction of the Davis Rd. overpass (Town Bridge #37) on the Twentymile Stream during Tropical Storm Irene, Cavendish has been working with FEMA, Vermont Agency of Natural Resources, Vermont River Management Program and the U.S. Army Corps of Engineers to enhance the originally approved project to one of “improved” bridge replacement project, as suggested by a number of hydraulic studies. The Town will be providing incremental capital to increase the width of the bridge which will help mitigate flood waters and fluvial erosion. This bridge lies within section M26T2.05 in the Phase 2 Geomorphic Stream Assessment and had been recognized by the study as a high priority replacement.<sup>29</sup> The Mitigation and Preparedness Actions and Projects for Implementation, as outlined in Table 8, include potential efforts for inclusion in future Public Assistance projects. Some projects that will require funding include protection of critical Town infrastructure from future flooding and erosion and have been identified as vulnerabilities during Tropical Storm Irene and previous flood events. The proposed Sewer Lift project to protect sections of the system currently vulnerable to flooding, the high hazard stone culvert (Singleton’s) which directs water towards the Town during high flow events, and a plan to conduct hydraulic studies at the impoundment above Cavendish Gorge to address flood risk have already been identified and will require funding.

It is also expected that other action items in Table 8, including a review of sensitive areas identified in River Corridor Plans, site review of dam structures, and culvert maintenance will reveal additional properties or structures that may have experienced past flood or erosion damage and could require future Public Assistance funding.

### Past Mitigation Initiatives

The **Table 9** below summarizes the past mitigation strategies that have been completed, established and on-going, dropped, or held for future consideration. The Town wanted to have a single reference source over time to identify past successes, possibly take up previously tabled ideas, or check if an idea had been discussed in past plans. Moving forward, plan maintenance and future updates will move projects to this list from the implementation table as status determines. This will serve as a running record and reference of the Town’s mitigation initiatives.

**Table 9: Previous Mitigation Actions and Projects Completed, Established or Dropped**

| COMPLETED<br>MITIGATION<br>ACTIONS            | AHMP | HAZARD<br>ADDRESSED                     | RESPONSIBLE<br>PARTY     | FUNDING<br>SOURCE | STATUS                  |
|---|------|---|--------------------------|-------------------|-------------------------|
| Developed a hazardous materials response plan | 2013 | Hazardous Material Incident, Earthquake | Fire Departments, SWCRPC | SWCRPC EMPG funds | Continues with updates. |

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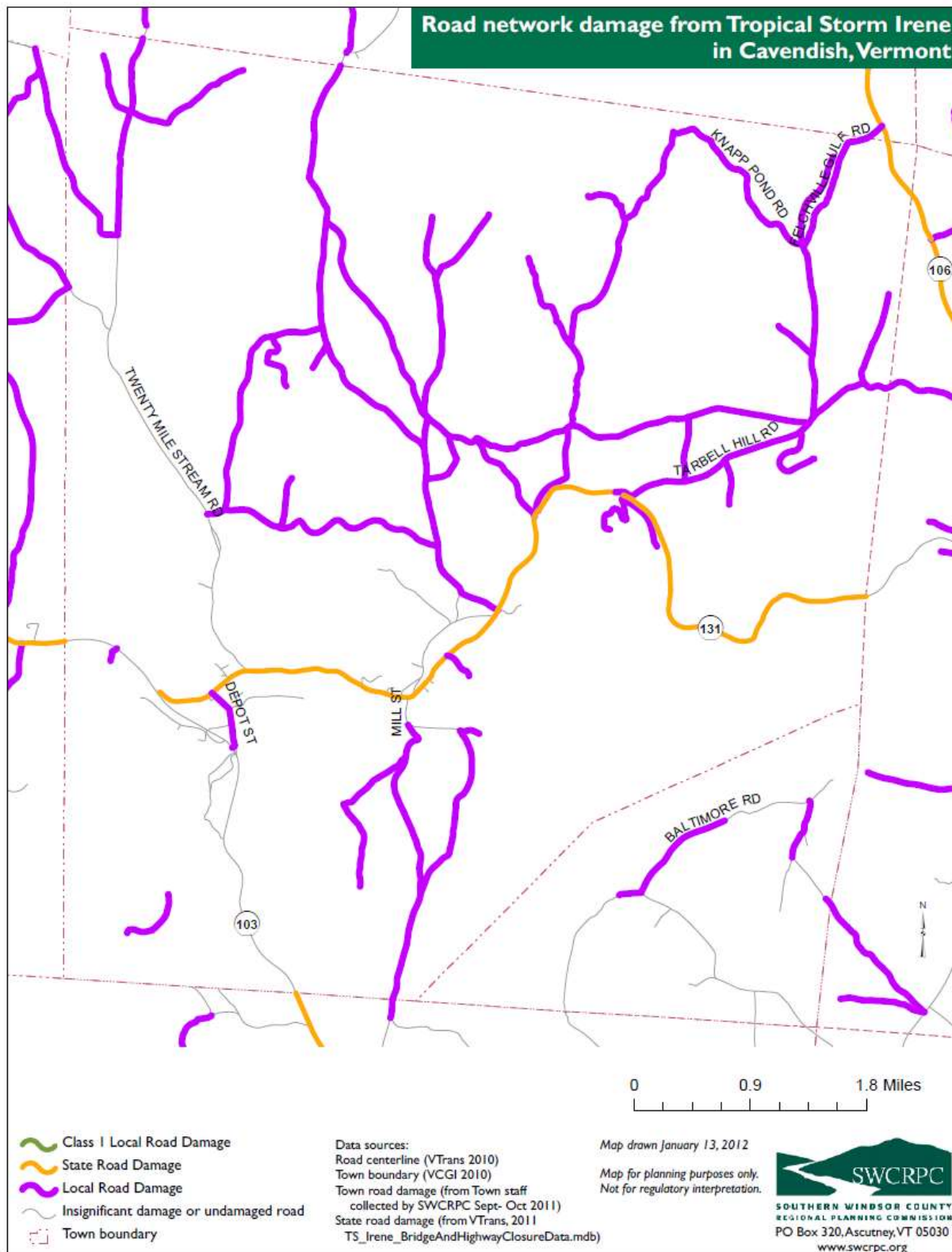
<sup>29</sup> Black River Corridor Management Plan, pg. 27



|   |             |   |   |   |  |
|---|-------------|---|---|---|--|
| FHR updated to include data from River Corridor Studies   | 2013        | Flash Flooding                                  | Town Manager, Planning Commission, SWCRPC | Utilizing Existing Town Resources, SWCRPC | FHR added river corridor overlay and flood resiliency measures, adopted 2015 |
| Program in place to distribute safe home heating during winter  | 2013        | Structure fire                                  | Selectboard, SWCRPC                       | Utilizing Existing Town Resources         | Procedures are in place for annual program                                   |
| Participation in Firewise Program   | 2013        | Wildfire, Structure Fire, Severe Winter Weather | Selectboard, Fire Departments             | Utilizing Existing Town Resources         | Established fire education program through school district                   |
| Provide Firewise 'Be Firewise Around Your Home' brochure to property owners                             | 2013        | Structure fire, Wildfire                        | Fire Departments                          | Utilizing Existing Town Resources         | Distribution Program through school district.                                |
| Ensure tie down all non-anchored structures   | 2013        | Earthquake, High Wind, Flood                    | Homeowners, Planning Commission           | Utilizing Existing Town Resources         | Requirement addressed in FHR Update to be adopted 2015                       |
| Ensure all non-secure propane tanks are tied down   | 2013        | Earthquake, Flooding                            | Selectboard, Planning Commission          | Utilizing Existing Town Resources         | Requirement addressed in FHR Update to be adopted 2015                       |
| <b>TABLED MITIGATION ACTIONS</b>  | <b>AHMP</b> | <b>HAZARD ADDRESSED</b>                         | <b>RESPONSIBLE PARTY</b>                  | <b>FUNDING SOURCE</b>                     | <b>STATUS</b>  |
| Purchase land along Winery Road for flood storage   | 2013        | Flooding  | Town Manager                              | HGMP, PDM-C                               | Reconsidered. Action not practical   |
| Retrofit critical facilities for greater protection from earthquake, high winds, and snow load capacity | 2013        | Earthquake, High Winds, Winter Weather          | Town Manager, Selectboard Chair           | HMGP, Town Capitol Budget                 | Reconsidered. For low priority hazards                                       |

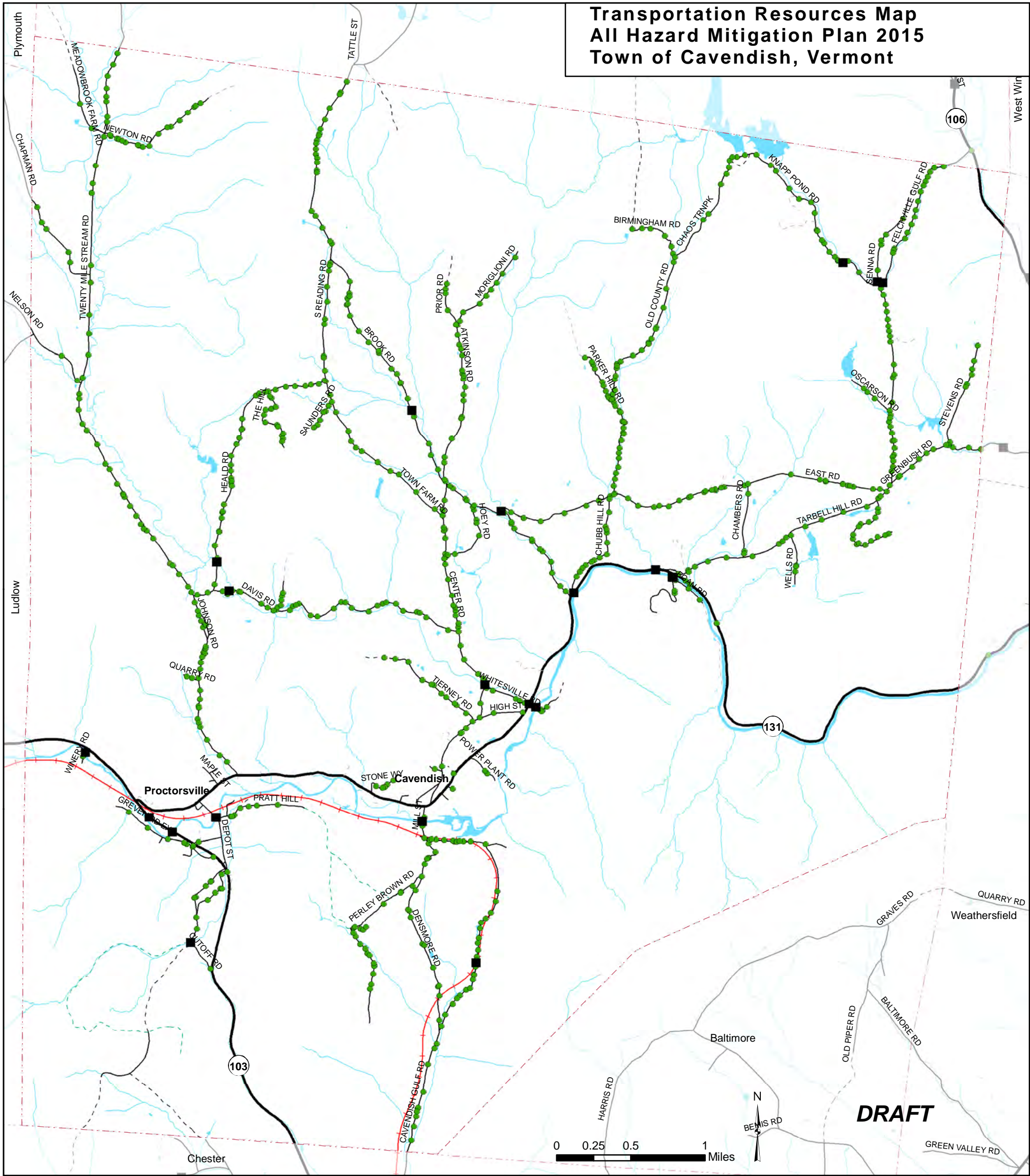
## **Appendix A**

Map 1: Road Network Damage from Tropical Storm Irene





Transportation Resources Map  
All Hazard Mitigation Plan 2015  
Town of Cavendish, Vermont



- Bridge or Very Large Culvert
- Culvert
- ~ Rivers and Streams
- ~ Lakes and Ponds
- ~ VT State Highway
- ~ Class 2 and 3 Town Highway
- ~ Class 4 Town Hwy & Legal Trail
- ~ Private Road
- ~ State Forest Road
- ~ Railroads
- ~ Town boundary

There are no airports in Town.

Data Sources: Airports (VT Agency of Transportation 2014), State Bridges and Large Culverts (VT Agency of Transportation 2014), Local Bridges and Culverts (Draft 2014 inventory by Southern Windsor County Regional Planning Commission and Town), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town Boundary (RPC 2014 using Parcels 2009).

VT State Plane, Meters, NAD 83  
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.



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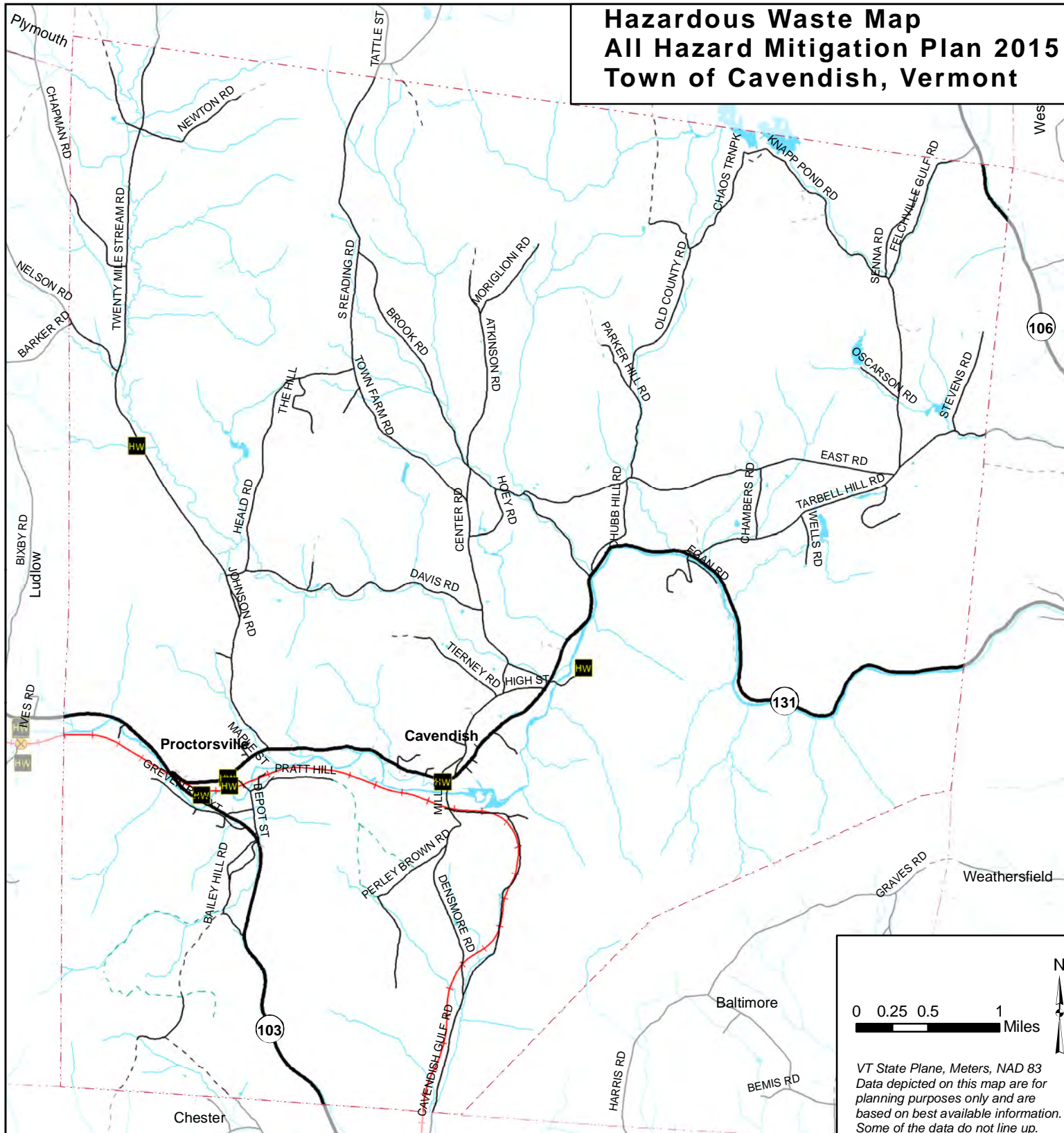
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DRAFT Drawn February 6, 2015



# Hazardous Waste Map

## All Hazard Mitigation Plan 2015

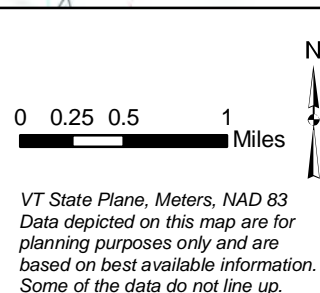
### Town of Cavendish, Vermont



- HW Hazardous Waste Site
- Fully Regulated Generator
- ⊗ Conditionally Exempt Generator
- ⊙ Out of Business
- ⊕ Unknown Status
- ~ Rivers and Streams
- Lakes and Ponds
- VT State Highway
- Class 2 and 3 Town Highway
- - - Class 4 Town Hwy & Legal Trail
- Private Road
- State Forest Road
- + Railroads
- Town boundary

There are no airports in Town.

Data Sources: Hazardous Waste Facilities (VT Dept of Environmental Conservation 2006), Hazardous Waste Sites (VT Dept of Environmental Conservation 2012), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town Boundary (RPC 2014 using Parcels 2009).



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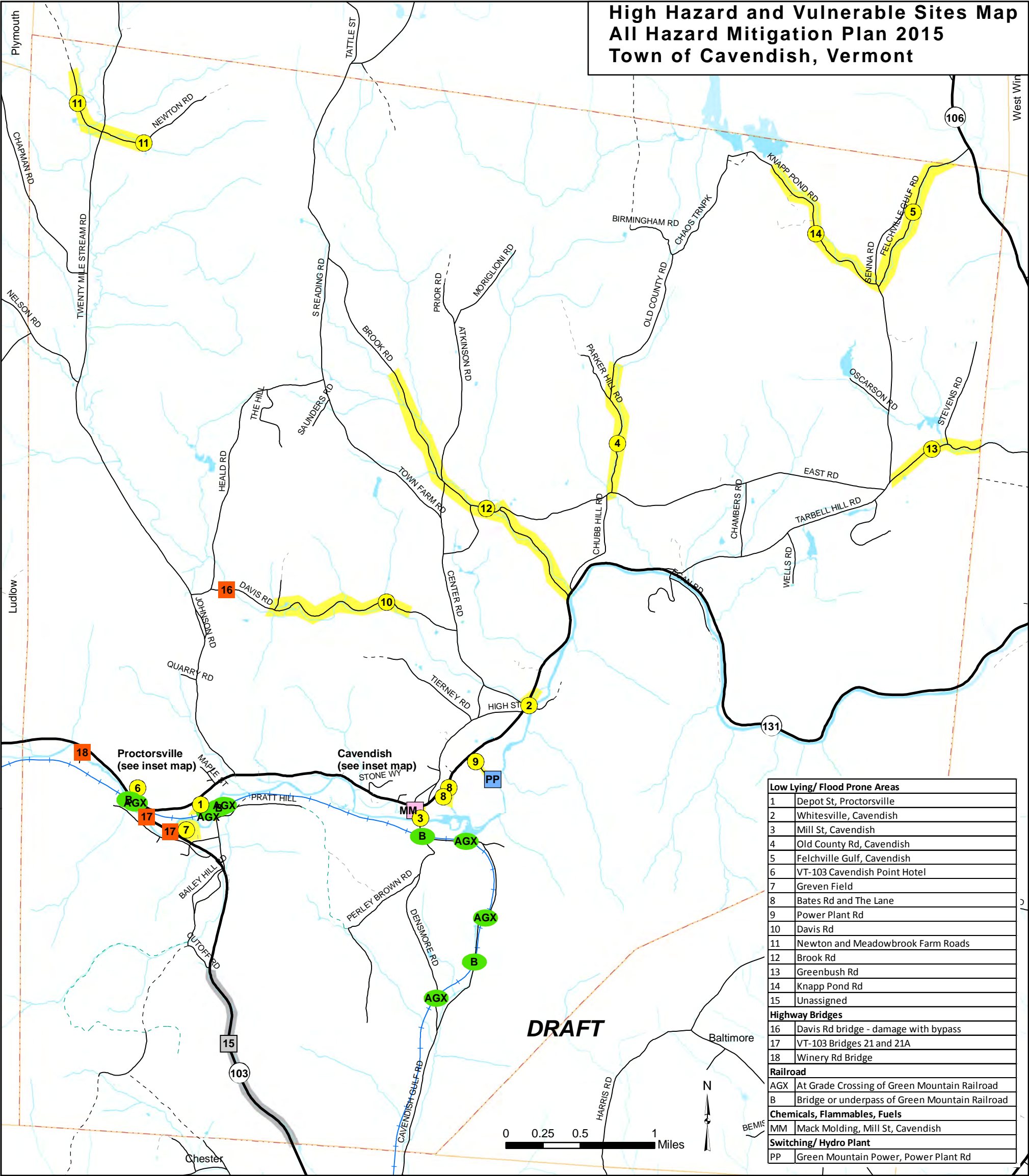


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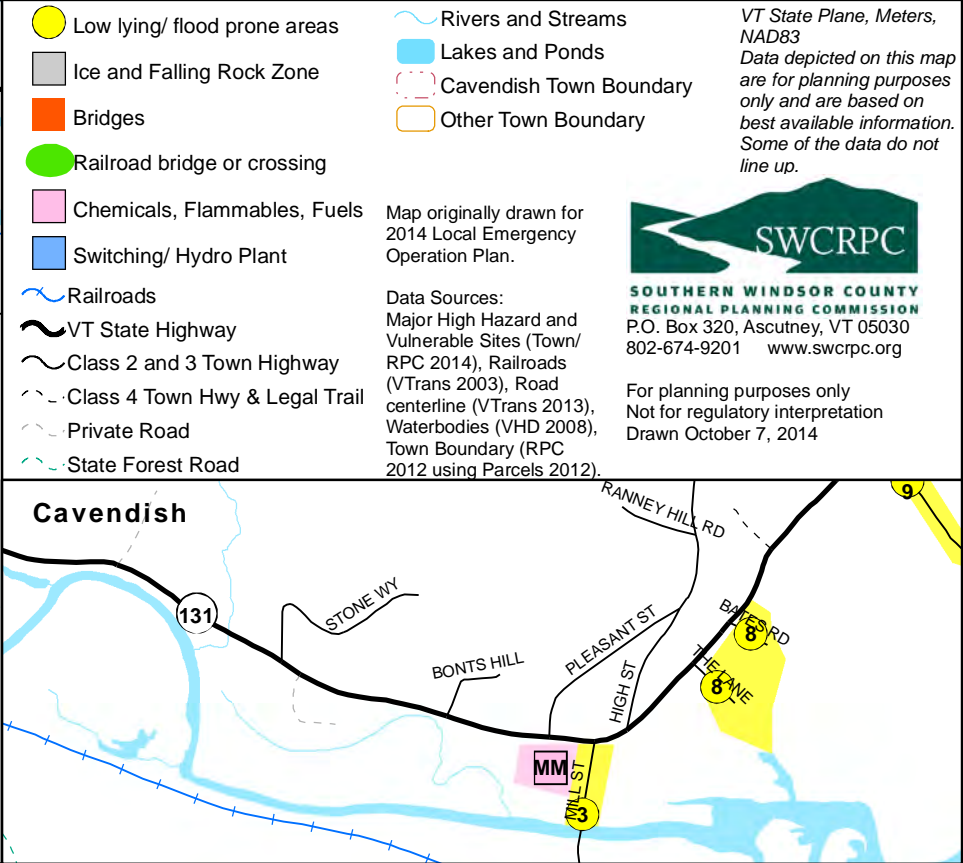
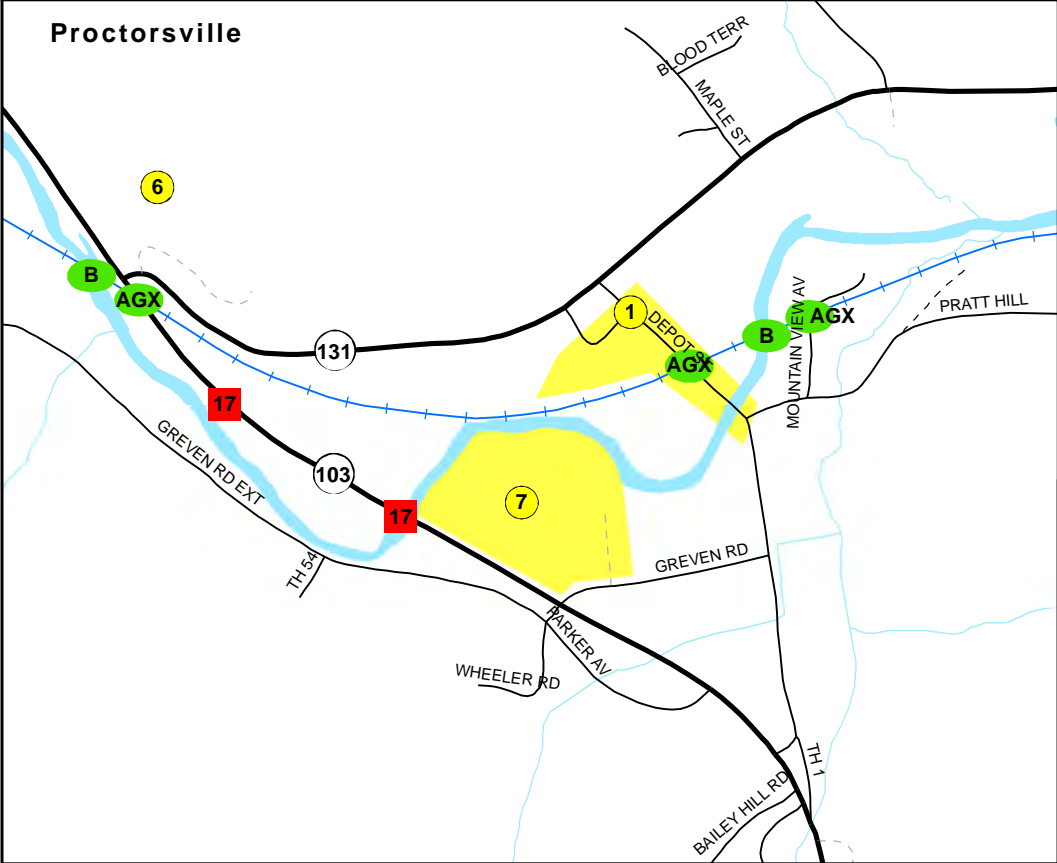
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DRAFT Drawn February 6, 2015



High Hazard and Vulnerable Sites Map  
All Hazard Mitigation Plan 2015  
Town of Cavendish, Vermont



| Low Lying/ Flood Prone Areas |  |
|------------------------------|--|
| 1                            | Depot St, Proctorsville                        |
| 2                            | Whitesville, Cavendish                         |
| 3                            | Mill St, Cavendish                             |
| 4                            | Old County Rd, Cavendish                       |
| 5                            | Felchville Gulf, Cavendish                     |
| 6                            | VT-103 Cavendish Point Hotel                   |
| 7                            | Greven Field                                   |
| 8                            | Bates Rd and The Lane                          |
| 9                            | Power Plant Rd                                 |
| 10                           | Davis Rd                                       |
| 11                           | Newton and Meadowbrook Farm Roads              |
| 12                           | Brook Rd                                       |
| 13                           | Greenbush Rd                                   |
| 14                           | Knapp Pond Rd                                  |
| 15                           | Unassigned                                     |
| Highway Bridges              |  |
| 16                           | Davis Rd bridge - damage with bypass           |
| 17                           | VT-103 Bridges 21 and 21A                      |
| 18                           | Winery Rd Bridge                               |
| Railroad                     |  |
| AGX                          | At Grade Crossing of Green Mountain Railroad   |
| B                            | Bridge or underpass of Green Mountain Railroad |
| Chemicals, Flammables, Fuels |  |
| MM                           | Mack Molding, Mill St, Cavendish               |
| Switching/ Hydro Plant       |  |
| PP                           | Green Mountain Power, Power Plant Rd           |



- Low lying/ flood prone areas
- Ice and Falling Rock Zone
- Bridges
- Railroad bridge or crossing
- Chemicals, Flammables, Fuels
- Switching/ Hydro Plant
- Railroads
- VT State Highway
- Class 2 and 3 Town Highway
- Class 4 Town Hwy & Legal Trail
- Private Road
- State Forest Road
- Rivers and Streams
- Lakes and Ponds
- Cavendish Town Boundary
- Other Town Boundary

Map originally drawn for 2014 Local Emergency Operation Plan.

Data Sources:  
Major High Hazard and Vulnerable Sites (Town/ RPC 2014), Railroads (VTrans 2003), Road centerline (VTrans 2013), Waterbodies (VHD 2008), Town Boundary (RPC 2012 using Parcels 2012).

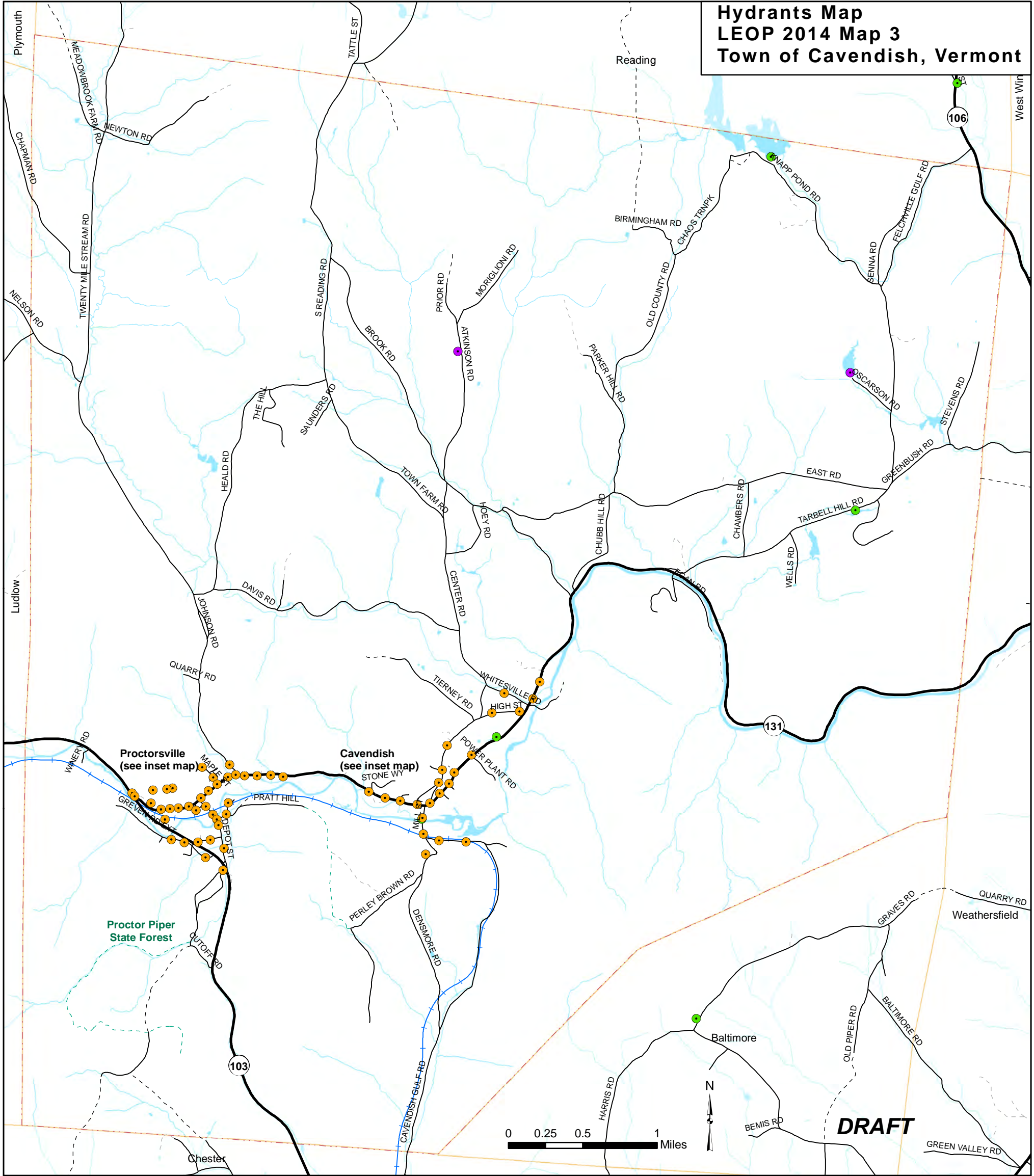


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Drawn October 7, 2014

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Hydrants Map  
LEOP 2014 Map 3  
Town of Cavendish, Vermont

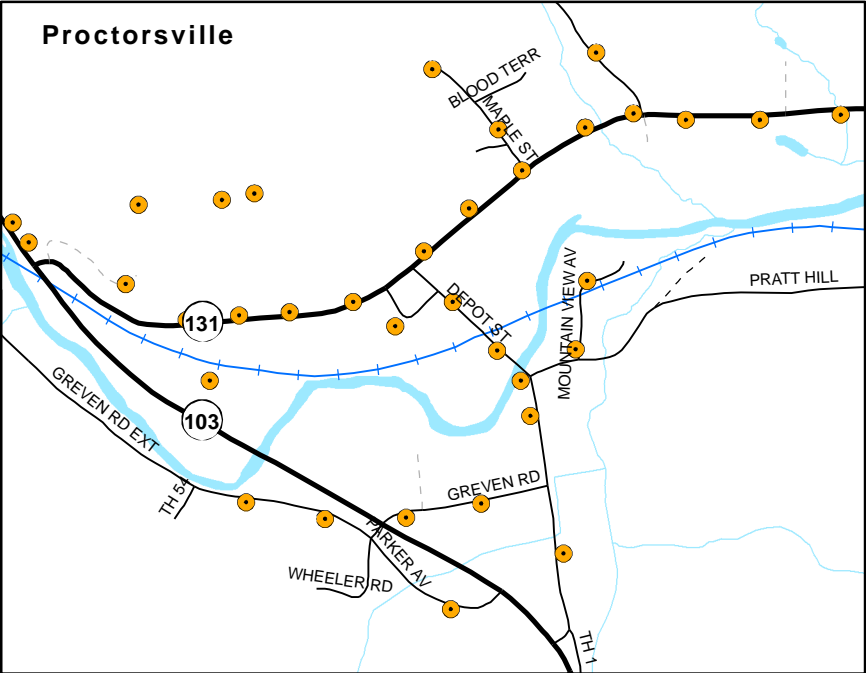
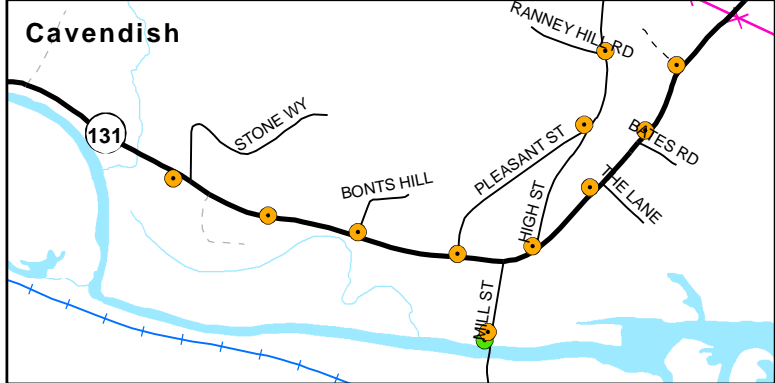


0 0.25 0.5 1 Miles

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- Municipal Hydrant
- Dry Hydrant
- Drafting Site for Hydrant
- Railroads
- VT State Highway
- Class 2 and 3 Town Highway
- Class 4 Town Hwy & Legal Trail
- Private Road
- State Forest Road
- Rivers and Streams
- Lakes and Ponds
- Cavendish Town Boundary
- Other Town Boundary

Drafting Site - potential water drafting site, fire pond  
Dry Hydrant - non-pressurized rural water supply hydrant  
Municipal Hydrant - pressurized municipal rural water supply hydrant (pressurized from pond supply being higher than hydrant site)



Data Sources:  
Hydrants (E911 April 2013), Railroads (VTrans 2003), Waterbodies (VHD 2008), Road centerline (VTrans 2013), Town Boundary (RPC 2012 using Parcels 2012)/

VT State Plane, Meters, NAD 83  
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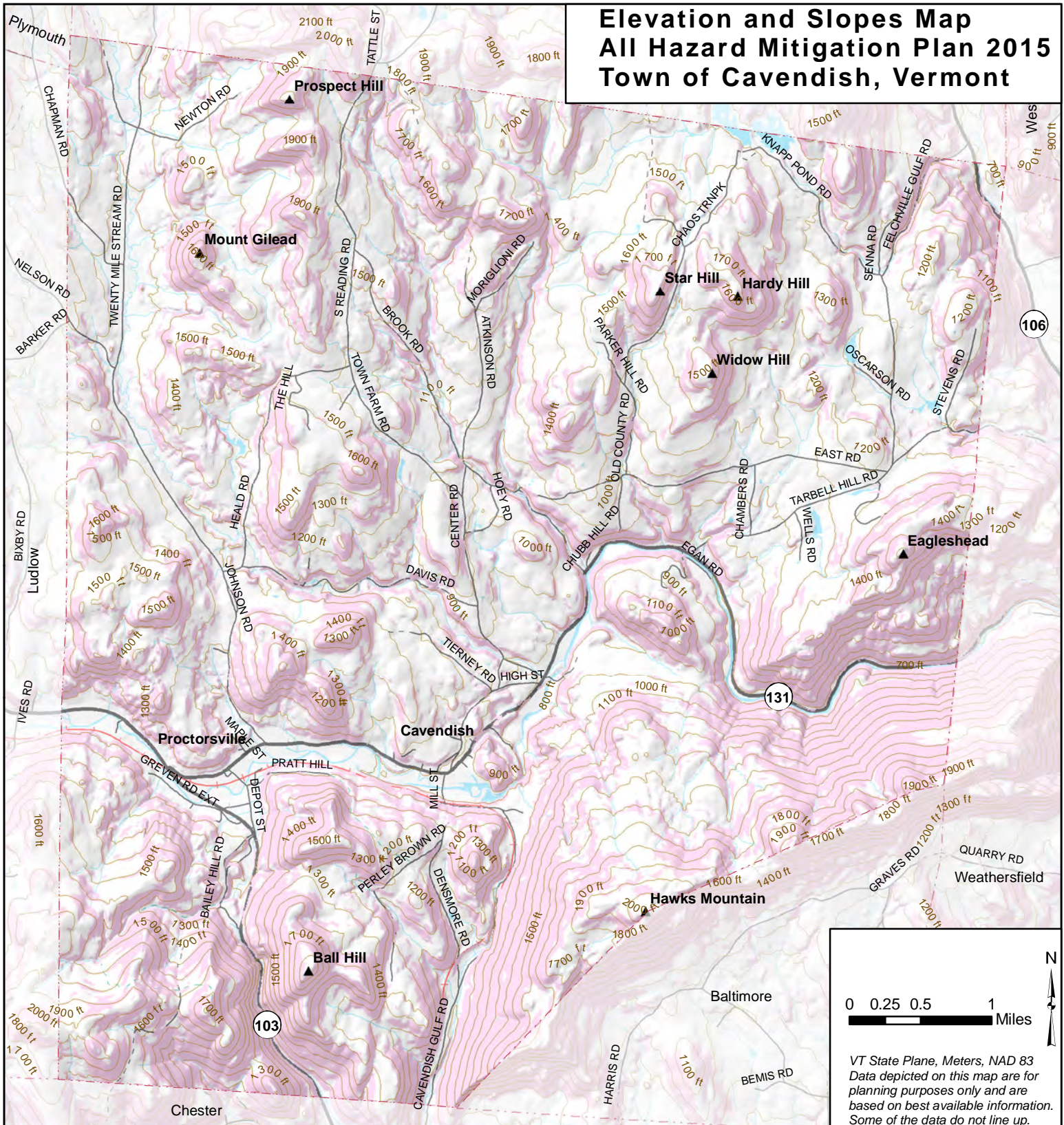


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# Elevation and Slopes Map All Hazard Mitigation Plan 2015 Town of Cavendish, Vermont



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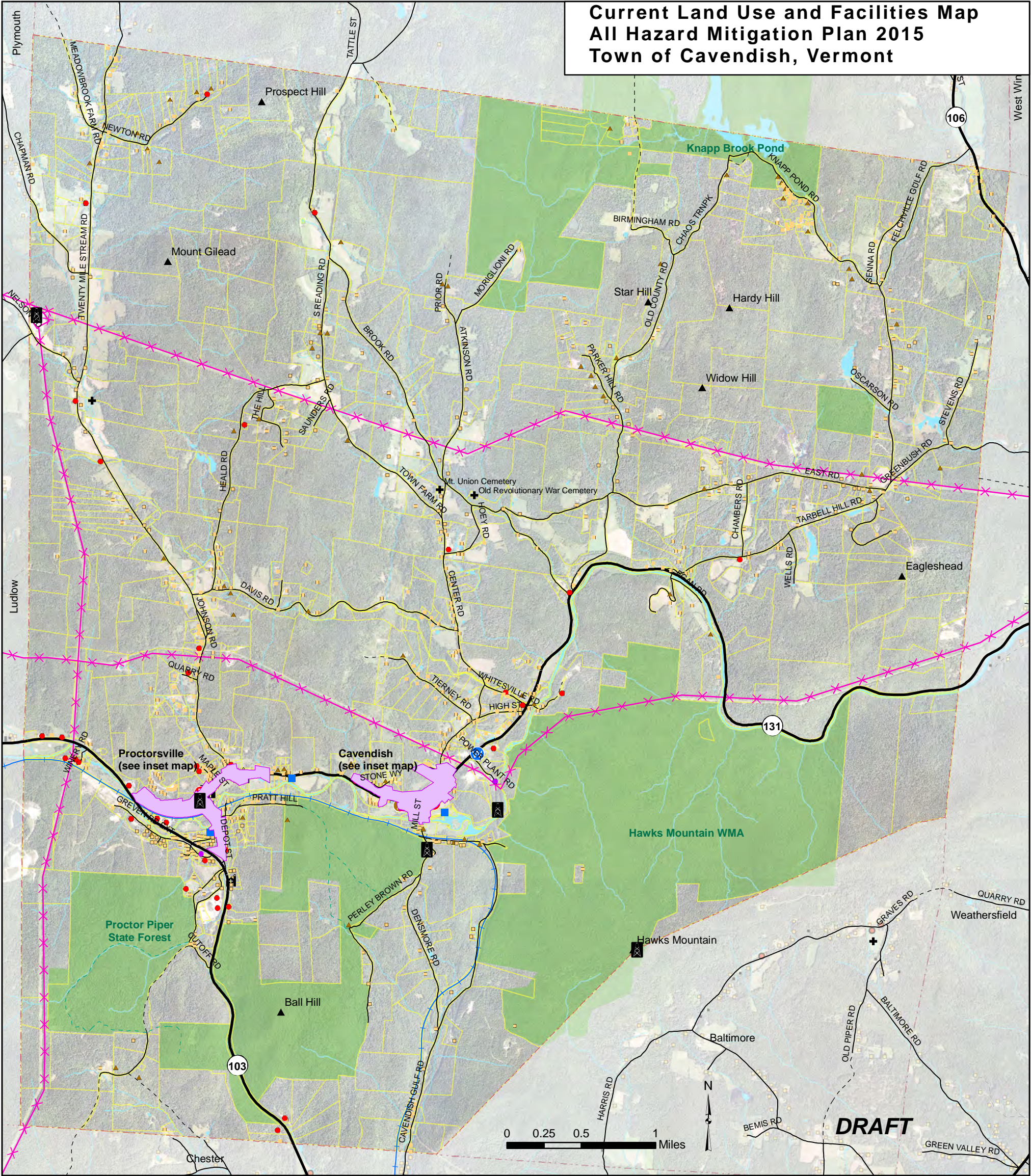
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Not for regulatory interpretation  
DRAFT Drawn February 6, 2015

Data Sources: Contours, steep slopes and hillshade (derived from 10m Digital Elevation Model, US Geological Survey/ VT Center for Geographic Information 2012), Hill/Mountain Summit (Unknown Source), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town Boundary (RPC 2014 using Parcels 2009).



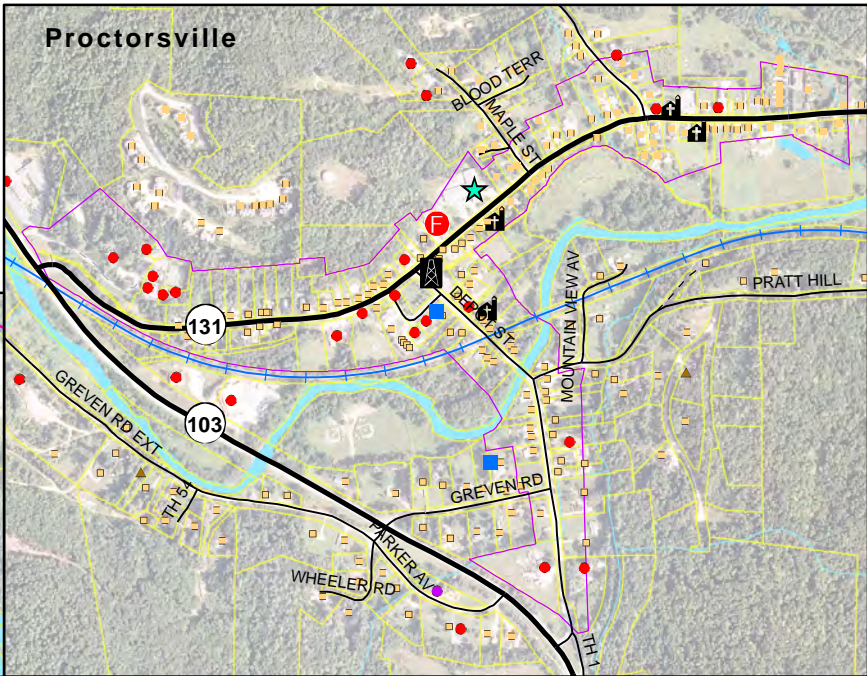
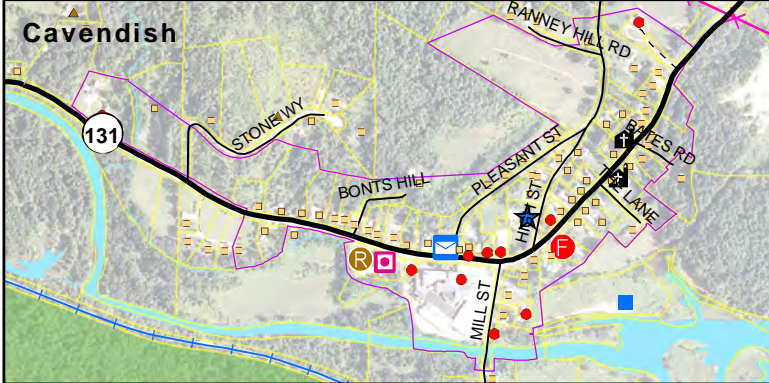
Current Land Use and Facilities Map  
All Hazard Mitigation Plan 2015  
Town of Cavendish, Vermont



- |                                 |                                   |
|---------------------------------|-----------------------------------|
| ★ Town Office                   | ✚ Cemetery                        |
| ★ Elementary School and Library | ▲ Hill/ Mountain Summit           |
| 🚒 Fire Station                  | 📡 Telecommunications Tower        |
| 🚚 Town Highway Garage           | ✚ Transmission Line               |
| 💧 Town Water Treatment Plant    | 🚊 Railroads                       |
| 🏠 Other Town Facility           | 🛣️ VT State Highway               |
| 📬 Post Office                   | 🛣️ Class 2 and 3 Town Highway     |
| 🏛️ Historical Society           | 🛣️ Class 4 Town Hwy & Legal Trail |
| 🏠 House of Worship              | 🛣️ Private Road                   |
| 🏭 Industrial                    | 🛣️ State Forest Road              |
| 🔴 Commercial                    | 🌊 Rivers and Streams              |
| 🏡 Residential                   | 🟦 Lakes and Ponds                 |
| 🏕️ Camp                         | 🟢 Conserved Lands                 |

- |                              |
|------------------------------|
| 🟡 Parcels                    |
| 🟡 Village Center Designation |
| 🔴 Town Boundary              |

Data Sources: Facilities in town (VT E911 April 2013 and Southern Windsor County Regional Planning Commission 2014), Buildings (VT E911 April 2013), Cemeteries (VT Agency of Transportation 2001), Transmission Lines (VT Center for Geographic Information 2003 and Southern Windsor County Regional Planning Commission 2013), Telecommunications Towers (VT Natural Resources Board 2007 and Southern Windsor County Regional Planning Commission 2013), Railroads (VT Agency of Transportation 2014), Conserved Lands (VT Agency of Natural Resources 2012), Waterbodies (VT Hydrographic Dataset 2008), Hill/Mountain Summit (Unknown source), Road centerline (VT Agency of Transportation 2014), Village Center Designation Boundary (Southern Windsor County Regional Planning Commission 2013), Town Boundary (Southern Windsor County Regional Planning Commission 2014 using Parcels 2009), Aerial (National Agricultural Imagery Program 2009), Parcels (Cartographic Associates 2009).



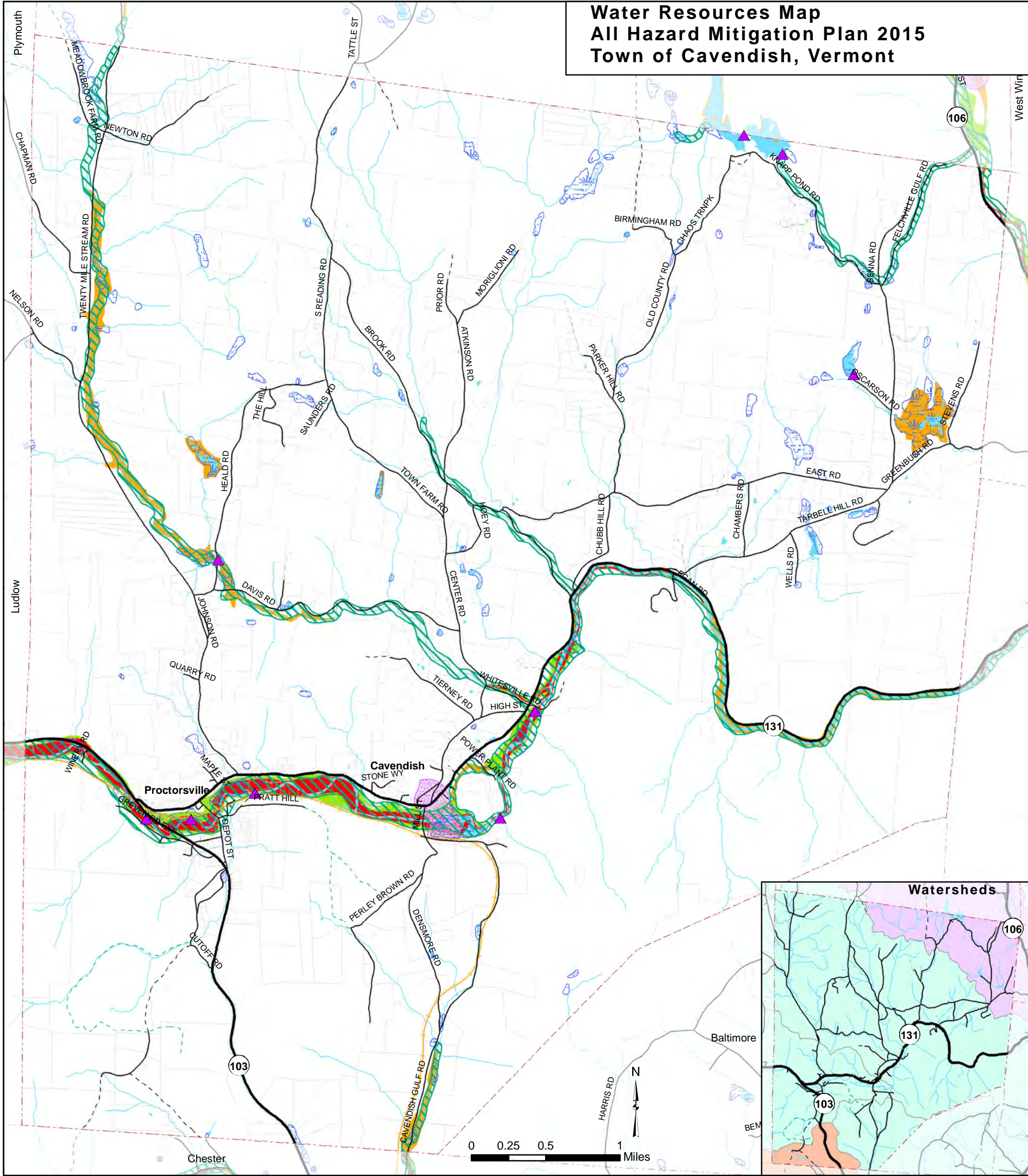
VT State Plane, Meters, NAD 83  
Data depicted on this map are for  
planning purposes only and are  
based on best available information.  
Some of the data do not line up.



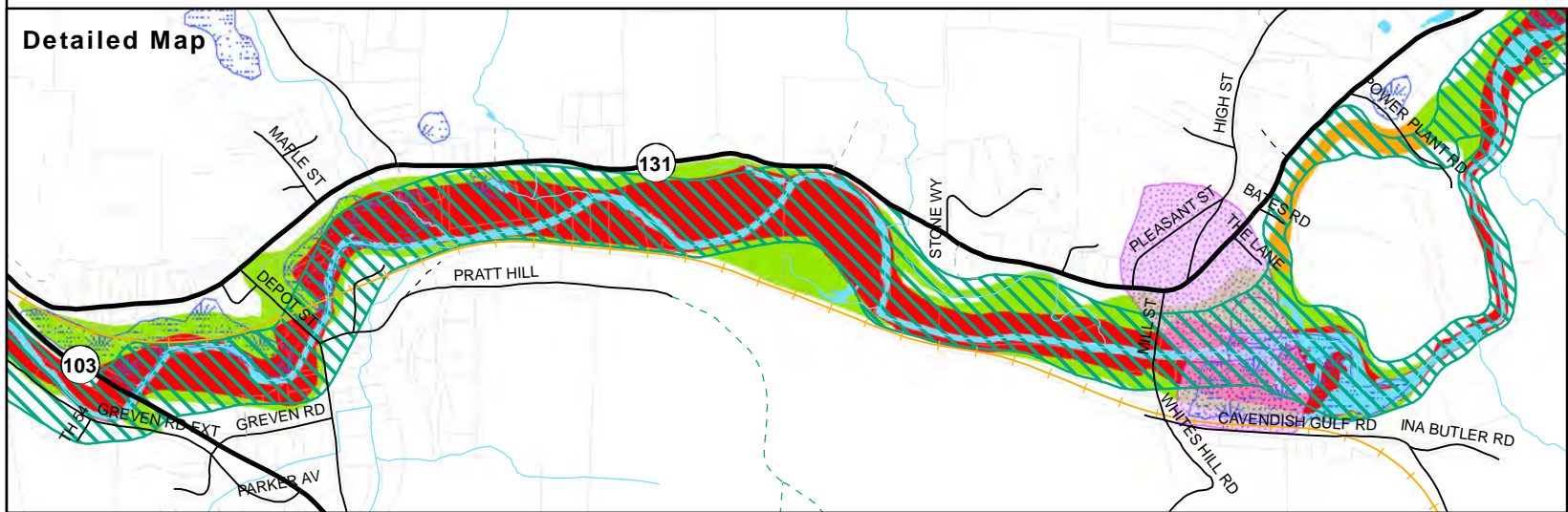
P.O. Box 320, Ascutney, VT 05030  
802-674-9201 www.swcrpc.org  
For planning purposes only  
Not for regulatory interpretation  
DRAFT Drawn February 6, 2015



Water Resources Map  
All Hazard Mitigation Plan 2015  
Town of Cavendish, Vermont



- |                                |                                |   |
|--------------------------------|--------------------------------|---|
| Dam                            | VT State Highway               | <b>Major Watersheds (in small map only)</b> |
| Floodway (Zone AE)             | Class 2 and 3 Town Highway     | Black River                                 |
| Floodplain (Zone A)            | Class 4 Town Hwy & Legal Trail | North Branch Black River                    |
| Floodplain (Zone AE)           | Private Road                   | Williams River                              |
| River Corridor Protection area | State Forest Road              |   |
| Groundwater Protection Area    | Railroads                      |   |
| Wetland                        | Parcels (Cavendish only)       |   |
| Rivers and Streams             | Town boundary                  |   |
| Lakes and Ponds                |                                |   |
- There are no surface water protection areas within the town (VT Agency of Natural Resources 2010).
- Data Sources: Dams (VT Agency of Natural Resources 2008), Floodplain and Floodway (Special Flood Hazard Areas) (Federal Emergency Management Agency 2008), River Corridor Protection Area (VT Agency of Natural Resources, January 2, 2015), Wetlands (VT Significant Wetlands Inventory) (VT Agency of Natural Resources 2010), Groundwater Protection Area (also known as Wellhead Protection Areas) (VT Agency of Natural Resources 2011), Surface Water Protection Area (VT Agency of Natural Resources 2010), Railroads (VT Agency of Transportation 2014), Road centerline (VT Agency of Transportation 2014), Waterbodies and Watersheds (VT Hydrographic Dataset 2008), Town Boundary (Southern Windsor County Regional Planning Commission 2014 using Parcels 2009), Parcels (Cartographic Associates 2009).



VT State Plane, Meters, NAD 83  
Data depicted on this map are for  
planning purposes only and are  
based on best available information.  
Some of the data do not line up.



P.O. Box 320, Ascutney, VT 05030  
802-674-9201 www.swcrpc.org

For planning purposes only  
Not for regulatory interpretation  
DRAFT Drawn February 6, 2015



## **Appendix B**

## AGENDA

### Cavendish Hazard Mitigation Committee Meeting

On March 25, 2015

At Cavendish Town Hall

#### Review of 2015 Cavendish All Hazard Mitigation Plan Preliminary Draft dated 3-24

- Determine status on Past Plan Mitigation and Preparedness Projects and Actions (Table 1, pg 8)
- Review and Confirm Reading Hazard Identification and Analysis (Table 2, pg 11)
- Review Existing Reading Resources for Mitigating Hazards: Authorities, Policies and Programs (Table 7, pg 34)
- Discuss Previous Plan Goals, Strategies and Actions (Table 8, pg 38) **and** Attached Goals, Strategies and Actions for Possible Inclusion in 2015 Plan
- Missing Information Highlighted in Draft – if available
  - Fire Responses (Table 4, pg 18)
  - Irene damage summary info/Bridge –Culvert Inventory (pg 20)
  - Notable hazard events since last plan
  - Hazardous Spill data (Table 6, pg 30)
  - Update info on status of dams (pg 29)
- Review Maps (under separate attachment)
- Misc., Next steps, deadlines

# VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORM

**PROGRAM:** Cavendish All Hazard Mitigation Plan  
**DATE OF MEETING:** March 25, 2015  
**MEETING LOCATION:** Cavendish Town Office  
**TOPIC:** Hazrad Mitigation Committee  
**MEETING TIME:** 10:00 AM

| VOLUNTEER ATTENDEES - CLAIMED |                 |                           |                       |                  |                  |               |
|-------------------------------|-----------------|---------------------------|-----------------------|------------------|------------------|---------------|
| No.                           | NAME            | AFFILIATION               | MILEAGE<br>ROUND TRIP | MEETING<br>HOURS | TOTAL<br>MILEAGE | TOTAL<br>TIME |
|                               |                 |                           |                       |                  | 0.565            | \$20.00       |
| 1                             | Cindy Ingersoll | SWCRPC                    | 28                    | 2                | 15.54            | 40.00         |
| 2                             | Rich Svec       | Town Manager              | 0                     | 2                | -                | 40.00         |
| 3                             | Eitenne Ting    | Planning Commission Chair | 0                     | 2                | -                | 40.00         |
| 4                             | Bob Glidden     | Fire Chief / SB Chair     | 0                     | 2                | -                | 40.00         |
| 5                             |                 |                           |                       |                  | -                | -             |
| 6                             |                 |                           |                       |                  | -                | -             |
| 7                             |                 |                           |                       |                  | -                | -             |
| 8                             |                 |                           |                       |                  | -                | -             |
| 9                             |                 |                           |                       |                  | -                | -             |
| 10                            |                 |                           |                       |                  | -                | -             |
| 11                            |                 |                           |                       |                  | -                | -             |
| 12                            |                 |                           |                       |                  | -                | -             |
| 13                            |                 |                           |                       |                  | -                | -             |
| 14                            |                 |                           |                       |                  | -                | -             |
| 15                            |                 |                           |                       |                  | -                | -             |
| 16                            |                 |                           |                       |                  | -                | -             |
| 17                            |                 |                           |                       |                  | -                | -             |
| 18                            |                 |                           |                       |                  | -                | -             |
| 19                            |                 |                           |                       |                  | -                | -             |
| 20                            |                 |                           |                       |                  | -                | -             |
| 21                            |                 |                           |                       |                  | -                | -             |
| 22                            |                 |                           |                       |                  | -                | -             |
| 23                            |                 |                           |                       |                  | -                | -             |
| 24                            |                 |                           |                       |                  | -                | -             |
| Sub Total                     |                 |                           | 28.00                 | 8.00             | \$15.54          | \$160.00      |

| FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM |      |             |                       |                  |                                 |               |
|---|------|-------------|-----------------------|------------------|---------------------------------|---------------|
| No.   | NAME | AFFILIATION | MILEAGE<br>ROUND TRIP | MEETING<br>HOURS | TOTAL<br>MILEAGE<br>(08/01/08-) | TOTAL<br>TIME |
|   |      |             |                       |                  | 0.565                           | \$20.00       |
| 1   |      |             |                       |                  |                                 |               |
| 2   |      |             |                       |                  |                                 |               |
| 3   |      |             |                       |                  |                                 |               |
| 4   |      |             |                       |                  |                                 |               |
| 5   |      |             |                       |                  |                                 |               |
| 6   |      |             |                       |                  |                                 |               |
| 7   |      |             |                       |                  |                                 |               |
| 8   |      |             |                       |                  |                                 |               |
| 9   |      |             |                       |                  |                                 |               |
| 10  |      |             |                       |                  |                                 |               |
| Sub Total                                     |      |             | 28.00                 | 8.00             | \$0.00                          | \$0.00        |

TOTAL MATCH #REF!

TOTAL Non-Volunteer Match #REF!

TOTAL VOLUNTEER MATCH #REF!

**TOWN OF CAVENDISH PLANNING COMMISSION**  
**Agenda for Regular Meeting Wednesday, April 1, 2015**  
**6:30 – 8:00 P.M. at the Cavendish Town Hall**

Item 1: Call meeting to order

Item 2: Adjust agenda

Item 3: Approve meeting minutes

Item 4: Hear Citizens

Item 5: New Business

- a. Introduce new PC members
- b. Review All Hazard Mitigation Plan material

Item 6: Old Business

- a. Review draft Flood Regulation

Item 7: Review correspondence

Item 8: Adjourn



# VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORM

**PROGRAM:** Cavendish All Hazard Mitigation Plan  
**DATE OF MEETING:** April 1st, 2015  
**MEETING LOCATION:** Cavendish Town Office  
**TOPIC:** Planning Commission Meeting - Hazard Mitigation Plan Dr  
**MEETING TIME:** 6:30pm

| VOLUNTEER ATTENDEES - CLAIMED |                 |                           |                       |                  |                  |               |
|-------------------------------|-----------------|---------------------------|-----------------------|------------------|------------------|---------------|
| No.                           | NAME            | AFFILIATION               | MILEAGE<br>ROUND TRIP | MEETING<br>HOURS | TOTAL<br>MILEAGE | TOTAL<br>TIME |
|                               |                 |                           |                       |                  | 0.565            | \$20.00       |
| 1                             | Cindy Ingersoll | SWCRPC                    | 28                    | 2                | 15.54            | 40.00         |
| 2                             | Eitenne Ting    | Planning Commission Chair | 0                     | 2                | -                | 40.00         |
| 3                             | Robert Williams | PC                        | 0                     | 2                | -                | 40.00         |
| 4                             | Barabara        | public                    | 0                     | 2                | -                | 40.00         |
| 5                             | Wendy Regier    | public                    | 0                     | 2                | -                | 40.00         |
| 6                             | Robin Timko     | public                    | 0                     | 2                | -                | 40.00         |
| 7                             |                 | LPCTV-public              | 0                     | 2                | -                | 40.00         |
| 8                             | Steve Birge     | PC                        | 0                     | 2                | -                | 40.00         |
| 9                             | Tim Calabrese   | public                    | 0                     | 2                | -                | 40.00         |
| 10                            | Dan Churchill   | PC                        | 0                     | 2                | -                | 40.00         |
| 11                            | Joe Marini      | PC                        | 0                     | 2                | -                | 40.00         |
| 12                            |                 |                           |                       |                  | -                | -             |
| 13                            |                 |                           |                       |                  | -                | -             |
| 14                            |                 |                           |                       |                  | -                | -             |
| 15                            |                 |                           |                       |                  | -                | -             |
| 16                            |                 |                           |                       |                  | -                | -             |
| 17                            |                 |                           |                       |                  | -                | -             |
| 18                            |                 |                           |                       |                  |                  |               |
| 19                            |                 |                           |                       |                  |                  |               |
| 20                            |                 |                           |                       |                  |                  |               |
| 21                            |                 |                           |                       |                  |                  |               |
| 22                            |                 |                           |                       |                  |                  |               |
| 23                            |                 |                           |                       |                  |                  |               |
| 24                            |                 |                           |                       |                  |                  |               |
| Sub Total                     |                 |                           | 28.00                 | 22.00            | \$15.54          | \$440.00      |

| FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM |      |             |                       |                  |                                 |               |
|---|------|-------------|-----------------------|------------------|---------------------------------|---------------|
| No.   | NAME | AFFILIATION | MILEAGE<br>ROUND TRIP | MEETING<br>HOURS | TOTAL<br>MILEAGE<br>(08/01/08-) | TOTAL<br>TIME |
|   |      |             |                       |                  | 0.565                           | \$20.00       |
| 1   |      |             |                       |                  |                                 |               |
| 2   |      |             |                       |                  |                                 |               |
| 3   |      |             |                       |                  |                                 |               |
| 4   |      |             |                       |                  |                                 |               |
| 5   |      |             |                       |                  |                                 |               |
| 6   |      |             |                       |                  |                                 |               |
| 7   |      |             |                       |                  |                                 |               |
| 8   |      |             |                       |                  |                                 |               |
| 9   |      |             |                       |                  |                                 |               |
| 10  |      |             |                       |                  |                                 |               |
| Sub Total                                     |      |             | 28.00                 | 22.00            | \$0.00                          | \$0.00        |

TOTAL MATCH #REF!

TOTAL Non-Volunteer Match #REF!

TOTAL VOLUNTEER MATCH #REF!

TOWN MANAGER  
SELECTMEN  
(802) 226-7291



TOWN CLERK  
TOWN TREASURER  
(802) 226-7292

To: Board of Selectmen  
From: Richard F. Svec, Town Manager  
Subject: Selectmen's Meeting, Monday, April 13, 2015 in the Cavendish Town Office Meeting Room at 6:30 pm

..... **AGENDA** .....

1. Call the Meeting to Order
2. Act upon minutes of the meetings of March 9<sup>th</sup>, 2015
3. Sign Orders
4. Review Correspondence
5. Adjust agenda
6. Hear Citizens
7. Katherine Otto of the Southern Windsor County Regional Planning Commission will be present to share the report and summary findings of the Cavendish Bridge and Culvert Inventory work which is now complete.
8. Town Manager to discuss the submission of the Annual Town Highway Financial Plan which needs to be signed and submitted to the Agency of Transportation.
9. Town Manager to present Town Treasurer's request for the Select Board to sign resolutions for two new bank accounts.
10. As Local Liquor Control Board, review of Liquor License application for Williams' Country Store.
11. Town Manager to review Cavendish Local Basic Emergency Operations Plan (LEOP) annual update with the Select Board.
12. Updates on Energy Committee activities including the ribbon cutting event on the solar project and the Solarize Program (in partnership with Reading, Windsor, Weathersfield and Brownsville).
13. Update on Davis Road bridge project
14. Discuss update of Cavendish All Hazards Mitigation Plan
15. Discuss dates for forthcoming VELCO Connecticut Valley Transmission Line Project presentation and Alternatives Presentation by Vtrans regarding Bridge #58 on Depot Street
16. Update on various town activities including spring roads, quarterly budget report, cemetery operations, recent water system boil notice, forthcoming activities, ERP program activities, recreation activities, transfer station activities, etc.
17. Town Manager to discuss plans for the hiring of an assistant to work with him in several areas including, but not limited to: cemetery supervision, transfer station administration, project and program development and supervision, grant applications, grant administration, wrapping up remaining Irene recovery activities.
18. Other business
19. Adjourn

P.O. BOX 126, 37 HIGH STREET  
CAVENDISH, VERMONT 05142-0126

FAX (802) 226-7290

# VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORM

**PROGRAM:** Cavendish All Hazard Mitigation Plan  
**DATE OF MEETING:** April 13th, 2015  
**MEETING LOCATION:** Cavendish Town Office  
**TOPIC:** Selectboard Meeting - Hazard Mitigation Plan Draft Review  
**MEETING TIME:** 6:30pm

| VOLUNTEER ATTENDEES - CLAIMED |                  |                        |                       |                  |                  |               |
|-------------------------------|------------------|------------------------|-----------------------|------------------|------------------|---------------|
| No.                           | NAME             | AFFILIATION            | MILEAGE<br>ROUND TRIP | MEETING<br>HOURS | TOTAL<br>MILEAGE | TOTAL<br>TIME |
|                               |                  |                        |                       |                  | 0.565            | \$20.00       |
| 1                             | Cindy Ingersoll  | SWCRPC                 |                       |                  | -                | -             |
| 2                             | MaragretCaufield | public                 |                       |                  | -                | -             |
| 3                             | Jennifer Leak    | public                 |                       |                  | -                | -             |
| 4                             | Gail Woods       | public                 |                       |                  | -                | -             |
| 5                             | Katharine Otto   | SWCRPC                 |                       |                  | -                | -             |
| 6                             | Rich Svec        | Town Manager/SB Chair  |                       |                  | -                | -             |
| 7                             | Curtis Bidgood   | public                 |                       |                  | -                | -             |
| 8                             | Bob Glidden      | Cav Fire Department/SB |                       |                  | -                | -             |
| 9                             | Larry Wilfong    | public                 |                       |                  | -                | -             |
| 10                            | Carl Snyder      | public                 |                       |                  | -                | -             |
| 11                            | Leon Woods       | public                 |                       |                  | -                | -             |
| 12                            |                  |                        |                       |                  | -                | -             |
| 13                            |                  |                        |                       |                  | -                | -             |
| 14                            |                  |                        |                       |                  | -                | -             |
| 15                            |                  |                        |                       |                  | -                | -             |
| 16                            |                  |                        |                       |                  | -                | -             |
| 17                            |                  |                        |                       |                  | -                | -             |
| 18                            |                  |                        |                       |                  | -                | -             |
| 19                            |                  |                        |                       |                  | -                | -             |
| 20                            |                  |                        |                       |                  | -                | -             |
| 21                            |                  |                        |                       |                  | -                | -             |
| 22                            |                  |                        |                       |                  | -                | -             |
| 23                            |                  |                        |                       |                  | -                | -             |
| 24                            |                  |                        |                       |                  | -                | -             |
| Sub Total                     |                  |                        | 0.00                  | 0.00             | \$0.00           | \$0.00        |

| FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM |      |             |                       |                  |                                 |               |
|---|------|-------------|-----------------------|------------------|---------------------------------|---------------|
| No.   | NAME | AFFILIATION | MILEAGE<br>ROUND TRIP | MEETING<br>HOURS | TOTAL<br>MILEAGE<br>(08/01/08-) | TOTAL<br>TIME |
|   |      |             |                       |                  | 0.565                           | \$20.00       |
| 1   |      |             |                       |                  |                                 |               |
| 2   |      |             |                       |                  |                                 |               |
| 3   |      |             |                       |                  |                                 |               |
| 4   |      |             |                       |                  |                                 |               |
| 5   |      |             |                       |                  |                                 |               |
| 6   |      |             |                       |                  |                                 |               |
| 7   |      |             |                       |                  |                                 |               |
| 8   |      |             |                       |                  |                                 |               |
| 9   |      |             |                       |                  |                                 |               |
| 10  |      |             |                       |                  |                                 |               |
| Sub Total                                     |      |             | 0.00                  | 0.00             | \$0.00                          | \$0.00        |

|                           |       |
|---------------------------|-------|
| TOTAL MATCH               | #REF! |
| TOTAL Non-Volunteer Match | #REF! |
| TOTAL VOLUNTEER MATCH     | #REF! |



Ascutney Professional Building, Route 5  
Post Office Box 320, Ascutney, VT 05030  
802 674-9201 / fax 802 674-5711  
www.swcrpc.org

**Cavendish All Hazard Mitigation Plan  
October 1<sup>st</sup>, 2014 – Hazard Analysis  
Cavendish Planning Commission  
6:30pm**

1. All Hazard Mitigation Plans
2. Hazard Analysis
3. Hazard Extent
4. Hazard Mitigation Committee

**Frequency of Occurrence:** Probability

- |                   |   |
|-------------------|---|
| 1 = Unlikely      | <1% probability of occurrence in the next 100 years (less than 1 occurrence in 100 years)                           |
| 2 = Occasionally  | 1–10% probability of occurrence per year, or at least 1 chance in next 100 years (1 to 10 occurrences in 100 years) |
| 3 = Likely        | >10% but <100% probability per year (at least 1 chance in next 10 years)  |
| 4 = Highly Likely | 100% probable in a year (an annual occurrence)  |

**Warning Time:** Amount of time generally given to alert people to hazard

- |                        |
|------------------------|
| 1 = More than 12 hours |
| 2 = 6–12 hours         |
| 3 = 3–6 hours          |
| 4 = None–Minimal       |

**Potential Impact:** Severity and extent of damage and disruption

- |                |  |
|----------------|--|
| 1 = Negligible | Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries        |
| 2 = Minor      | Isolated occurrences of moderate to severe property damage, brief disruption of critical facilities and infrastructure, and potential for injuries |
| 3 = Moderate   | Severe property damage on a neighborhood scale, temporary shutdown of critical facilities, and/or injuries or fatalities                           |
| 4 = Major      | Severe property damage on a town-wide or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities                   |

# VOLUNTEER FORM TO DOCUMENT IN-KIND SERVICES - MATCH INFORM

**PROGRAM:** Cavendish All Hazard Mitigation Plan  
**DATE OF MEETING:** October 1st, 2014  
**MEETING LOCATION:** Cavendish Town Office  
**TOPIC:** Planning Commission Meeting - Hazard Analysis  
**MEETING TIME:** 6:30pm

| VOLUNTEER ATTENDEES - CLAIMED |                      |             |                       |                  |                  |               |
|-------------------------------|----------------------|-------------|-----------------------|------------------|------------------|---------------|
| No.                           | NAME                 | AFFILIATION | MILEAGE<br>ROUND TRIP | MEETING<br>HOURS | TOTAL<br>MILEAGE | TOTAL<br>TIME |
|                               |                      |             |                       |                  | 0.565            | \$20.00       |
| 1                             | Steve Birge          | PC          |                       |                  | -                | -             |
| 2                             | Joe Marini           | PC          |                       |                  | -                | -             |
| 3                             | Etienne Ting         | PC Chair    |                       |                  | -                | -             |
| 4                             | John Saydek          | PC          |                       |                  | -                | -             |
| 5                             | Carol Walasewicz     | PC          |                       |                  | -                | -             |
| 6                             | Dan Willey           | PC          |                       |                  | -                | -             |
| 7                             | Wendy Regier         | Public      |                       |                  | -                | -             |
| 8                             | John Broker-Campbell | SWCRPC      |                       |                  | -                | -             |
| 9                             |                      |             |                       |                  | -                | -             |
| 10                            |                      |             |                       |                  | -                | -             |
| 11                            |                      |             |                       |                  | -                | -             |
| 12                            |                      |             |                       |                  | -                | -             |
| 13                            |                      |             |                       |                  | -                | -             |
| 14                            |                      |             |                       |                  | -                | -             |
| 15                            |                      |             |                       |                  | -                | -             |
| 16                            |                      |             |                       |                  | -                | -             |
| 17                            |                      |             |                       |                  | -                | -             |
| 18                            |                      |             |                       |                  | -                | -             |
| 19                            |                      |             |                       |                  | -                | -             |
| 20                            |                      |             |                       |                  | -                | -             |
| 21                            |                      |             |                       |                  | -                | -             |
| 22                            |                      |             |                       |                  | -                | -             |
| 23                            |                      |             |                       |                  | -                | -             |
| 24                            |                      |             |                       |                  | -                | -             |
| Sub Total                     |                      |             | 0.00                  | 0.00             | \$0.00           | \$0.00        |

| FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM |      |             |                       |                  |                                 |               |
|---|------|-------------|-----------------------|------------------|---------------------------------|---------------|
| No.   | NAME | AFFILIATION | MILEAGE<br>ROUND TRIP | MEETING<br>HOURS | TOTAL<br>MILEAGE<br>(08/01/08-) | TOTAL<br>TIME |
|   |      |             |                       |                  | 0.565                           | \$20.00       |
| 1   |      |             |                       |                  |                                 |               |
| 2   |      |             |                       |                  |                                 |               |
| 3   |      |             |                       |                  |                                 |               |
| 4   |      |             |                       |                  |                                 |               |
| 5   |      |             |                       |                  |                                 |               |
| 6   |      |             |                       |                  |                                 |               |
| 7   |      |             |                       |                  |                                 |               |
| 8   |      |             |                       |                  |                                 |               |
| 9   |      |             |                       |                  |                                 |               |
| 10  |      |             |                       |                  |                                 |               |
| Sub Total                                     |      |             | 0.00                  | 0.00             | \$0.00                          | \$0.00        |

TOTAL MATCH #REF!

TOTAL Non-Volunteer Match #REF!

TOTAL VOLUNTEER MATCH #REF!