

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

Adopted April 20, 2016

*Prepared by the Town of Chester and Southern  
Windsor County Regional Planning Commission*

**2016-2021**

Last Revised 02/18/2016

Town of Chester 2016-2021 All Hazard Mitigation Plan

April 20, 2016

**CERTIFICATE OF ADOPTION**

Town of Chester, VT  
Selectboard

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

WHEREAS, the Town of Chester 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 Chester Selectboard on 4/20/16 to present and receive public comment on the draft Plan; and

WHEREAS, the updated 2016-2021 Chester All Hazard Mitigation Plan was submitted to the Division of Emergency Management and Homeland Security and the Federal Emergency Management Agency for review on March 19, 2016; and

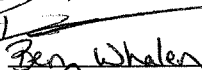
NOW, THEREFORE BE IT RESOLVED that the Town of Chester Selectboard hereby adopts the 2016-2021 Chester All Hazard Mitigation Plan for municipal use and implementation.

Duly adopted this 20<sup>th</sup> day of April, 2016.

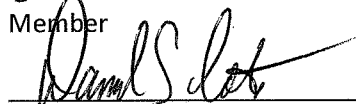
Chester Selectboard:

  
John DeBenedictis

Chair, Chester Selectboard

  
Ben Whalen

Member

  
Daniel S. Lott

Member

  
Member

Member

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## **1. INTRODUCTION**

The goal of this stand-alone All Hazard Mitigation Plan is to help the community identify risks and provide local mitigation strategies it can take to make Chester 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 Chester 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 Chester 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 Chester and will focus on the hazards and mitigation programs best suited for the town.

It is the intent of the town, once this plan is formally approved by FEMA, to incorporate and address recommended mitigation strategies in the town's future comprehensive, emergency operations and disaster response planning, the town plan and in the update of town bylaws and ordinances. The town also intends to continue the cross-board communication in development and implementation of updates to these plans. Chester encourages hazard mitigation planning to



be incorporated into other community planning projects, such as the Town Plan, capital budget planning, and Town Basic Emergency Operation Plan.

### **3. TOWN PROFILE**

The Town of Chester is located within Windsor County in southeastern Vermont, bordered by the Towns of Springfield, Baltimore, Cavendish, Ludlow, Andover, Windham, Grafton, and Rockingham. Regional highways, including VT Routes 10, 11 and 103, connect with large population areas outside of Chester. Route 103 is part of the National Highway System and Vermont Truck Network. Evacuation routes are detailed in the Chester Basic Emergency Operations Plan.

The Green Mountain Railroad runs through Chester 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.

The 2010 U.S. Census indicated a population of 3,154 and a growth rate of 3.4% between 2000 and 2010. This growth rate is comparable with the Vermont state population growth rate, but significantly higher than the -1.3% rate for Windsor County. Within Chester, the positive growth rate indicates the possibility for future development increasing the value and importance of regulatory tools such as flood hazard regulations and zoning regulations. These tools allow for the town to deter growth away from areas deemed unsafe and potentially prone to hazards.

The ongoing growth and expansion of the Okemo Mountain Resort in Ludlow and other nearby ski areas may put some residential and commercial development pressure on the Town of Chester. The current zoning map designates uses and areas of development which are sufficient to handle current development trends.

Current land use in the Town of Chester follows traditional settlement patterns of New England villages. The village areas of Main Street, Chester Depot, and the Stone Village have a mixture of commercial, industrial, and residential uses, as well as services such as post offices, health care, schools, and town offices. The village center is served by municipal water and sewer service, while areas outside of the downtown are served by private wells and on-site septic systems. Residential areas outside the village centers are primarily rural in nature and low or moderate in density.

The majority of land area in the town is forested; steep slopes, undeveloped ridgelines, and large wetland areas add to the scenic beauty of the town and serve as important habitat areas for large wildlife. Elevations in Chester range from a low point of approximately 700 feet along the Williams River in the southeast corner to a high point of 2,309 feet at the summit of Steadman Hill. Working farms, fields, and agricultural pasture lands are important assets to the town and help to define its rural character.

As in all of Vermont, the climate is generally temperate with moderately cool summers and cold winters. 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 mountains. The weather can be unpredictable at times, with large variations in temperature, precipitation, and other conditions occurring both within and between seasons.

#### **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 2012 Chester All Hazard Mitigation Plan, which at the time was an annex to the 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.

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

The Town of Chester in partnership with the Southern Windsor County Regional Planning Commission established a plan of completion for the Chester 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**

In March of 2014, SWCRPC staff met with the Chester Hazard Mitigation Committee to complete the hazard analysis.<sup>1</sup> Participants also 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.

The current plan is an extensive update to the previous annex plan. A partial list of revisions that have been made include:

- General updates
- Reorganization/restructuring of the plan

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<sup>1</sup> See Appendix for sign-in sheets

- Revaluation of hazards and edits as necessary
- Update of data and statistics
- Status of mitigation strategies
- Identification of current mitigation strategies
- Maps

In the winter of 2014-2015, SWCRPC staff reviewed and edited the previous version of the Hazard Mitigation Plan to continue the rewriting process. This revision includes updating population statistics in the town profile section, incorporating hazard events that occurred since the last plan revision into the hazard analysis, updating and adding data, and reviewing the progress of past mitigation actions. Following the draft edits completed by SWCRPC, a publicly noticed meeting was held at Chester Town Hall on February 5, 2015<sup>2</sup>. The revised draft plan was submitted to the Planning Commission for review and comment on February 27, 2015. Planning Commission members comments were reviewed, discussed and incorporated into the draft. SWCRPC sent the revised draft plan to the Chester selectboard for them to review at their next meeting. No comments were received at that meeting. Simultaneously, the revised draft plan was put out for public comment. This was done by posting an electronic copy on the town and SWCRPC website and having a hard copy of the plan advertised and made available at the town office for public review and comment. No comments were received from the public. On March 6, 2015 the Chester AHMP was distributed to adjacent towns for comment via email (Baltimore, Ludlow, Springfield, Cavendish, Andover, Windham, Rockingham/ Bellows Falls and Grafton).

Attendees of these meetings consisted of members of the Chester Planning Commission, Selectboard, Town Manager, town personnel, members of the public and SWCRPC staff.

- David Pisha – Chester Town Manager
- Graham Kennedy – Chester Public Works Director
- Jeff Holden – Chester Water and Sewer Superintendent
- Matthew Wilson – Chester Fire Chief
- Rick Cloud – Chester Police Chief
- Allison Hopkins – SWCRPC Regional Planner

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 Chester Hazard Mitigation Plan, Chester Town Plan and the recently updated SWCRPC Regional Plan were provided as examples to facilitate the discussion of highest hazards facing the town. Attendees of the meeting collaborated in creating the hazard analysis seen in the Hazard Identification and Analysis section of this Plan (Table 1).

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<sup>2</sup> See Sign-in sheet

At a subsequent meeting attendees discussed areas of town most likely to be affected by these hazards as well as future goals and mitigation strategies that may be undertaken to reduce the risk of future harm and cost to the town. These mitigation strategies were incorporated into the implementation schedule at the end of this document. Changes in priorities, development, and local mitigation efforts were also considered both at these meetings and during the entire revision process. Mitigation Strategies included developing goals, objectives and strategies aimed at mitigating future disaster losses that are cost-effective, technically feasible, and environmentally sound. Following the meetings, SWCRPC staff made the revisions and drafted a new, updated plan which is available for review at the Chester Town Office and posted on the SWCRPC website ([www.swcrpc.org](http://www.swcrpc.org)). The final adopted Chester Local Hazard Mitigation Plan will also be posted on the SWCRPC website and available at the Chester Town Offices.

This plan has also been updated to reflect progress in local mitigation planning efforts. The table below (Table 1) incorporates status updates for actions from the previous plan. The majority of the not-completed actions have been reevaluated and incorporated into the new Projects and Actions table near the end of this document. In addition, several of the not-completed actions were not chosen to be on the updated list. The Town of Chester and Mitigation Committee decided that other actions had higher priority and feasibility of completion. The following actions were not carried forward: Develop EOP (because EOP was developed), Installation of redundant power systems at critical facilities (because this was completed), Develop procedures and plans for the safe relocation of at needs populations as needed (because this is an on-going effort and partly handled through LEOP), and Utilize Village Center designation to make building owners eligible for tax credits for code improvements (i.e. sprinklers) (because this was completed).

**Table 1: Status on Past Plan Mitigation and Preparedness Projects and Actions**

ACTION	TYPE OF ACTION	HAZARD ADDRESSED	RESPONSIBLE PARTY	TIME FRAME	FUNDING SOURCE	STATUS
Stabilize river banks on Williams River	Mitigation	Flooding, Fluvial Erosion	Public Works Director, Selectboard, Town Manager	2012-2015	HMGP grant, town budget, NRCS	On-going
Upgrade drainage ditches and culverts	Mitigation	Flooding, Transportation Disruption	Public Works Director	Annually	Town budget, VTrans structures grants, HMGP	On-going
Keep culvert/bridge inventory updated	Mitigation	Flooding, Transportation Disruption	Public Works Director, SWCRPC	Annually	No cost to town	Culverts Completed ; Bridges Scheduled

Purchase three emergency generators	Preparedness	High Winds, Severe Winter Weather	Selectboard, Fire Department, Police Department	2012-2016	VEM Generator Grants, HMGP	Purchased: 1 in place generator and 1 portable
Capital program for equipment replacement	Preparedness	All Hazards	Selectboard	Annual	Town budget	On-going
New emergency services facility	Preparedness	Fire, Transportation Incidents, Hazardous Materials, Severe Winter Weather	Selectboard, Town Manager, Police Department, Fire Department	2015-2016	Town budget (needs voter approval)	Town Manager working on plan
Develop EOP	Mitigation, Preparedness	All Hazards	Police Department, Fire Department, Selectboard, SWCRPC	2012 then annual updates	No cost to town, SWCRPC EMPG funding	On-going
Investigate the purchase of the town's repetitive loss property	Mitigation	Flooding	Town Manager, Selectboard	2012-2013	FEMA HMGP, FMA grants	On-going buy-outs
Develop and implement procedures for retrofitting critical facilities to damage from high wind events	Mitigation	High Wind Events, Winter Storm	Fire Department, Planning Commission	2013-2015	No cost to town, what cost to retrofit?	Not completed
Conduct additional stream geomorphic assessment work on the Williams River and significant tributaries	Mitigation	Flooding, Fluvial Erosion	SWCRPC, Planning Commission	2013-2015	PDM-C grant, HMGP grant, Clean & Clear program	Near Completion
Conduct engineering study to assess vulnerability of critical facilities to earthquake, high wind, and winter storm events	Mitigation	Earthquake, High Wind Events, Severe Winter Weather	Planning Commission, Selectboard	2014-2016	HMGP grant	Not completed

Increase enforcement of current regulations to reduce speeding, and reduce the likelihood/severity of transportation incidents.	Mitigation	Transportation Incident, Hazardous Materials	Police Department, Selectboard	Ongoing	No cost to town	2015 Town meeting vote for additional police officer
Continue to encourage hazardous materials training and response capability within Chester first response agencies	Mitigation, Preparedness	Hazardous Materials	Fire Department, Police Department	Ongoing	No cost to town	Completed
Installation of redundant power systems at critical facilities	Mitigation, Preparedness	High Wind Events, Severe Winter Weather	Selectboard, Fire Department	2014-2016	Town budget	Completed – mobile generator
Develop procedures and plans for the safe relocation of at needs populations as needed	Mitigation, Preparedness	Severe Winter Weather, Fire, High Wind Events, Hazardous Materials Incident, Earthquake	Fire Department, Emergency Management Director, Town Manager	2012-2013	No cost to town	On-going – part of evacuation plan
Utilize Village Center designation to make building owners eligible for tax credits for code improvements (i.e. sprinklers)	Mitigation	Fire	Planning Commission, Town Manager	2014-2015	No cost to town	Completed in 2014
Encourage the installation of adequate fire suppression into new construction	Mitigation	Fire	Planning Commission, Fire Chief	Ongoing	No cost to town	On-going

Overall the following mitigation actions have occurred in Chester over the last 5 years:

- Buyout of property located at 895 Vermont Route 11 West
- Buyout of property located at 1035 Vermont Route 11 West
- Relocation of approximately 900 feet of roadway on Popple Dungeon Road

There has been some small scale development (commercial, residential, or otherwise) in the last five years, and no major development is anticipated in the next five years. According to town records only 8 homes and 1 commercial building were issued permits for new structures between 2012 and May 2015. This small amount of development has not impacted the Town's vulnerability.

The following plans, studies, reports, and technical information was consulted during the preparation of this plan:

- Southern Windsor County Regional Planning Commission Multi-Jurisdictional All-Hazard Mitigation Plan with Chester, VT Annex. Adopted August 20, 2012.
- Chester Town Plan. Adopted July 21, 2010
- Town of Chester Flood Damage Prevention Regulations. Adopted September 26, 2007
  - Includes Flood Regulations which regulate the Special Flood Hazard Area (SFHA)
- Chester Local Emergency Operations Plan (LEOP). Adopted 5/21/2014
- Flood Insurance Study for Windsor County, Vermont (dated 09/28/2007)
- Southern Windsor County Regional Planning Commission. 2014 Regional Plan. Volumes 1 and 2. Adopted November 18, 2014

At the time this plan was being prepared there was no Phase 1 or Phase 2 Stream Geomorphic Assessments completed within Windsor – studies which help to delineate fluvial erosion hazard areas. An assessment of the Mill Brook watershed is due to be completed in June 2015. The town does not have any studies of landslides or earthquakes.

#### **4.3 Plan Maintenance Process**

The future method for monitoring and evaluating the Chester All Hazard Mitigation Plan includes annual meetings of the identified Hazard Mitigation Review Committee in partnership with the SWCRPC. The purpose of these meetings will be to continue to identify hazards which may threaten structures and property within the town and to review the mitigation strategies included within this plan. The mitigation strategies will be reviewed annually to ensure that appropriate actions are being followed and budgeted for as necessary. These efforts will be coordinated by the Zoning Administrator and Town Manager. An effort will be made to involve representatives from the Chester Selectboard, Chester Volunteer Fire Department, Chester Police Department, and Chester Highway Department along with local volunteer boards and interested members of the public, including local business owners. In addition, neighboring communities will be pointed to where draft versions can be found for review and comment. An opportunity to provide public input will also be scheduled for a Selectboard meeting in April or May each year.

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



Chester 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. In addition, the town realizes the importance of improving communication and integration among diverse committees, plans and regulations while meeting state requirements for hazard mitigation and flood resilience. This plan encourages hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan, budget planning, and Town Local Emergency Operation Plan.

The Hazard Mitigation Committee will be responsible for monitoring this plan to ensure that specific mitigation actions are implemented as resources or opportunities become available. This includes the identification and application for additional funding opportunities. The hazard mitigation committee will also be responsible for reviewing the plan to ensure proposed mitigation actions remain in line with current town goals, strategies, and policies.

Just under four years into the five year plan revision process, the SWCRPC and Local Emergency Planning Committee (LEPC) 3 will assist the Chester Hazard Mitigation Committee in revising and updating this plan to incorporate issues which have been identified during the ongoing mitigation meetings. The Chester All Hazard Mitigation Plan update process will begin in January 2019 assuming a July 2015 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), Chester town website [www.chester.govoffice.com/](http://www.chester.govoffice.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 Chester All Hazard Mitigation Plan and forward a copy of the adoption resolution for FEMA to complete the plan approval and adoption process.

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

The following assessment addresses the Town of Chester'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 anticipated amount of warning time and an assessment of the



risk each poses. The ranking methodology used for the analysis ranked the frequency of occurrence, warning time, and potential impact and provided an overall hazard score. For this plan, the hazards which ranked around a seven were considered for inclusion and additional information. Hazards not considered as a “high hazard” may still occur.

**Table 2: Hazard Analysis**

Hazard	Frequency of Occurrence	Warning Time	Potential Impact	Hazard Score
Flash Flood/Flood/Fluvial Erosion	4	4	2	10
Severe Weather (Thunderstorm, Lightning, High Wind, Hail, and Flooding)				
*Note: We have defined ‘Severe Weather’ to include two or more of the above hazards.	2	1	1	4
Landslides/Mudslides/Rockslides	1	4	1	6
Hurricanes/Tropical Storms	2	1	4	7
Wildfire / Brushfire	4	4	1	9
Extreme Cold/Snow/Ice Storm	4	1	2	6
Structural Fire	4	4	2	10
Water Supply Contamination	1	4	4	9
Extreme Heat	1	2	1	4
Dam Failure	2	4	2	8
Ice Jams	4	2	2	8
Drought	1	1	2	4
Earthquake	2	4	1	7
Hazardous Material Spill	4	4	4	12
Tornado / Microbursts	3	4	1	8
Transportation Incidents	4	4	1	9

- 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

A discussion of the ‘high’ likelihood hazards is detailed in the proceeding subsections along with a County-wide FEMA Disaster Declarations table, local records and a narrative description of the hazard. While all hazards were considered by the Hazard Mitigation Committee for inclusion in this plan, it is not feasible to detail each in depth. 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. This plan will only focus on the hazards that Chester has chosen to mitigate for and has resources for, which are Flash Flood/Flood/Fluvial Erosion, Hurricanes/Tropical Storms/Tornado/Microbursts, Brushfire and Wildfires, Water Supply Contamination, Dam Failure, Ice Jams, Earthquake, Hazardous Materials Spill and Transportation Incidents. Hazards that ranked low in the above table are not detailed as they are not likely to occur in Chester or are a way of life in Vermont and handled well by the Town. That is why this plan will not cover those hazards.

<b>Table 3 - Federal Disaster Declarations: Windsor County 1970 - 2014</b>		
<b>FEMA Disaster Number</b>	<b>Date of Incident</b>	<b>Description</b>
4163	January 29, 2014	Severe Winter Storms
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

1816	January 14, 2009	Severe Winter 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
1201	January 15, 1998	Ice Storms
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
840	September 11, 1989	Severe Storms, Flooding
712	June 18, 1984	Severe Storms, Flooding
518	August 15, 1976	Severe Storms, High Winds, Flooding
397	July 6, 1973	Severe Storms, Flooding, Landslides

## 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 Chester.

### a) Flash Flood/Flood/Fluvial Erosion Hazard

Flash floods are a significant hazard to the Town of Chester and occur yearly. The town is susceptible to both flash flooding, frequently caused by summer thunderstorms and spring snow runoff, and fluvial erosion hazard flooding. Fluvial erosion – rivers and streams produce fluvial erosion, in which weathered sediment is picked up for transport, and movement to new locations. It can range from slight bank erosion to major changes in river channel location.

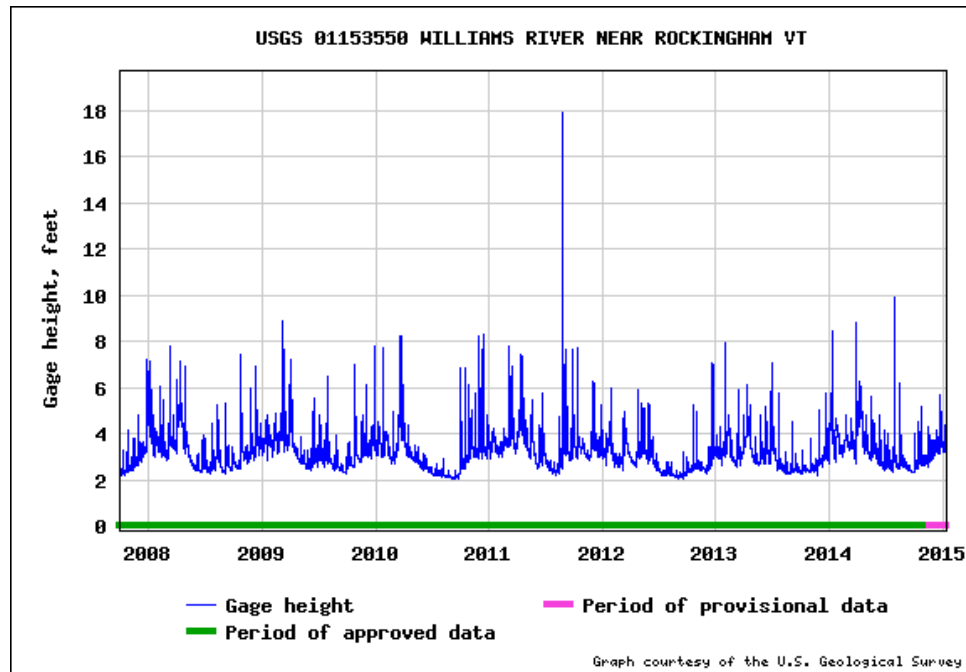
The damage from spring flooding events can vary greatly depending upon the amounts of precipitation, snow cover, spring melt, soil saturation, and topography. FEMA has designated floodplains or areas where there is a 1% chance of annual flooding in a given year, in the town for areas including the South Branch, Middle Branch, and main stem of the Williams River.

Particularly at risk are the three village areas located along the identified floodplains and near to the confluence of the Williams River and Middle Branch Williams River. The areas of high population concentration and services, namely Chester Village, the Chester Depot, and Stone Village, are either within or surrounded by floodplains. A significant flash flood or 100-year flood event in these areas would disrupt evacuation routes, and could impact many residences, special population areas, and hazardous materials storage facilities.

Notable and recent flood events that have occurred in Chester are:

- Flash flooding (6/1960)
- Ice jams on Williams River, Middle Branch Williams River, So. Branch Williams River (2/1976)
- Ice jam on Williams River (1/1990)
- Ice jam on Williams River (1/1996)
- Ice jam on Williams River (1/1999)
- Ice jams (2) on Williams River (12/2000)
- Flooding resulted in serious damage to Popple Dungeon Road (2003)
- Ice jams on Williams River (2007)
- Flash flooding following Tropical Storm Irene (2011)
- Flash flooding (July 2014)

The National Weather Service maintains a river gauge on the Williams River in the Town of Rockingham, which is located directly to the southeast of Chester. Between Rockingham and Chester there are no flow interruptions such as dams or other impoundments, therefore, river gauge data on the Williams River in Rockingham may be used to determine extent within Chester.



According to the National Weather Service:

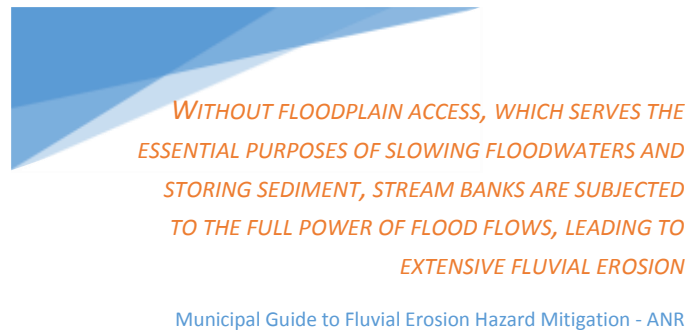
**Flood Categories (in feet)**

Major Flood Stage:	15
Moderate Flood Stage:	12
Flood Stage:	8
Action Stage:	6

Also according to the National Weather Service, the record crest prior to Tropical Storm Irene was 9.98 feet in 1993.

Recent Crests	Historic Crests
(1) 9.87 ft on 07/28/2014	(1) 17.94 ft on 08/28/2011
(2) 8.45 ft on 01/12/2014	(2) 9.98 ft on 03/29/1993
(3) 17.94 ft on 08/28/2011	(3) 9.87 ft on 07/28/2014
(4) 8.36 ft on 03/23/2010	(4) 9.69 ft on 04/03/2005
(5) 8.10 ft on 04/17/2007	(5) 9.54 ft on 05/14/2006
(6) 8.99 ft on 03/15/2007	(6) 9.41 ft on 01/19/1996
(7) 9.54 ft on 05/14/2006	(7) 9.05 ft on 01/27/1996
(8) 9.69 ft on 04/03/2005	(8) 8.99 ft on 03/15/2007
(9) 8.77 ft on 10/29/2003	(9) 8.77 ft on 10/29/2003
(10) 7.82 ft on 06/12/2001	(10) 8.71 ft on 04/16/1996

Chester, like many other towns within Southern Windsor County, is at risk for fluvial erosion hazard flooding events. Stream geomorphic assessments completed for neighboring towns indicate that the area is prone to erosion hazards and additional assessments are necessary. If a stream cannot spill out of its banks, the power of the trapped water increases and the channel either digs down or cuts further into the sides. Where there are nearby roads and buildings these adjustments to the channel's shape can become dramatic and costly. Without floodplain access, which serves the essential purposes of slowing floodwaters and storing sediment, stream banks are subjected to the full power of flood flows, leading to extensive fluvial erosion.<sup>3</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. By allowing a river the room it needs to slow the flow, over time it can function as a responsive system and avoid repeated losses to public infrastructure and investments. There is a need for responsive systems with room to adjust and intact floodplains to moderate the impact of high water events. The State recently embarked on mapping river corridors that are particularly susceptible to fluvial erosion. The maps have since been completed and are available online<sup>4</sup>.



Some options for mitigating fluvial erosion hazards include:

- 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

The Chester Fire Department is currently in the process of completely revamping their technical rescue abilities. They now offer 10 Cold Water Rescue Technicians, 10 Swift and Flood Water Technicians and a 14 foot Rescue boat and motor will be ordered in late

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<sup>3</sup> Municipal Guide to Fluvial Erosion Hazard Mitigation - ANR

<sup>4</sup>

[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)

February. Chester's new Technical Rescue Team trains once a month and 4 weekends a year. Once the department has their final training with the boat they will be applying for Chester to be recognized as Water Rescue Resource within the state.

#### b) Hurricanes/Tropical Storms/Tornado/Microbursts

Tropical Storm Irene, in late August, 2011 brought much devastation to the Town of Chester. Several roads were completely washed away, leaving a river bed instead of a road. Bridges were destroyed and culverts were washed downstream. The sewer main which crosses under the Williams River was washed downstream, allowing sewage to spill into the river. Large tracts of land were washed away and approximately 46 structures (including bridges and culverts) were lost and needed full replacement.

The total damage sustained by the Town of Chester is estimated at approximately \$1.75 million. Many of the Town's roads were impacted by the storm and required repairs. In addition, numerous culverts required either replacement or repair. Map 1 shows the areas of Roadway Damage. The most heavily impacted areas were as follows:

- Christmas Tree Road
- Goldthwaite Road
- Missing Link Bridge
- Popple Dungeon Road
- Potash Brook Road
- Smokeshire Road
- Wymans Falls Road
- Sewer Line Crossing under the Williams River
- Pump Stations

High wind events are very infrequent events in the Town of Chester; therefore, there is an acknowledged lack of previous occurrence data. That said, it is important to note that the entire town is equally at risk from the threat. High wind events can down numerous trees within minutes. The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. The scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage.

Saffir-Simpson Hurricane Scale		
Category	Wind Speed	
	mph	knots
5	156-210	135-185
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

Tornadoes have the potential to cause more significant damage but occur rarely in Chester and their effects, although severe, are usually localized in extent. The State of

Vermont Hazard Mitigation Plan states that “tornado season in Vermont runs ordinarily from March through August; however, tornadoes can strike at any time of the year if the essential conditions are present.” The largest tornado that has occurred within 50 miles of the Town of Chester occurred in 1998 and registered as an F3 tornado, with wind speeds over 158 miles per hour. 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 the Town of Chester. No high wind hazard areas have been identified or mapped in our region. The State of Vermont Hazard Mitigation Plan continues with “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. This includes no deaths, with the state ranking 44th for injuries and 45th for cost of damages. When we compare these statistics to other states by the frequency per square mile, Vermont ranks as follows: number 38 for the frequency of tornadoes, 0 for fatalities, 39 for injuries per area, and number 41 for costs per area.”

Hurricanes are also an infrequent event in Chester. 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. Another major problem is widespread power 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. Power failures usually result in minor inconveniences to residents; however, longer duration events may result in the loss of perishable items as well as business losses. The loss of power for extended periods of time would be particularly difficult on the milking operations at the three Chester dairy farms. Power outages in winter months could result in the loss of the ability to heat homes, as well as an increase in bursting water pipes and the resulting structural water damage.

**c) Brush Fire & Structure Fire**

Fires, including both structure and brush, were identified during the hazard analysis and vulnerability assessment as high hazard to the Town of Chester. Structure fires are common throughout Vermont especially during the winter months as Chester residents heat their homes with wood or wood pellet burning stoves. In 2013 the Chester Fire Department responded to 116 calls, 166 calls in 2014 and 43 calls in the first two months of 2015. The Department has noted a steady increase in motor vehicle and fire related incidents each year.

Large **wildfires** are uncommon events within Vermont and the Town of Chester, the larger hazard is small, uncontrolled brush fires which may burn between 1 and 10 acres. A wildfire is defined as ‘any free burning uncontrollable wildland fire not prescribed for the area which consumes the natural fuels and spreads in response to its environment.’<sup>5</sup>

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<sup>5</sup> NOAA Glossary



**d) Water Supply Contamination**

The Water System contains two (2) wells. The Jeffrey Well Station, which is located on 17 acres at 391 Route 103 North, is capable of producing 576,000 gallons of water per day and is the primary well. The secondary source is the Canal Street Well, located in the middle of the meadow at the end of Canal Street, which is capable of producing 288,000 gallons per day. The Canal Street Well is put online once every two weeks to keep it operational. The daily consumption is about 200,000 gallons per day, or about 25% of capacity. The wells are pumped during off peak hours for the best electrical utility rates and the water is stored in and drawn from the 1,000,000 gallon precast, pre-stressed concrete tank, located off Reservoir Road. It is located within the Aquifer Protection Area. Water supply contamination is the introduction of point and non-point source pollutants into public ground water and/or surface water supplies. Although minimal, water supply contamination does pose a threat in Chester.

**e) Dam Failure**

Dams are manmade structures built to impound water. Dams are built 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. Dams may also 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. Dam failures can occur at any time in a dam's life; however, failures are most common when water storage for the dam is at or near design capacity. At high water levels, the water force on the dam is higher 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.

The Water Department of the Town of Chester owns 550 acres of land off the Reservoir Road in the center section of Town. This forest land was purchased for the watershed area and holds an 11 acre reservoir, which is used for recreational purposes only. There is a small publicly owned dam at this location. The reservoir previously served as the Town drinking water source and should be preserved for use during an emergency, for instance, when the Jeffrey and Canal wells are not available. This 550 acre site is a managed forest with a ten year Forest Management Plan prepared by the State Forester, who also manages the forest in accordance with the Plan.

**f) Ice Jams**

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. 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 threaten many of the same properties as 100-year flood events, and damage can be expected to be similar. There are several recorded ice jams on the Williams River in Chester for the years 1976-2014 recorded by the US Army Corps of Engineers, Cold Regions Research and Engineering Laboratory (CCREL).

**Table 4: Ice Jam Events Chester, VT 1976-2014<sup>6</sup>**

<b>Town</b>	<b>River</b>	<b>Jam Date</b>
Chester	Williams River	12/17/2000
Chester	Williams River	12/17/2000
Chester	Williams River	1/24/1999
Chester	Williams River	1/19/1996
Chester	Williams River	1/23/1990
Chester	South Branch Williams River	2/1/1976
Chester	Middle Branch Williams River	2/1/1976
Chester	Williams River	2/1/1976

Many additional ice jams have occurred in town historically, but have not been recorded. The North Branch of the Williams River is prone to ice jams and flooding in the late winter and early spring. Ice jams most frequently occur in the Williams River at bridges along VT Route 103 between Trebo Road and VT Route 10. Infrastructure damage is most likely to occur at these locations.

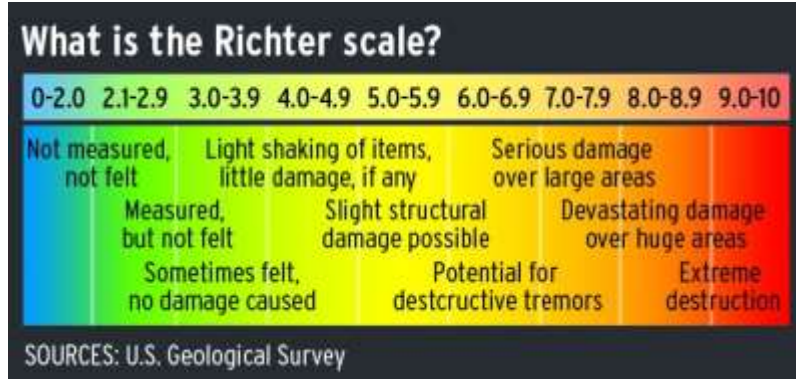
#### **g) Earthquake**

An earthquake is a sudden rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, avalanches, and tsunamis. The magnitude and intensity of an earthquake is determined by the use of scales like the Richter Scale and the Mercalli Scale.

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<sup>6</sup> US Army Corps of Engineers, Cold Regions Research and Engineering Laboratory (CCREL).

New England states are located on the North American Tectonic Plate and are subject to internal plate earthquakes, as opposed to plate boundary earthquakes that are prevalent in California.



New England earthquakes are not directly correlated with known fault lines and affect a wider geographic area than the western quakes when they occur.

Earthquakes pose a hazard to the Town of Chester due to the historical nature of residential and commercial buildings in the town. The historic nature of buildings is problematic as many of these structures are not securely fastened to their foundations, making them more vulnerable to earthquake damage.

#### h) Hazardous Materials Spill

There are multiple sources of data available on hazardous materials spills both in Vermont and in the Town of Chester, each provides a different picture of the frequency of hazardous materials spills.

<b>Table 5</b> <b>Town of Chester - Hazardous Materials Incidents</b> <b>PHMSA - Office of Hazardous Materials Safety</b>						
Incident Route	Date of Incident	Quantity Released	Unit of Measure	Commodity Long Name	Hazardous Class	Total Amount of Damages
ROUTE 11	5/16/2014	2500	LGA	GASOLINE CASINGHEAD	FLAMMABLE - COMBUSTIBLE LIQUID	\$1,784,891
ROUTE 11	3/11/1998	2400	LGA	FUEL OIL (NO. 1 2 4 5 OR 6)	FLAMMABLE - COMBUSTIBLE LIQUID	\$64,000

The U.S. Department of Transportation lists seven hazardous materials spills which have occurred in Windsor County, Vermont since 1971; only showing two of those spills to have occurred in the Town of Chester.

The Vermont Agency of Natural Resources Spills Database includes a more comprehensive listing of hazardous materials spills within the Town of Chester since the year 2010.

**Table 6: Vermont Agency of Natural Resources - Spills Database; Since 2010**

<b>Date</b>	<b>Address</b>	<b>Quantity</b>	<b>Material</b>
1/27/2010	Intersection of Potash Brook Rd & Farr Rd	10 gallons	Hydraulic Oil
2/10/2010	1328 Chandler Rd	<1 gallon	Fuel Oil
3/24/2010	837 VT Route 11	<1 gallon	Fuel Oil
5/20/2010	Sullivan Access Rd	10 gallons	Hydraulic Oil
5/26/2010	40 Fenton Rd	3 gallons	Transformer Oil
6/17/2010	Main St	unknown	Fuel Oil
7/13/2010	Elm St	4 gallons	Hydraulic Oil
3/3/2011	482 Depot St	unknown	Fuel Oil
3/14/2011	903 Cummings Rd	70 gallons	Fuel Oil
4/18/2011	466 Trebo Rd	unknown	unknown
11/21/2011	157 Watkins Rd	100 gallons	Diesel
5/17/2012	VT Route 103	<1 gallon	MODF
6/5/2012	145 Main St	5 gallons	Gasoline
6/8/2012	367 Elm St	1 gallon	unknown
8/17/2012	Intersection of Church & North St	2 gallons	Hydraulic Oil
11/7/2012	1083 Cummings Rd	<1 gallon	Fuel Oil
2/27/2013	Gould Ave	unknown	Kerosene
7/3/2013	VT Route 103	6 gallons	Diesel
8/18/2013	626 Mattson Rd	2 gallons	MODF
4/30/2014	141 Marcs Dr	unknown	unknown
5/16/2014	895 VT Route 11	2470 gallons	Gasoline

#### **i) Transportation Incidents**

Highway accidents are common in Chester. Table 6 below lists reported accidents on local roads recorded by the Vermont Agency of Transportation for the years 2009-2013. Table 7 lists high crash locations (HCL) on major highways for the years 2008-2012. The 2015 town budget, requiring voter approval, would increase the police force by one officer. The availability of additional manpower could result in increased speeding enforcement, thus reducing the likelihood and/or severity of motor transportation incidents.

In the fall of 2014 rumble strips were added to Route 103. With the noise and vibrations that rumble strip produce when drivers stray from the traveled lane, they are an effective countermeasure for preventing roadway departure crashes. They are also helpful in alerting plow drivers to the lane limits when heavy snow, fog or dust conditions reduce the driver's visibility.

Accidents on roadways can cause property damage, bodily injury, or death. Highway accidents can also result in short term disruption of important local and regional travel corridors. A significant threat to the town posed by transportation incidents is the potential for releasing hazardous materials into the surrounding area. Community

training exercises, relying on the expertise of the Chester Fire Department, has been and will continue to be conducted. Currently, the Fire Department is on schedule to have two Tech level hazmat officers by the end of 2015.

Crashes on local roads 2009-2013		
Type of crash	Number of crashes	Percentage of crashes
Crash with fatality	0	0%
Crash with injury	18	34%
Crash with property damage only	35	66%
Unknown reason for crash	0	0%
Total number of crashes on local roads	53	

Table 7: Reported Crashes on Local Roads

High Crash Locations (HCL) on Major Highways for 2008-2012									
HCL Rank*	Town	Route	Location (by Milemarkers)	Average Daily Traffic (ADT)	Total Number of Crashes	Crashes with Fatalities	Crashes with Injuries	Crashes with Property Damage Only	Type
134	Chester	VT-10	2.700 - 3.000	3,200	9	0	4	7	Section
210	Chester	VT-11	0.977 - 1.277	2,704	7	0	1	6	Section
290	Chester	VT-11	5.077 - 5.377	4,492	9	0	2	7	Section
379	Chester	VT-103	5.447 - 5.747	4,000	6	0	2	4	Section
384	Chester	VT-11	5.477 - 5.777	4,200	8	0	3	5	Section
453	Chester	VT-11	4.577 - 4.877	4,925	8	1	1	6	Section
526	Chester	VT-103	2.247 - 2.547	7,148	8	0	1	7	Section
571	Chester	VT-10	1.400 - 1.700	3,000	5	0	3	2	Section

Note: HCL Rank is done by VTrans on a statewide level with sections and intersections ranked independently

Table 8: High Crash Locations on Major Highways

## 6. MITIGATION PROGRAM

### 6.1 Goals and Strategies

The following sections detail the mitigation goals, strategies, and potential mitigation actions which the town has identified to aid in the reduction of threats posed by the hazards detailed in this plan. The implementation schedule that follows is a table of actions that the town has targeted for implementation during the five year cycle of this plan.

The 2010 Chester Town Plan identifies the following recommendations which support hazard mitigation:

- Excessive commercial development along VT Route 10, 11, and 103 (i.e. strip development) is discouraged. Access management and innovative commercial development that maintains the characteristics of the existing village areas and greens, is encouraged.



- Necessary transportation improvements, especially road and bridge maintenance, public transit options, car and vanpooling, or other techniques to utilize existing infrastructure should be supported.



- Keep the existing transportation network in good repair to avoid costly replacement in the future.



- Reduce the adverse impacts of current peak traffic volumes.



- Work with other towns along the Route 103 corridor to coordinate mitigation efforts aimed at alleviating the effects of truck and peak ski / tourist traffic.



- Obtain the property necessary to widen the intersection of Routes 103 / 11 and Maple Street to provide adequate, or better, turning radius for commercial vehicles.



- At the intersection of Routes 103 / 11 and Maple Street, acquire the parcel on the northeasterly corner for widening and realignment of the intersection.



- Provide the residents of Chester the best possible Ambulance, Fire, and Police service by supporting the improvements to these services that are prudent and necessary.



- Any housing development in Chester should contain provisions for adequate fire protection.
- Support the continued cross training of police officers as Emergency Medical Technicians.



- Provide the Chester Village water customers with a pure, clean water supply.



- Upgrade public water system as needed to maintain quality, efficiency, and environmental soundness.



- Purchase and install a reserve tank to be located on the Town of Chester property behind the Green Mountain Union High School.



- Update the public water system to meet future State and Federal water quality requirements.



- Design a storm drainage system for the area of the Town of Chester serviced by the Sewer Plant in order to properly dispose of ground and surface water.



- Maintain the reservoir as a backup potable water source for the town.



- Provide residents with safe, effective, and efficient utility service.
- Promote underground electric lines where possible and practical.
- Roads and driveways shall meet town standards and shall provide adequate, safe emergency vehicle access.



- Consider land use regulations to restrict developments in steep slope areas.



- Maintain or enhance the integrity and functions of Chester's surface waters and wetlands.



- Protect the quality and quantity of groundwater for Chester's residents.



- Continuous areas of undisturbed vegetation along rivers and streams should be encouraged, thereby protecting shorelines, wildlife habitat, and scenic quality.



- New development adjacent to streams or rivers must be designed to cause minimal damage to the stream environment. Any such development should be planned so that surface waters do not become silted, contaminated, or otherwise degraded.



- Natural vegetated buffer strips between development and surface waters should be maintained.



- Any storing or transporting of chemicals or other hazardous material should be done in such a manner so as to have no adverse effects on streams or other sources of water.



- Restrict development within the aquifer protection districts in order to protect the public drinking water.



The following general goals were identified by the Hazard Mitigation Committee to reduce or avoid long term vulnerabilities to identified hazards:

- Reduce the loss of life and injury resulting from all hazards.

- Reduce the impact of hazards on the town's waterbodies, natural resources, and historic resources.
- Reduce the economic impacts from hazard events.
  - Minimize disruption to the road network to maintain access.
  - Mitigate financial losses incurred by municipal, residential, industrial, agricultural and commercial establishments due to disasters.
  - Ensure that community infrastructure is not significantly damaged by a hazard event.
- Encourage hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan, All-Hazards Emergency Operation Plan, Capital Improvement Plan, Basic Emergency Operations Plan and School Crisis Plan.
- Ensure that members of the general public continue to be part of the hazard mitigation planning process.

The following policies were added or changed in response to Tropical Storm Irene and other high hazard events which have occurred since 2012 (last plan adoption):

- The Town of Chester is currently in the process of updating its Town Plan. This document will take a greater look at the town's goals towards river management and flood plain development. This AHMP will be referenced during the update of the Town Plan.

## **6.2 Existing Programs**

The following programs, policies, and regulations are currently being implemented throughout the Town of Chester and help to reduce the towns' long-term susceptibility to hazards. These programs reduce the effects of hazards to existing, new, and future buildings, infrastructure, and critical facilities by preventing their location in identified and known hazard areas and by ensuring that the infrastructure and buildings are designed to minimize damage from hazard events.

The town currently participates in the NFIP program and will continue to regulate floodplain use through the Chester Flood Hazard Regulations last updated and adopted on September 26, 2007; these regulations refer to the FEMA flood insurance rate maps last revised by FEMA in 2007 and adopted on September 28<sup>th</sup>, 2007. The town will continue to enforce these regulations to maintain future NFIP compliance. As outlined in the regulations, the Administrative Officer is charged with implementing and advising residents on floodplain development, as well as regulating construction within Special Flood Hazard Areas and NFIP compliance.

One structure in Chester has been listed as repetitive loss by FEMA, a non-residential structure. The building carries flood insurance and is currently valued at approximately \$319,000. There are 44 NFIP insurance policy holders within the Town of Chester, 31 of which are located in the 100 year flood zone. Thirty nine claims have been filed since 1978, totaling \$74,734 dollars in payouts.



The following authorities, policies, programs, and resources related to hazard mitigation are currently in place and/or being implemented in the Town of Chester in addition to the NFIP. These programs reduce the effects of hazards to existing, 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 improvements that may be needed.

**Table 9: Existing 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.	Effectively addresses issues with floodplains, transportation, safety, municipal and critical facilities; revised and readopted in 2010	Plan is updated on a five year cycle, the next revision process is set to begin in 2015
Basic/ Local Emergency Operations Plan	Basic municipal procedures for emergency response	Outlines procedures for call-outs, evacuations, etc.; last updated in 2014	Plan is reviewed and updated yearly following town meeting; statewide template can restrict additional functionality
School Emergency Response Protocol	School procedures for emergency response	Utilizes template provided by state; provides a checklist of actions for use by administrators and first responders during emergency situations	Coordinating response procedure among planning tools may improve effectiveness
LEPC All Hazards Resource Guide	Outline resources available to town in emergency situations	Effective in providing data and resources to town first responders	Should be revised to include resources specific to Chester; revision to occur in 2015
Mutual Aid – Emergency Services	Agreement for regional coordinated emergency services	Member of Keene and Connecticut Valley Mutual Aid	All mutual aid agreements should be formalized
Road Standards	Design and construction standards for roads and drainage systems	Effective through continued use and implementation	Continued implementation of road standards is critical to effectiveness
Subdivision Regulations	Regulates the division of land, standards for site access and utilities	Effective through their continued implementation	Continued updates and enforcement are important for continued effectiveness
Flood Hazard Area Regulations	Regulates development in FEMA flood hazard areas	Effective at limiting development in known hazard areas	Continued updates and enforcement are critical to greater effectiveness

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness
Site Plan Review	Reviews plans for development	Effective in addressing drainage and impervious surface area	Continued use of this mechanism will help prevent additional hazards
National Flood Insurance Program (NFIP)	Provides ability for residents to acquire flood insurance	Effective, Chester is compliant with the NFIP program	Flood maps should be updated, town may pursue CRS rating
Maintenance Programs	Bridge & Culvert Inventory	Effective at tracking and planning infrastructure upgrades	Inventories should be kept current when possible
Access Permits	Regulates driveway access along town-maintained roads	Effective in limiting the number of road cuts, thereby reducing the potential for transportation issues	Continued enforcement of permit regulations will maintain effectiveness
Entertainment Permits	Addresses fire safety and public occupancy issues	Effective cooperation with VT Labor and Industry	Continued enforcement will maintain effectiveness
Local Emergency Planning Committee 3	Volunteer organization involved in regional hazard mitigation efforts	Effective and important contributor in hazard mitigation planning	Greater town participation at the regional meetings would be beneficial
Southern Windsor County Regional Planning Commission	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 tools	The RPC should focus on improving the planning process and investigate additional sources of historical data on hazards

### **6.3 Mitigation Strategies, Actions and Projects**

The Chester hazard mitigation committee discussed each mitigation strategy and found that many projects are still ongoing and/or are still relevant. In most cases, the past identified strategies have been left in place because of their ongoing and cyclic nature, for example, the incorporation of strategies into the town capital budget and planning documents. The instructions were to choose which should be included in the five year plan, based on cost (including considering the feasibility to complete or initiate in that time) versus benefit (or need). The Chester Hazard Mitigation Committee kept in mind the following benefits while creating Table 10:

- 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

Over the past several years, the Town of Chester has become keenly aware of the need to plan for future mitigation of our highway infrastructure. Each year, the town reviews the needs for the upcoming season so that projects can be placed within the existing capital program. This is done on an annual basis. The Town is also taking advantage of the Better Backroads Grant in an effort to update the Bridge and Culvert inventory as well as the Road Surface Management Plan.

The Town of Chester was awarded two property buyout grants as a result of Tropical Storm Irene. The town has also applied for two additional buyout grants as a result of the July, 2014 storm. We are awaiting that funding award. In addition, Chester received a Hazard Mitigation Grant for the relocation of 900 feet of paved road as a measure of mitigating bank erosion. As a result of Tropical Storm Irene and then the July, 2014 storm, 4 large culverts on Potash Brook Road were destroyed. The town has secured funding through the Vermont Emergency Highway Fund to upgrade these culverts to multi arch plate box culverts as a mitigation measure.

The Town of Chester works very closely with VTrans in the maintenance and repair of its highway infrastructure. The town has recently applied for a grant through VTrans to perform a long needed rebuild of Route 35. In addition, the town has been awarded a grant through the Emergency Highway Funds to repair the roads and 4 box culverts that were damaged in the July, 2014 storm in West Chester. The Town is also taking advantage of the Better Backroads Grant in an effort to update the Bridge and Culvert inventory as well as the Road Surface Management Plan.

The following identified programs, projects and activities are future mitigation strategies for the Town of Chester. These mitigation strategies have been chosen by the town as the most appropriate policies and programs to lessen the impacts of potential hazards.

Potential mitigation projects are prioritized on an ad-hoc basis by:

- Severity of need
- Projects with the greatest potential impact
- Available funding
- Prior to pursuing potential mitigation projects, the Town considers the costs and benefits of the project.
- FEMA methodology for determining cost-benefits is used in determining the priority of a project.

The mitigation measures performed in the last several years have been a result of major events such as Tropical Storm Irene and the July, 2014 storm. When considering maintenance and replacement of highway infrastructure each year, Chester refers primarily to its bridge and culvert inventory as well as its Road Surface Management Plan. Chester also takes into consideration grant funding that may be available to assist in these projects.

**Table 10: Proposed Hazard Mitigation Programs, Projects and Activities**

<b>ACTION</b>	<b>TYPE OF ACTION</b>	<b>HAZARD ADDRESSED</b>	<b>RESPONSIBLE PARTY</b>	<b>TIME FRAME</b>	<b>FUNDING SOURCE, COST TO TOWN</b>
Stabilize river banks on Williams River	Mitigation	Flooding, Fluvial Erosion	Public Works Director, Selectboard, Town Manager	2016-2021	HMGP grant, town budget, NRCS Cost to Town: medium
Upgrade drainage ditches and culverts	Mitigation	Flooding, Transportation Disruption	Public Works Director	Annually	Town budget, Vtrans structures grants, HMGP Cost to Town: high
Keep culvert/bridge inventory updated	Mitigation	Flooding, Transportation Disruption	Public Works Director, SWCRPC	Annually	No cost to town
Purchase emergency generators for Town Hall and Pump Station on Elm	Preparedness	High Winds, Severe Winter Weather	Selectboard, Fire Department, Police Department	2016-2021	DEMHS Generator Grants
Capital program for equipment replacement	Preparedness	All Hazards	Selectboard	Annually	Town budget
New emergency services facility	Preparedness	Fire, Transportation Incidents, Hazardous Materials, Severe Winter Weather	Selectboard, Town Manager, Police Department, Fire Department	2016-2017	Town budget (needs voter approval)
Update EOP	Mitigation, Preparedness	All Hazards	Police Department, Fire Department, Selectboard, SWCRPC	Annually	SWCRPC EMPG funding Cost to Town: low
Review Town Plan, bylaws to ensure hazards are addressed	Mitigation	Flooding	Zoning, Planning Commission, Selectboard, SWCRPC	Annually	MPG funding Cost to Town: low

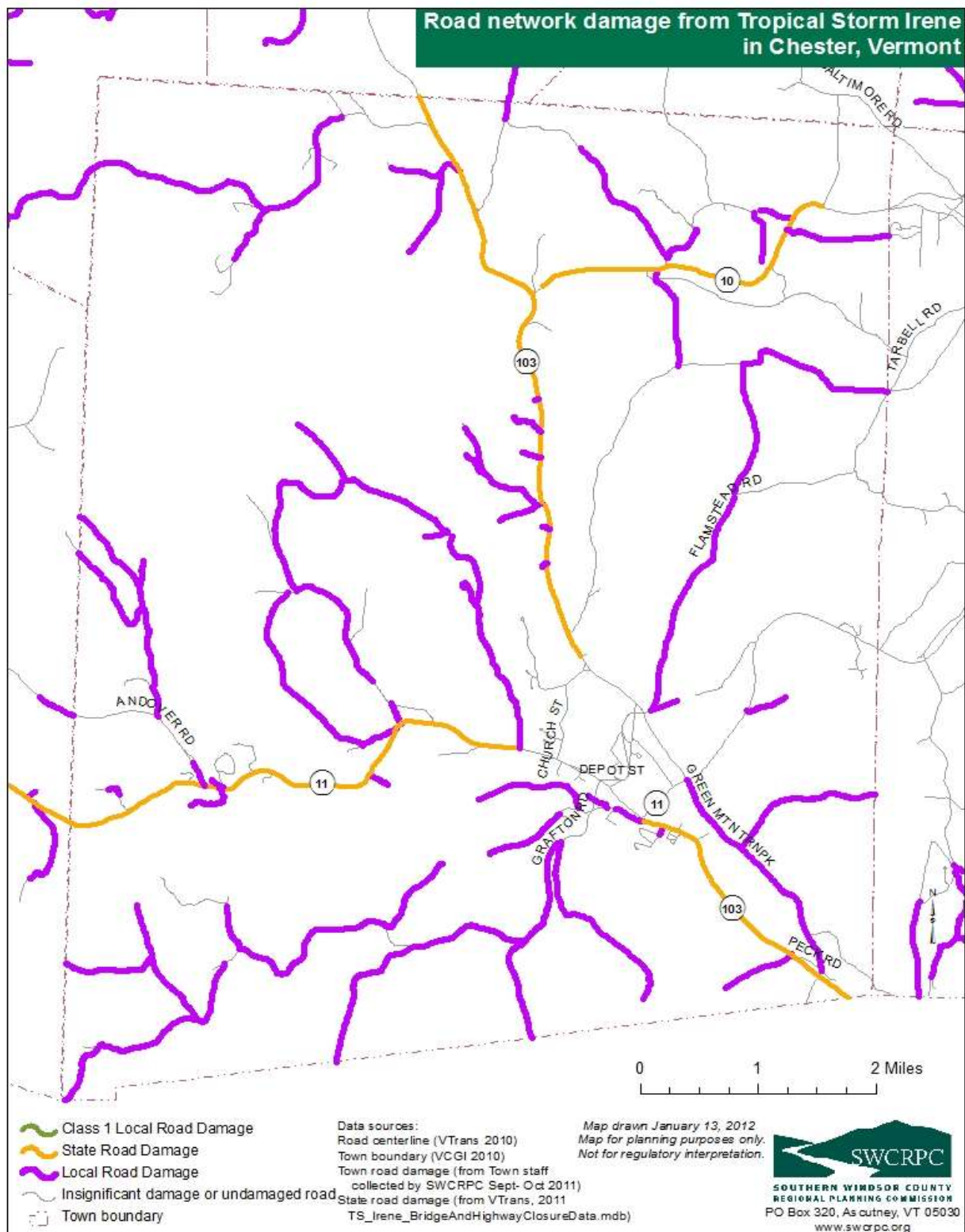
<b>ACTION</b>	<b>TYPE OF ACTION</b>	<b>HAZARD ADDRESSED</b>	<b>RESPONSIBLE PARTY</b>	<b>TIME FRAME</b>	<b>FUNDING SOURCE, COST TO TOWN</b>
Attend training on floodplain management and flood regulation administration	Mitigation	Flooding	Town Staff, Selectboard	2016-2017	Town funds Cost to Town: low
Conduct additional stream geomorphic assessment work on the Williams River and significant tributaries.	Mitigation	Flooding, Fluvial Erosion	SWCRPC, Planning Commission	2016	PDM-C grant, HMGP grant, Clean & Clear program Cost to Town: medium
Conduct engineering study to assess vulnerability of critical facilities to flooding	Mitigation	Flooding	Planning Commission, Selectboard	2016-2018	Town funds Cost to Town: high
Increase enforcement of current regulations to reduce speeding, and reduce the likelihood/severity of transportation incidents.	Mitigation	Transportation Incident, Hazardous Materials	Police Department, Selectboard	Annually	Town Funds Cost to Town: low
Continue to encourage hazardous materials training and response capability within Chester first response agencies.	Mitigation, Preparedness	Hazardous Materials	Fire Department, Police Department	Annually	Town funds Cost to Town: low
Public Outreach: distribute FEMA guides and brochures	Mitigation, Preparedness	Flooding, Severe Winter Weather, Fire	Town Clerk, Zoning	2016-2017	No cost to town
Public Outreach: distribute state brochures on fire prevention	Mitigation, Preparedness	Structure Fire, Wildfires	Fire Department, Town Clerk, EMD	2016-2017	No cost to town
Public Outreach: provide information on Village Center designation benefits; ie: building owners eligible for tax credits	Mitigation	Fire	Planning Commission, Town Manager	2016-2018	No cost to town

ACTION	TYPE OF ACTION	HAZARD ADDRESSED	RESPONSIBLE PARTY	TIME FRAME	FUNDING SOURCE, COST TO TOWN
for code improvements					
Encourage the installation of adequate fire suppression into new construction	Mitigation	Fire	Planning Commission, Fire Chief	2016-2017	No cost to town

#### **6.4 Integration**

Chester uses all of the tools listed throughout the plan for current and future activities with the town. For example: the Local Emergency Operation Plan has a contact list that is used for response purposes in the case of a hazard event, and is updated every year after Town Meeting. The list includes updates to vulnerable geographic locations, as well as locations of vulnerable populations. Town Road and Bridge Standards are followed by the town and Chester just completed updating their culvert inventory in 2015. The mitigation action and goals identified in this plan will be reviewed annually by the Selectboard at a meeting prior to Town Meeting Day. Additionally, the SWCRPC will work with the Chester Planning Commission to incorporate ideas into the next Town Plan rewrite. The goals of this hazard mitigation plan will be incorporated in the rewrite to ensure that emergency preparedness and mitigation planning efforts are included in the Town Plan, with particular attention to include the projects in the Mitigation Actions Table. As each referenced plans and regulations are updated, they will better incorporate hazard mitigation. This will assist with ensuring that this plan is utilized and project follow-through occurs.





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

**PROGRAM:** Chester AHMP  
**DATE OF MEETING:** February 5, 2015  
**MEETING LOCATION:** Chester Town Hall  
**TOPIC:** AHMP  
**MEETING TIME:** 10-11:30 AM

VOLUNTEER ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
1	David Pisha	Town Chester		1.5	0.575	\$20.00
2	Graham Kennedy	"		"	-	-
3	Matt Wilson	"		"	-	-
4	Jeff Holden	"		"	-	-
5					-	-
6					-	-
7					-	-
8					-	-
9					-	-
10					-	-
11					-	-
12					-	-
13					-	-
14					-	-
15					-	-
16					-	-
17					-	-
18					-	-
19			0		-	-
20					-	-
21					-	-
22					-	-
23					-	-
24					-	-
Sub Total			0.00	0.00	\$0.00	\$0.00

FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM						
No.	NAME	AFFILIATION				
1	ALLISON HOPKINS	SNCRPC			0	\$0.00
2					-	-
3					-	-
4					-	-
5					-	-
6					-	-
7					-	-
8					-	-
9					-	-
10					-	-
Sub Total			0.00	0.00	\$0.00	\$0.00



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

**PROGRAM:** Chester All Hazard Mitigation Plan  
**DATE OF MEETING:** March 18th, 2014  
**MEETING LOCATION:** Chester Town Hall  
**TOPIC:** Hazard Analysis  
**MEETING TIME:** 9:00am

VOLUNTEER ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
1	DAVID PISHA	TOWN OF CHESTER			0.565	\$20.00
2	GRAHAM KENNEDY	TOWN OF CHESTER			-	-
3	JERRY C HOLDEN	TOWN OF CHESTER			-	-
4	MATTHEW WILSON	TOWN OF CHESTER			-	-
5	Rick Cloud	" "			-	-
6					-	-
7					-	-
8					-	-
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 ROUND TRIP	MEETING HOURS	TOTAL MILEAGE (08/01/08-)	TOTAL TIME
1	John Broke-Campbell	SNRPP			0.565	\$20.00
2						
3						
4						
5						
6						
7						
8						
9						
10						
Sub Total			0.00	0.00	\$0.00	\$0.00

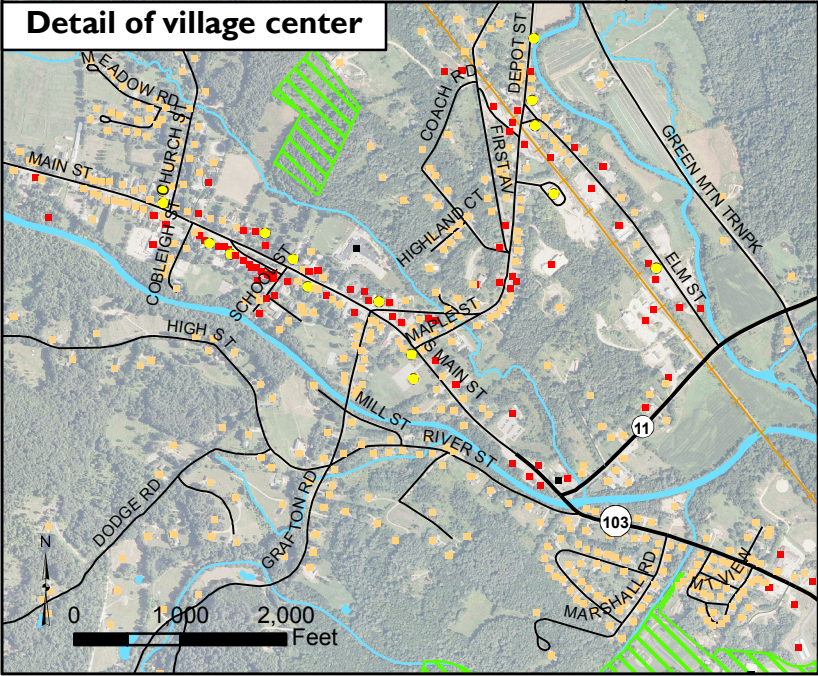
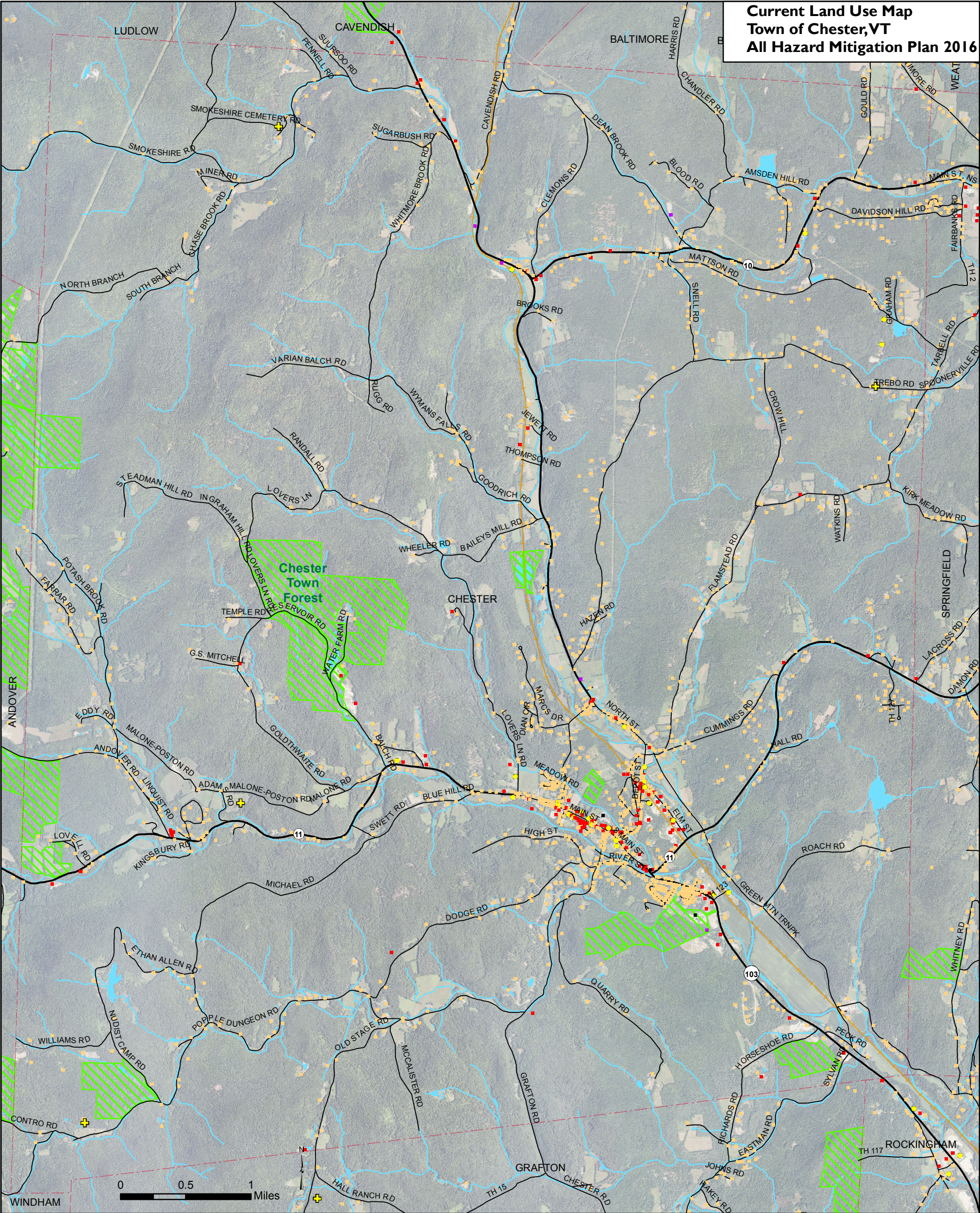
TOTAL MATCH #REF!

TOTAL Non-Volunteer Match #REF!

TOTAL VOLUNTEER MATCH #REF!



Current Land Use Map  
Town of Chester, VT  
All Hazard Mitigation Plan 2016



- Government and major destination
- Commercial, Farms and Lodging
- Educational
- Industrial and Manufacturing
- Residential
- Cemetery
- Conserved Lands
- Interstate Highway
- US Highway
- State Highway
- Town Highway
- Other Roadway (eg Private)
- Railroad
- Rivers and Streams
- Lakes and Ponds
- Town Boundary

Data Sources: Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012), Buildings (Vermont E-911, November 2014), Cemeteries (Vermont E-911, November 2014; and VTrans 2001), Conserved Lands (Vermont Land Trust 2013). Aerials (National Agricultural Imagery Program 2009).

VT State Plane Meters, NAD 83

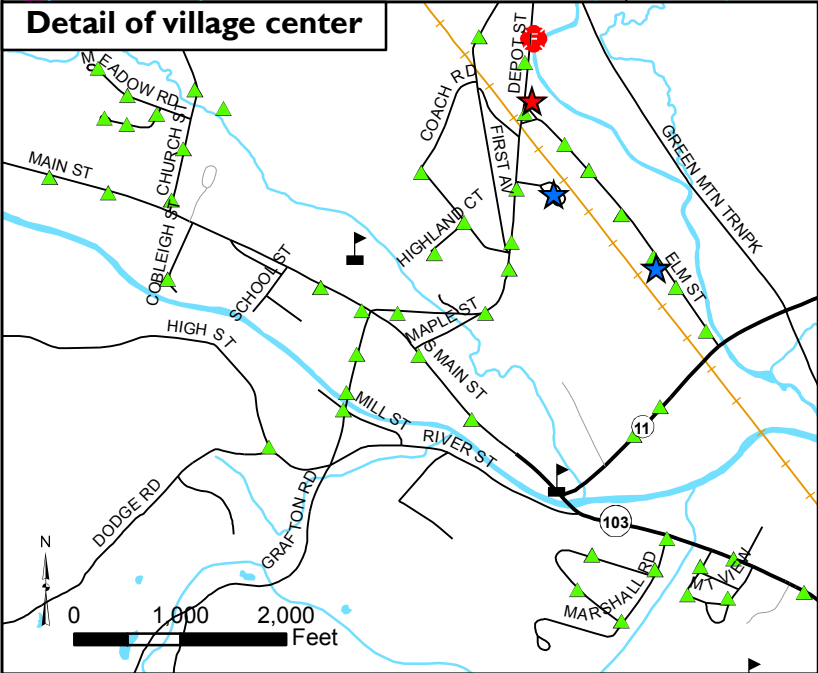
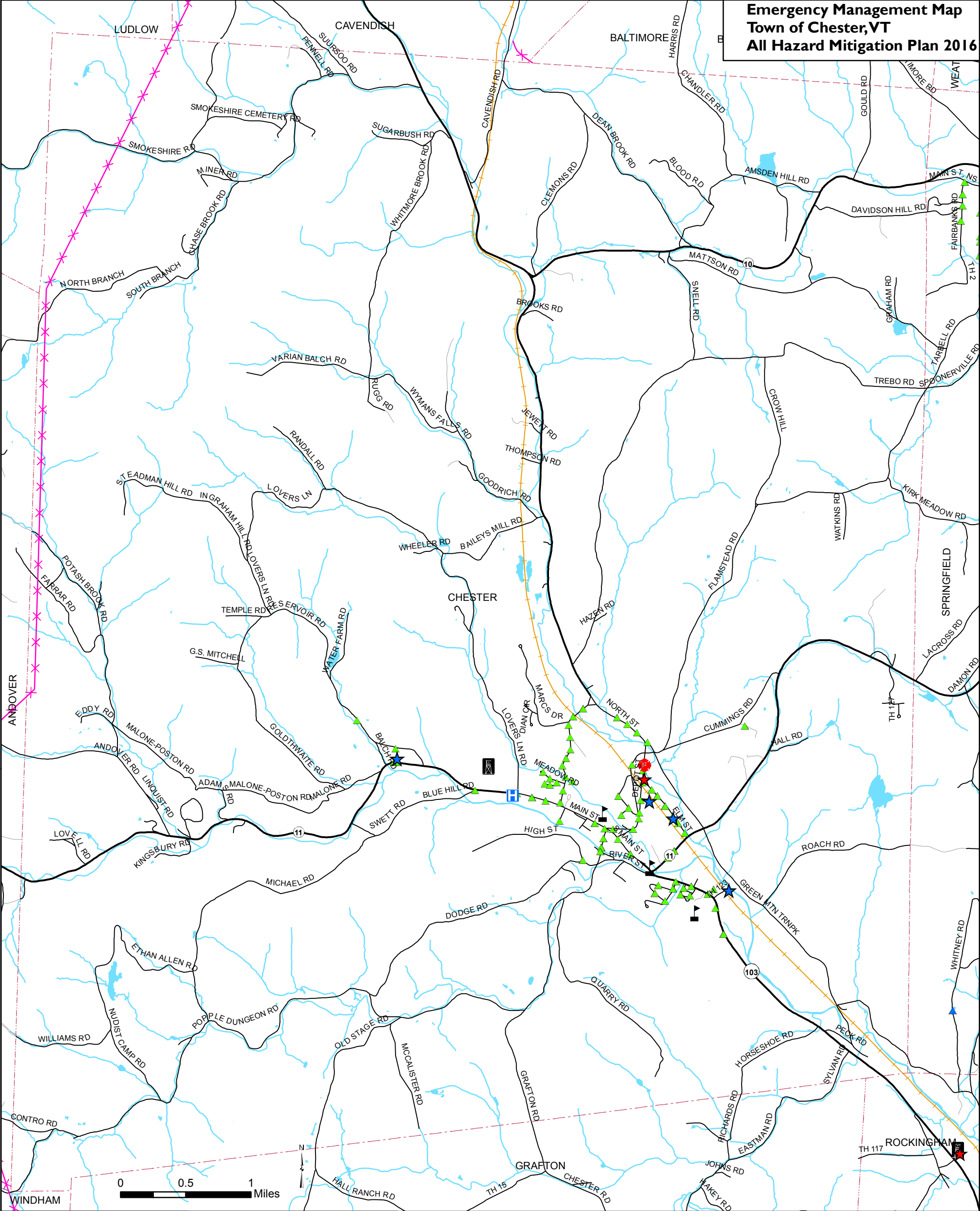
Map for planning purposes only.  
Not for regulatory interpretation.

Map drawn Jan 14, 2015  
Adapted April 20, 2016





Emergency Management Map  
Town of Chester, VT  
All Hazard Mitigation Plan 2016



- |                       |                               |                              |
|-----------------------|-------------------------------|------------------------------|
| ▲ Dry Hydrant         | ★ Police                      | 🛣 Interstate Highway         |
| ▲ Municipal Hydrant   | ★ Ambulance/ Rescue           | 🛣 US Highway                 |
| ▲ Pressurized Hydrant | 🚒 Fire Station                | 🛣 State Highway              |
| ▲ Other Hydrant       | 🏥 Hospital/ Health Center     | 🛣 Town Highway               |
|                       | 🎓 School                      | 🛣 Other Roadway (eg Private) |
|                       | ★ Town Hall and other govt    | 🚂 Railroad                   |
|                       | 🏠 Telecommunications Facility | 🌊 Rivers and Streams         |
|                       | ✂ Transmission Line           | 🟦 Lakes and Ponds            |
|                       |                               | 🔲 Town Boundary              |

Data Sources: Telecommunications Tower (Natural Resources Board 2007 and refined by SWCRPC 2013), Electric Transmission Line Corridor (VT Center for Geographic Information 2003 and refined by SWCRPC 2013), Hydrants (Vermont E-911, April 2013), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012), Buildings (Vermont E-911, November 2014),

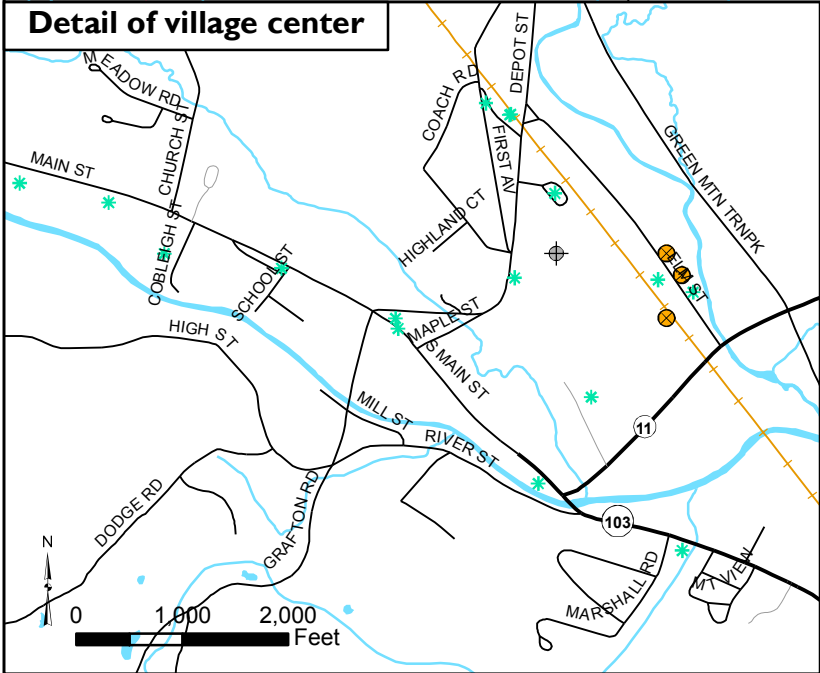
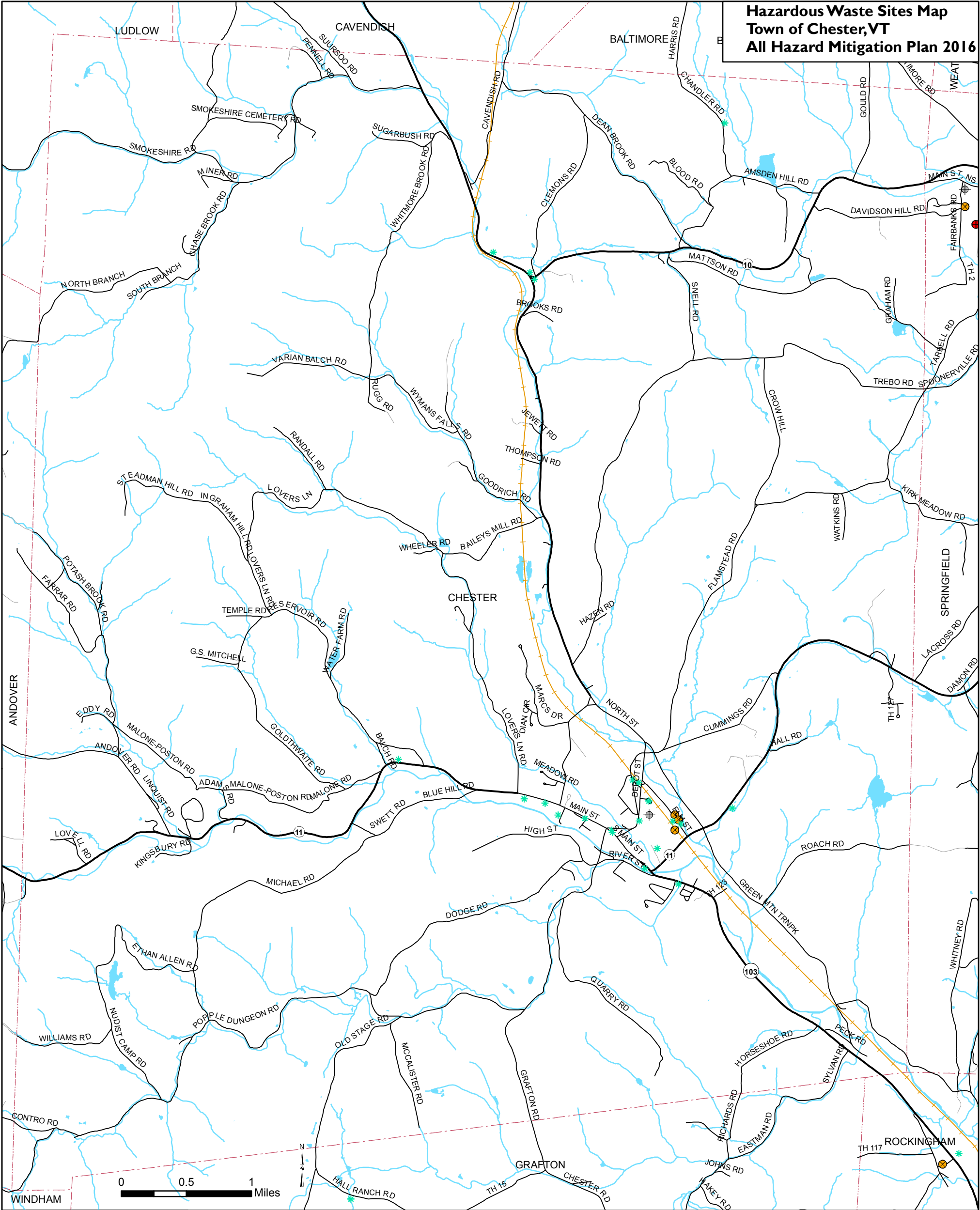
VT State Plane Meters, NAD 83

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Adapted April 20, 2016



**Hazardous Waste Sites Map**  
**Town of Chester, VT**  
**All Hazard Mitigation Plan 2016**



- \* Hazardous Waste Site
- Hazardous Waste Facility Status**
  - Fully Regulated Generator
  - Conditionally Exempt Generator
  - Out of Business
  - ⊕ Unknown Status
- Interstate Highway
- US Highway
- State Highway
- Town Highway
- Other Roadway (eg Private)
- Railroad
- Rivers and Streams
- Lakes and Ponds
- Town Boundary

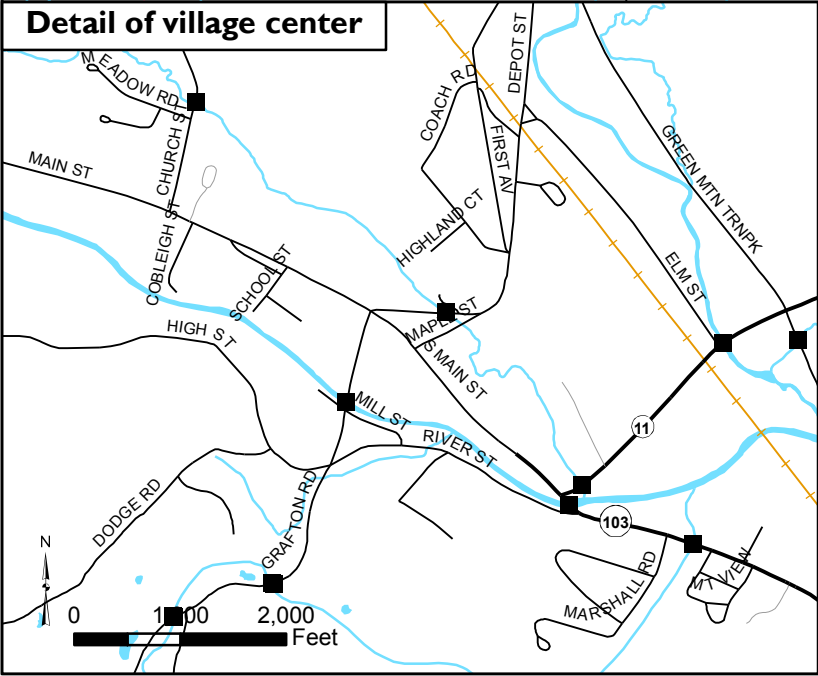
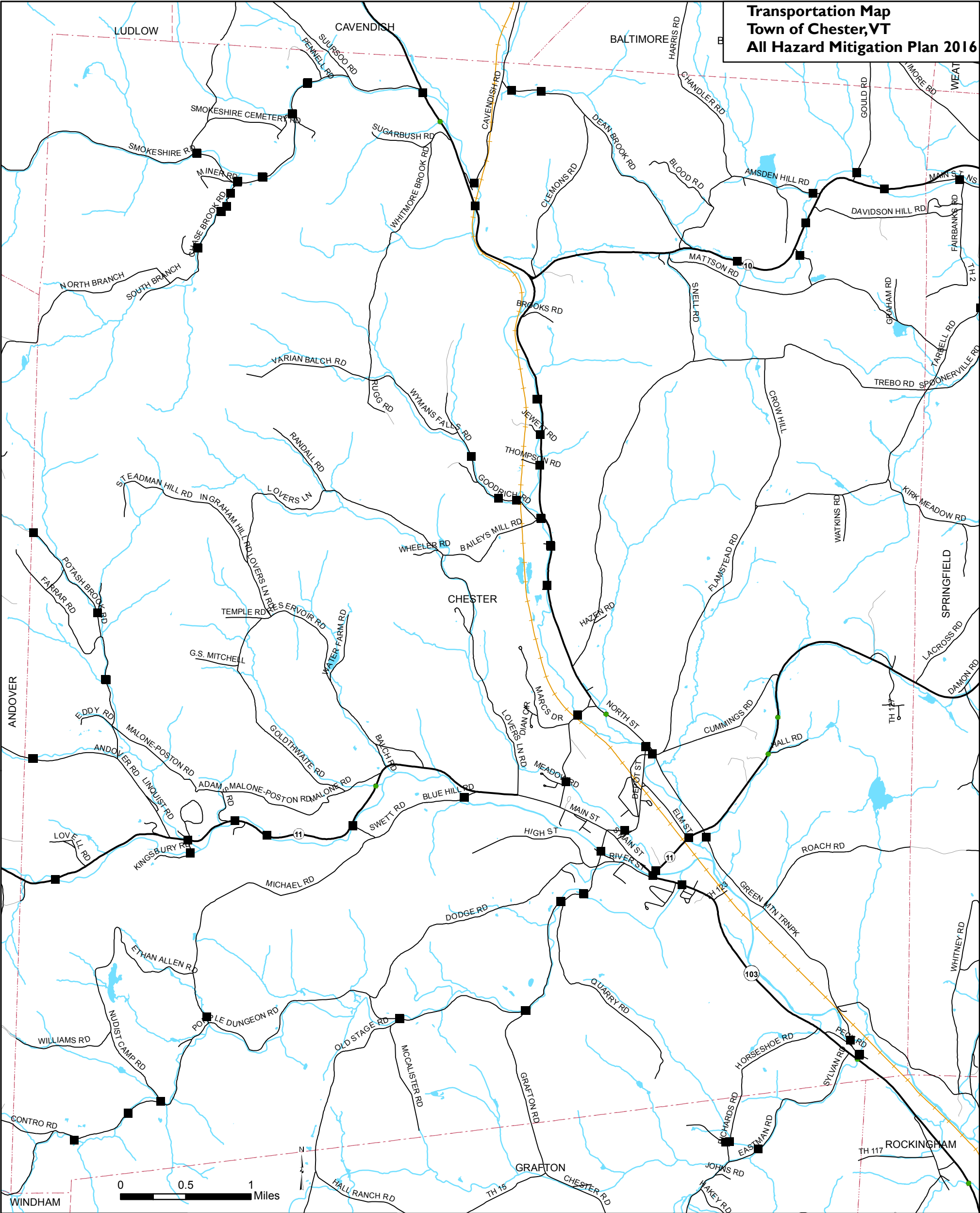
Data Sources: Hazardous Waste Facilities (VT Dept of Environmental Conservation 2006), Hazardous Waste Sites (VT Dept of Environmental Conservation 2012), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012).

VT State Plane Meters, NAD 83  
Map for planning purposes only.  
Not for regulatory interpretation.  
Map drawn Jan 14, 2015  
Adapted April 20, 2016





Transportation Map  
Town of Chester, VT  
All Hazard Mitigation Plan 2016



- Bridge or Very Large Culvert
- Culvert
- Airport
- Interstate Highway
- US Highway
- State Highway
- Town Highway
- Other Roadway (eg Private)
- Railroad
- Rivers and Streams
- Lakes and Ponds
- 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 (SWCRPC and Town 2012), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012)

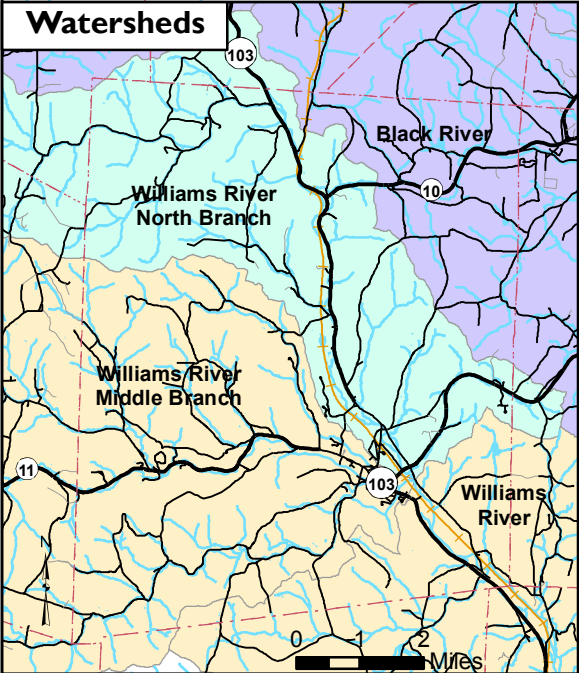
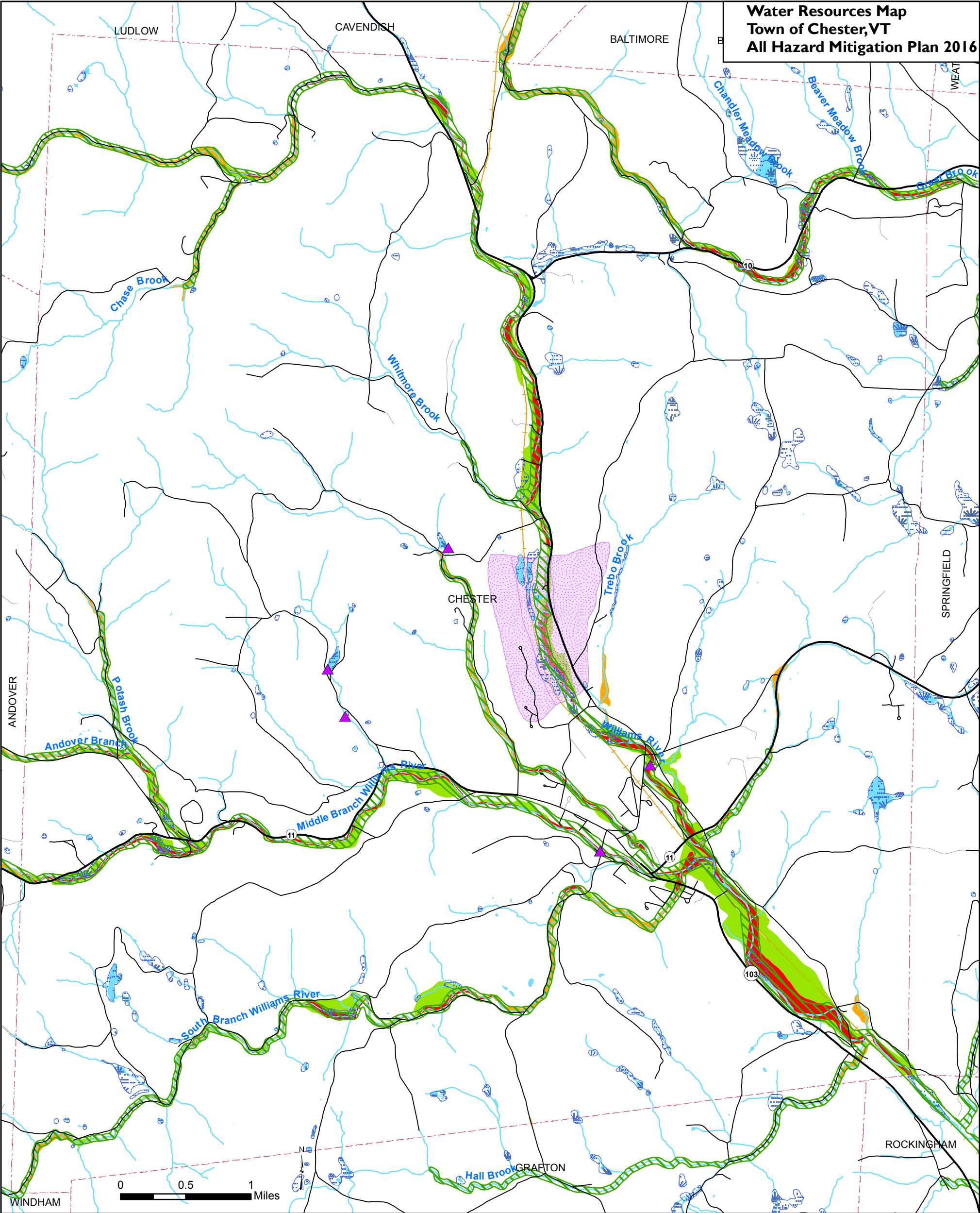
VT State Plane Meters, NAD 83

Map for planning purposes only.  
Not for regulatory interpretation.

Map drawn Jan 14, 2015  
Adapted April 20, 2016



Water Resources Map  
Town of Chester, VT  
All Hazard Mitigation Plan 2016



- |                                |                      |                            |
|--------------------------------|----------------------|----------------------------|
| Dam                            | Wetland              | Interstate Highway         |
| River Corridor Protection Area | Floodway (Zone AE)   | US Highway                 |
| Surface Water Protection Area  | Floodplain (Zone A)  | State Highway              |
| Groundwater Protection Area    | Floodplain (Zone AE) | Town Highway               |
|                                |                      | Other Roadway (eg Private) |
|                                |                      | Railroad                   |
|                                |                      | Rivers and Streams         |
|                                |                      | Lakes and Ponds            |
|                                |                      | Town Boundary              |
- Major Watersheds**
- Middle Branch Williams River
  - North Branch Williams River
  - Black River

There are no surface water protection areas within the Town of Chester.

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), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012)

VT State Plane Meters, NAD 83

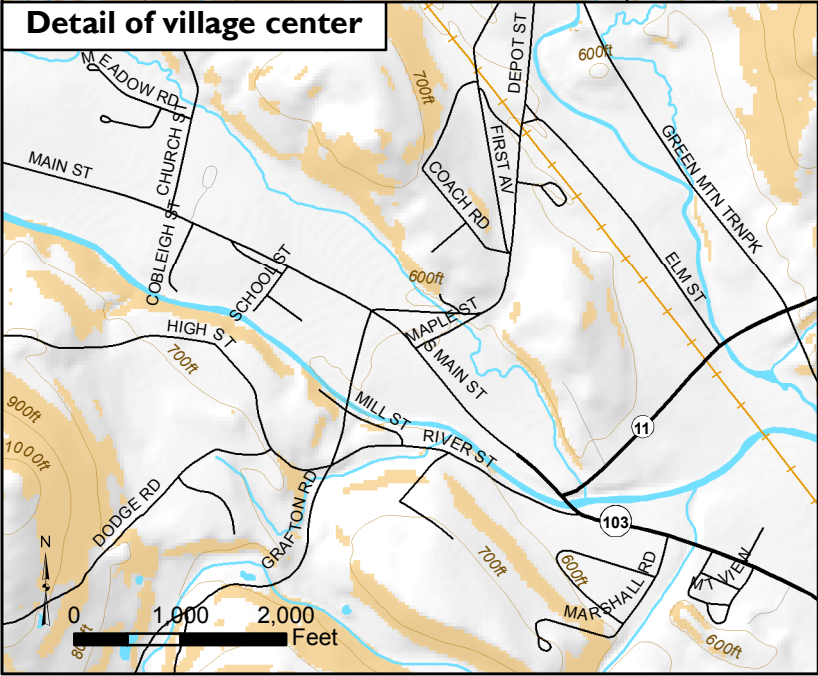
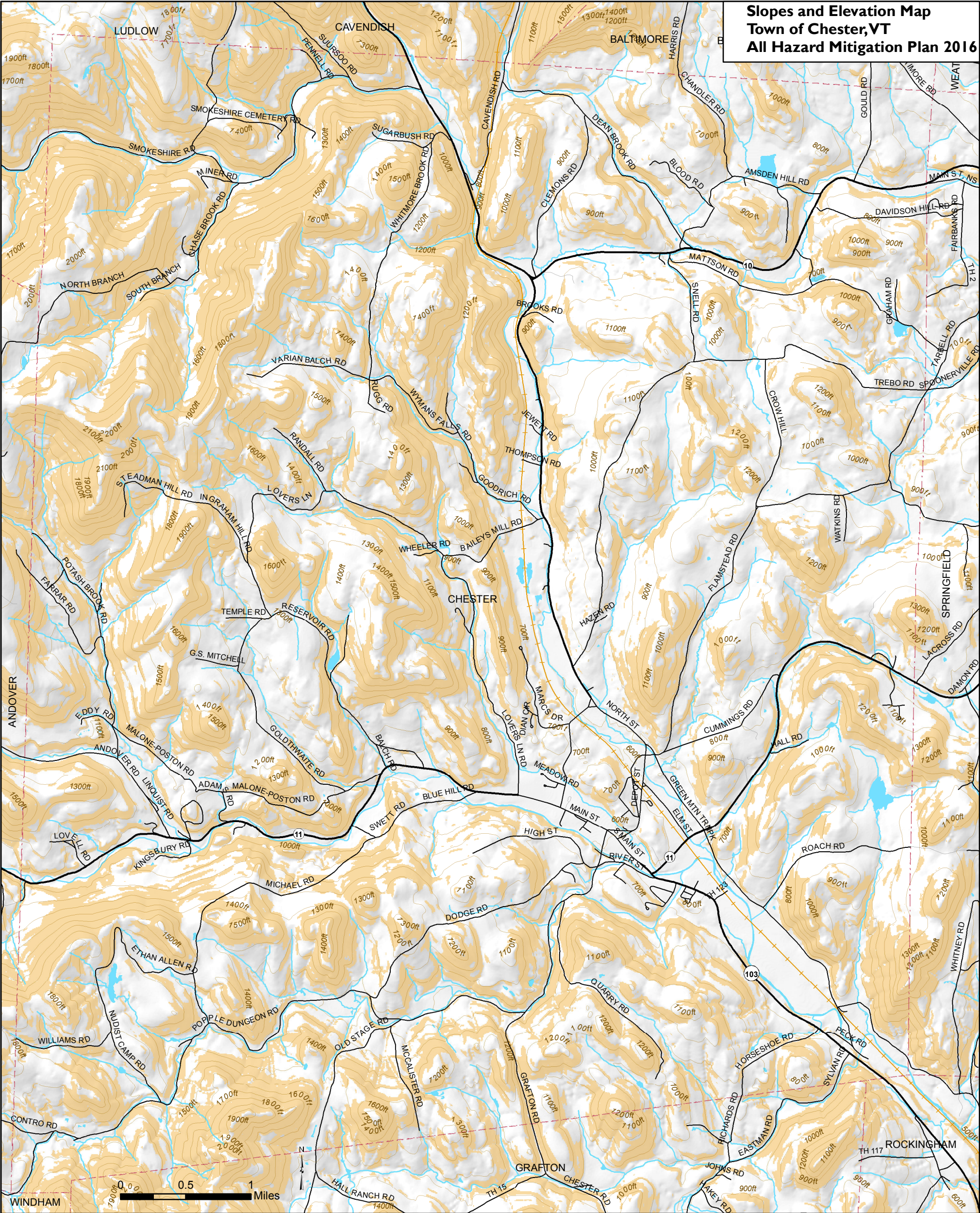
Map for planning purposes only.  
Not for regulatory interpretation.

Map drawn Jan 14, 2015  
Adapted April 20, 2016





Slopes and Elevation Map  
Town of Chester, VT  
All Hazard Mitigation Plan 2016



- 100ft Contour
- Steep slopes
- Interstate Highway
- US Highway
- State Highway
- Town Highway
- Other Roadway (eg Private)
- Railroad
- Rivers and Streams
- Lakes and Ponds
- Town Boundary

Data Sources: Contours, steep slopes and hillshade (derived from 10m Digital Elevation Model, US Geological Survey/VT Center for Geographic Information 2012), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012).

VT State Plane Meters, NAD 83

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