Town of Stamford
Hazard Mitigation Plan

May 18, 2015
Adopted October 1, 2015

Town of Stamford
Town Hall
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TOWN OF STAMFORD, VERMONT

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Resolution of Adoption

October 15, 2015

A Resolution adopting the Town of Stamford Hazard Mitigation Plan

WHEREAS, the Town of Stamford has worked with the Bennington County Regional Planning Commission to identify hazards, analyze past and potential future losses due to natural disasters, and identify strategies for mitigating future losses; and

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

WHEREAS, a duly-noticed public meeting was held by the Town of Stamford Selectboard on October 1, 2015 to formally adopt the Town of Stamford Hazard Mitigation Plan;

NOW, THEREFORE BE IT RESOLVED that the Town of Stamford hereby adopts the Town of Stamford Hazard Mitigation Plan.

Christopher Dargie, Selectboard Chair

Sheila G. Lawrence

Sheila G. Lawrence, Selectboard

Nancy L Bushika

Nancy L. Bushika, Selectboard

David Bugbee, Selectboard

David J Potvin

Daniel Potvin, Selectboard

Doris Shepard

Attest, Town of Stamford Town Clerk

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I. Introduction and Purpose

A. Purpose

Hazard mitigation is intended to reduce potential losses from future disasters. Hazard mitigation plans identify potential natural hazards that could affect a community and the projects and actions that a jurisdiction can undertake to reduce risks and damage from natural hazards such as flooding, landslides, wildland fire, and similar events (FEMA 2011).

This plan is intended to identify, describe and prioritize potential natural hazards that could affect the Town of Stamford and measures to reduce or avoid those effects. The Federal Emergency Management Agency, within the U.S. Department of Homeland Security and the Department of Vermont Emergency Management both advocate the implementation of hazard mitigation measures to save lives and property and reduce the financial and human costs of disasters.

The format of this plan is as follows. Section II provides a profile of the town, including a discussion of the environmental setting, demographics and settlement patterns. Section III describes the planning process along with lists of members of the planning committee and dates of meetings and public and agency review. Section IV analyzes the following natural hazards:

- Floods and Flash Floods
- Winter Storms
- High Wind Events
- Hail
- Temperature Extremes
- Drought
- Wildfire
- Landslides and Debris Flow
- Earthquake
- Hazardous Materials Spill
- Infectious Disease Outbreak
- Invasive Species

B. Mitigation Goals

The Town identified the following mitigation goals:

1. Significantly reduce injury and loss of life resulting from natural disasters.

2. Significantly reduce damage to public infrastructure and other critical facilities, minimize disruption to the road network and maintain both normal and emergency access.
3. Establish and manage a program to proactively implement mitigation projects for roads, bridges, culverts and other municipal facilities to ensure that community infrastructure is not significantly damaged by natural hazard events.
4. Design and implement mitigation measures so as to minimize impacts to rivers, water bodies and other natural features, historic structures, and neighborhood character.
5. Significantly reduce the economic impacts incurred by municipal, residential, industrial, agricultural and commercial establishments due to disasters.
6. Encourage hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan and the Town Local Emergency Operation Plan.
7. Ensure that members of the general public continue to be part of the hazard mitigation planning process.

Based on the above goals and the assessment of hazards (Section IV), Stamford identified and prioritized mitigation actions which are specifically described in Section V.D.

II. Town Profile

Stamford is located in Bennington County in southern Vermont along the Massachusetts border. The town is bordered by Pownal, Vermont to the west, Woodford, Vermont to the north, Readsboro, VT to the east and Clarksburg and Florida, Massachusetts to the south. The southeast corner touches the northwest corner of Monroe, Massachusetts. The main road through Stamford is Route 8/100, which follows the Hoosic River valley as the river flows southwest (Map 1). Most of the town is forested, with the Hoosac Range to the east and the Green Mountains to the north and west (Map 2).

The total population of Stamford in 2010 was 824 (U.S. Department of Commerce 2014). Table 1 provides a breakdown of structures by type in the town. There is a local school in the town, and the complex includes the school, the town hall and the town library. Nearly ½ of the town is in public ownership, either in state lands or part of Green Mountain National Forest (Map 3).

Table 1. Structures by type in Stamford, VT. Source: Vermont Center for Geographic Information

Type	Number
Single family dwelling	377
Mobile home	11
Multi-family dwelling	12

Table 1. Structures by type in Stamford, VT. Source: Vermont Center for Geographic Information	
Type	Number
Other residential	2
House of Worship	3
Commercial	12
Commercial farm	2
Government/Education	3
Camp	35
Other	15
Total	472

There are two public water sources, one at the Town Hall and the second at the Stamford Valley Golf Course. Otherwise, property owners are served by on-site wells and septic systems. Electricity is provided by Green Mountain Power (Vermont Center for Geographic Information 2014) and the town is served by fiber optic cables as well as wireless services (Stamford Town Plan 2011). Stamford has over 23 miles of public roads, with VT Route 8/100 as the only state highway. There are also private roads in some sections. Over half of the town budget goes to road maintenance. Some road sections are steep with and follow streams requiring frequent maintenance (Stamford Town Plan 2011). Map 5 shows the large number of culverts requiring regular maintenance to assure passage on these roads. According to the Vermont Agency of Transportation, the following represents the number of miles of road by type:

Table 2. Roads in Stamford by type. Source: Vermont Agency of Transportation 2013	
Road Type	Miles
State Highway	**5.752**
Class 2	3.50
Class 3	14.23
Class 4	6.91
Subtotal 2, 3, 4 (town roads)	**24.64**
Legal Trail	4.02

Map 4 shows critical facilities which include:

- Stamford Town Hall and Stamford Elementary School: this complex includes the town hall and school and the library. It also serves as the town's emergency shelter.
- Stamford Highway Garage: this also serves as the town's transfer station for solid waste.
- Stamford Fire House: provides fire protection for the community as well as mutual aid for nearby towns.

- Numerous bridges and culverts
- Stamford Valley Golf Course: this includes the second public water supply in addition to the town hall and school.

In addition, there are various historic buildings in the town.

III. Planning Process

The Bennington County Regional Commission began discussions with the Town on developing a hazard mitigation plan in 2013. The planning team first met on March 5, 2014. This is Stamford's first hazard mitigation plan as it was not part of the county plan developed in 2005 to 2007. The planning team consisted of members listed in Table 3 below

Table 3. Planning team members	
Name	Affiliation
Nancy Bushika	Select Board
Bill Levine	Emergency Management Director
Dave Tatro	Road Foreman
Lori Shepherd	Town Clerk

In addition, the Select Board, which includes Chris Dargie, Chair along with Sheila Lawrence and Dave Bugbee and Thomas Houghtaling devoted several of their meetings to developing this plan.

Table 4 lists the meeting dates and primary topics addressed. The initial planning meeting allowed for the planning team to receive an introduction to hazard mitigation planning and to review the planning process with BCRC staff. Following that meeting, BCRC staff collected information from sources listed in Sections IV and VI on previous events that had affected Bennington County and Stamford.

During the next meeting, the planning team reviewed the event summary and developed actions for implementation. Subsequent meetings of the Stamford Select Board were used to review and discuss these, make changes, and solicit public comment.

Table 4. Dates of planning meetings and public and agency review		
Meeting	Date (s)	Purpose
Initial Planning Team Meeting	March 5, 2014	Review the process of developing a hazard mitigation plan Identify key hazards Initial identification of actions

Table 4. Dates of planning meetings and public and agency review		
Meeting	Date (s)	Purpose
Select Board Meeting	July 17, 2014	Review of draft prepared by BCRC Further development of actions
Select Board Meeting	August 7, 2014	Review of the plan, the planning process and plan contents Solicitation of public comments
Select Board Meeting	September 4, 2014	Review of the plan, the planning process and plan contents Solicitation of public comments and decision to submit to FEMA

Except for the initial planning meeting, the above meetings were warned and comments were solicited from members of the public, business owners and other stakeholders. The draft plan was put online on the Bennington County Regional Commission and Town of Stamford websites, and notices sent out to members of the public informing them that they could review the plan at that website or in the Town Hall in Stamford, VT.

The Town Emergency Management Director and Road Commissioner were members of the planning team, and Select Board meetings served as a forum for public comment and involvement. The plan was also sent to the neighboring towns of Pownal, Woodford, and Readsboro in Bennington County as well as with Local Emergency Planning Committee #7, which includes Stamford, with Clarksburg, Florida and Monroe in Massachusetts and with the Berkshire County Regional Planning Commission in Massachusetts for comment. The plan was also reviewed by the Vermont Department of Emergency Management and Homeland Security. No comments were received from members of the public or from other agencies and organizations.

The plan was submitted for review by the Federal Emergency Management Agency on September 8, 2014 and revised May 18, 2015. Following conditional approval by FEMA, the Stamford Select Board adopted the plan on October 1, 2015.

IV. Hazard Analysis

A. Hazard Assessment

This section addresses each of the potential natural hazards based on data from the following sources:

a. Local knowledge
b. The National Climate Center storm events database (most recent data from their ftp site)
c. FEMA lists and descriptions of past disaster declarations
d. The Vermont Department of Forests, Parks and Recreation data on wildfires
e. HAZUS runs on potential earthquake damage
f. The Pownal and North Adams cooperative weather stations have data and temperature and precipitation normals from 1981 to 2010
g. Palmer Hydrologic Drought Index calculated from 1985 to 2014 from NOAA
h. Hazardous materials spills from VT ANR
i. Infectious disease outbreaks listed from the Vermont Department of Health (note these fluctuate, so only recent data are used)
j. Observations of invasive species compared to the state and federal lists of noxious species
k. The Vermont Hazard Mitigation Plan
l. New England Weather, New England Climate (Zielinski and Keim 2003)Vermont Weather Book (Ludlum 1996)
m. FEMA 2010 Flood Insurance Study, Bennington County, Vermont and Incorporated areas, Federal Emergency Management Agency Study Number 5003CV000A
n. National Weather Service 2014. Advanced Hydrologic Prediction Service, stream gauge information for the Hoosic River near Williamstown. Available via: http://water.weather.gov/ahps2/hydrograph.php?wfo=aly&gage=wilm3
o. SHELDUS records which were not as complete as NCDC and, therefore, not used.
p. Vermont Agency of Natural Resources and Vermont Agency of Natural Resources on invasive species.

With respect to NCDC data, there have been numerous changes to that database in just the last few years. While NCDC data goes back to 1950, there was a dramatic change in 1996 in the way data were collected. The number of events recorded in years prior to 1996 is far less than from 1996 onward. Therefore, to use the best reliable data, we used only data from 1996 onwards. We have also looked at the other sources of historical weather data. The cooperative weather observers for Peru, Sunderland and Pownal have the most consistent long-term data, though some is available from the North Adams observer. The only stream gauge is in Bennington near the New York border. There are no stream gauges located on the North Branch of the Hoosic River. There is a gauge in Williamstown approximately eight miles downstream of the Stamford/Clarksburg border.

We have communicated with USGS which is working on models of areas impacted by different storm events using Lidar and stream gauge data, but they are not working in Vermont as yet as far as we know. We looked at the USGS high water marks for Irene, but they were located only along the Batten Kill in Arlington and portions of the Roaring Branch and Walloomsac in Bennington, so none were in Stamford. Therefore we relied on the updated special flood hazard maps for potential flooding extent.

1. Floods and Flash Floods

a. Description

Flooding is the most frequent and damaging natural hazard in Vermont. The National Weather Service (2010) defines a flood as "any high flow, overflow, or inundations by water which causes or threatens damage." A flash flood is …"a rapid and extreme flow of high water into a normally dry area, or a rapid water rise in a stream or creeks above a predetermined flood level." These are usually within six hours of some event, such as a thunderstorm, but may also occur during floods when rainfall intensity increases, thereby causing rapid rise in flow or following rapid snowmelt. The NWS uses the following impact categories:

- Minor Flooding - minimal or no property damage, but possibly some public threat.
- Moderate Flooding - some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations.
- Major Flooding - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.
- Record Flooding - flooding which equals or exceeds the highest stage or discharge observed at a given site during the period of record keeping.

Floods may reach these magnitude levels in one or more reaches, but not necessarily all. The Williamstown river gauge lists thirteen feet as the major flood stage. That was exceeded on the following dates (National Weather Service 2014)[1]:

December 31, 1948 – 14.85 feet
November 26, 1950 – 13.85 feet
August 28, 2011 – 13.75 feet
August 10, 1976 – 13.02 feet

Most development along streams in Stamford is along the North Branch of the Hoosic River and the tributaries to it: Basin Brook, Brown Brook, Roaring Brook, Sumner Brook and two

[1] That gauge does not indicate areas of potential flooding at different stages.

unnamed tributaries near the Massachusetts border. These streams can be very flashy, and while some flood losses are the result of inundation, more often flood losses are caused by fluvial erosion. This can range from gradual bank erosion to catastrophic changes in the location of the river channel (Vermont River Management Program 2010). Runoff from snowmelt in the spring, summer thunderstorms, and tropical storms and hurricanes can all result in flooding in Stamford. Ice jam flooding can occur on Vermont rivers when substantial ice forms followed by several days of warmth, snowmelt and any rainfall leading to ice breakup. As the ice breaks up on the rivers, chunks of ice form jams which cause localized flooding on main stem and tributary rivers. Ice jams are most prevalent during mid-winter thaws in January and February and in March and April as warmer spring weather arrives. Digital flood zone maps have been prepared and are currently under review (Map 5). Maps of fluvial erosion hazard zones (now called "river corridors") for Stamford are being prepared by the Vermont Agency of Natural Resources, and should be available in late 2014.There are two small dams in Stamford, one on Sucker Pond and the other on Stamford Pond (Map 5). Both have been characterized as low hazard potential.

Table 5. Total number of flood events by type and year for Bennington County. Source: NCDC 2014

Year	Flash Flood	Flood	Total
1996	3	6	9
1997			
1998	1	3	4
1999	2		2
2000	4	1	5
2001			
2002	1		1
2003		2	2
2004	1	5	6
2005		5	5
2006		1	1
2007	1	1	2
2008			
2009	2		2
2010			
2011	3	3	6
2012			
2013	4		4
2014			
Total	22	27	49

b. Previous Occurrences

Ludlum (1996) describes numerous storm events that have affected Vermont since settlement, but the local impacts of these are difficult to trace. The 1927 flood was the largest disaster in the history of the state. The state received over six inches of rain, with some areas receiving 8-9 inches. Following a rainy October, this storm occurred from November 2nd through the 4th causing extensive flooding. Two storms occurred in March of 1936. Heavy rains and snowmelt caused significant flooding. Two years later, the 1938 hurricane caused both flooding and extensive wind damage.

Table 5 shows a total of 47 flood events in Bennington County from 1996 to 2012, using NCDC data. These have been primarily minor and affected either specific streams, and have not been county wide for most events. Table 6 describes ten moderate and extreme events that have occurred since 1996, using the National Weather Service (2010) categories, which likely affected Stamford. These events were described in the National Climate Database records (2014). It should be noted that only the January 1996 event occurred in the winter, with all other events in the spring, summer or fall. Ice jam flooding does occur and one instance of damage is described below.

Table 6. Significant flood events affecting Bennington County. Source: NCDC 2014					
Dates	Type	Description	Area	Category	FEMA
19-20 Jan 1996	Flood	An intense area of low pressure located over the Mid-Atlantic region produced unseasonably warm temperatures, high dew points and strong winds. This resulted in rapid melting of one to three feet of snow. In addition to the rapid snowmelt one to three inches of rain fell as the system moved northeast along the coast. This resulted in numerous road washouts and the flooding of several homes across the county	Countywide	Moderate	DR-1101 1/19 to 2/2 1996
11-12 May 1996	Flood	A low pressure system tracked across New York State and New England, moved to the east coast and intensified creating a prolonged period of precipitation. Over two inches of rain fell over much of western New England resulting in flooding along the Walloomsac River in Bennington County.	Bennington	Moderate	
8-10 Jan 1998	Flood	Mild temperatures and rain combined to cause small stream flooding throughout Bennington County The Batten Kill rose over eight feet at the Arlington gage, and the Walloomsac River crested nearly two feet above flood stage at Bennington. The main impact was extensive flooding of fields and roadways. Route 7A north of Arlington was closed due to flooding.	Arlington; Bennington; Countywide	Moderate	
16-17 Sept 1999	Flood	The remnants of Hurricane Floyd brought high winds and heavy rainfall (3-6 inches) to southern Vermont. Many smaller tributaries reached or exceeded bankfull. Estimated wind gusts exceeded 60 mph, especially over hilltowns. Power outages occurred across southern Vermont. A Cooperative Weather Observer recorded 4.55” of rain in North Adams, MA.	Countywide	Moderate	DR-1307 9/16-21 1999
14-17 Jul 2000	Flash Flood	Thunderstorms caused torrential rainfall with flash flooding washing out sections of roadways in northeast Bennington County and southern Bennington County. Routes 7 and 67 were closed. A Cooperative Weather Observer recorded 2.19” of rain in North Adams, MA.	Northeast Bennington County; Southern Bennington County; Arlington; Bennington; Shaftsbury	Moderate	DR- 1336 7/14-18 2000
17 Dec 2000	Flood	Unseasonably warm and moist air brought a record breaking rainstorm to southern Vermont. Rainfall averaged 2-3 inches. The heavy rain, combined with snowmelt and frozen ground, lead to a significant runoff and flooding. A Cooperative Weather Observer recorded 2.88” of precipitation in North Adams from 16 to 16 December.	Peru; Dorset: West Rupert	Moderate	DR-1358 12/16-18 2000 (Severe Winter Storm)
21 July to 18 Aug 2003		Severe storms and flooding affected Vermont including Bennington County. Note: this event does not appear in the NCDC data. A Cooperative Weather Observer recorded sporadic and sometimes large amounts of precipitation during that period in North Adams, MA.		Moderate	DR-1488 7/21-8/18 2003
31 Mar to 3 Apr 2004	Flood	Three inches of rain and melting snow caused flooding along the Batten Kill and Walloomsac Rivers	Arlington, Bennington	Minor	
16-17 Apr 2007	Flood	An intense coastal storm spread heavy precipitation across southern Vermont, starting as a mixture of wet snow, sleet and rain which later changed to all rain. Liquid equivalent precipitation totals ranged from three to six inches leading to minor flooding across portions of southern. A Cooperative Weather Observer recorded 2.5” of rain in North Adams, MA.	Arlington	Minor	DR- 1698 4/15-21 2000
28-29 Aug 2011	Flood/Flash Flood	Tropical Storm Irene produced widespread flooding, and damaging winds across the region. Rainfall amounts averaged four to eight inches and fell within	Countywide	Extreme	DR-4022 8/27-2 2011

Table 6. Significant flood events affecting Bennington County. Source: NCDC 2014					
Dates	Type	Description	Area	Category	FEMA
		a twelve hour period. A Cooperative Weather Observer recorded 5.10 of rain in North Adams, MA. This resulted in widespread flash flooding and river flooding across southern Vermont. In Bennington County, widespread flash flooding and associated damage was reported countywide, with many roads closed due to flooding and downed trees and power lines. Route 9, the main route across southern Vermont, was closed. The city of Bennington was inaccessible for a period of time. Record flooding occurred on the Walloomsac River at Bennington. Strong winds also occurred across southern Vermont, with frequent wind gusts of 35 to 55 mph, along with locally stronger wind gusts exceeding 60 mph. The combination of strong winds, and extremely saturated soil led to widespread long duration power outages.			
7 Sept 2011	Flood	Large amounts of moisture from the remnants of Tropical Storm Lee interacted with a frontal system producing heavy rainfall with total rainfall amounts ranging from three to seven. This heavy rainfall, combined with saturated soil from the excessive rains which during Irene led to widespread minor to moderate flooding across southern Vermont. A Cooperative Weather Observer in North Adams recorded 4.23" of rain between September 5th and 9th.	North Bennington; Countywide	Moderate	
29 May 2013	Flash Flood	Thunderstorms with heavy rainfall reached southern Vermont in the evening. Soils in the area were saturated, so the storms created flash floods with some road closures, primarily in the Town of Bennington.	Bennington	Minor	
2 June 2013	Flash Flood	Thunderstorms, hail and winds brought heavy rainfall to the town of Bennington. Eight to ten inches of water was reported in downtown Bennington, primarily as a result of stormwater system blockages.	Bennington	Minor	

Hurricanes and tropical storms that form in tropical waters have historically affected New England, but are relatively infrequent. Besides the 1938 storm, Tropical Storm Belle brought significant rains to Vermont in 1976 and Hurricane Gloria brought rain and wind damage in 1985. Stamford has been subjected to two major tropical storms in the past twenty years. The primary damage was from flooding with secondary damage from wind. There have been no NFIP-designated repetitive losses within the jurisdiction.

There are two dams within the Town. One is on Sucker Pond Brook and is owned by the Town of Bennington. The second is on Reservoir Brook and is owned by the U.S. Forest Service. Neither poses any hazard to populated areas or infrastructure within the town.

c. Extent and Location

In addition to the above events, the Peru, Pownal and Sunderland Cooperative Observer recorded precipitation. Table 7 shows those months by year where that value exceeded the 90th percentile. Several events of that magnitude have occurred where damage was not recorded in NCDC records or local knowledge, but this does provide additional information on potential flooding extent.

Table 7. Months where rainfall exceeded 90th percentile of monthly precipitation at the **Peru, Pownal and Sunderland** Cooperative Observer Stations from 1990 to 2013. Years in ***bold italics*** corresponded with events in Table 6.

Sunderland		Pownal	Peru
Month	Year	Year	Year
January	1990, ***1998***, 1999	***1996***, ***1998***, 1999	1990, 1999
February	2002, 2008, 2011	1990, 2008	2000, 2002, 2008
March	2001, 2007, 2008	1999, 2001, 2007	2001, 2008
April	1993, 1996, 2002, ***2007***, 2011	1990, 1993, 1996	1996, ***2007***
May	1990, 2000, 2006	1990, ***2013***	1990, 2012
June	1998, 2002, 2006	1998, 2000, 2002, ***2013***	1998, 2006, 2011, ***2013***
July	1996, 2004, 2008	2004, 2010	1996, ***2000***, 2013
August	1990, ***2003***, ***2011***	1990, 1991, ***2003***, 2011	1990, 2003, ***2011***
September	***1999***, 2003, ***2011***	***1999***, 2004, 2011	***1999***, 2003, ***2011***
October	2005, 2007, 2010	1995, 2003, 2010	1995, 2005, 2006, 2010
November	2002, 2004, 2005	2005	2002
December	1996, 2003, 2008	1990, 2003, 2011	1996

Damage from past floods has been minimal. The Hoosic is parallel to Vermont 8, and most development is along or near that road and County, Klondike and Lesure Roads and a few other small roads to the west and near the Massachusetts border. Map 5 shows special flood hazard areas in Stamford.

d. Probability, Impact, and Vulnerability

Based on data from 1996 to 2012, nine moderate or major flood events have affected Bennington County, resulting in an approximately 50% chance of such an event occurring in a given year. However, these have not all directly affected Stamford, so that probability should range from 10 to 50%. Based on analysis of GIS data from the Vermont Center for Geographic Information, Stamford has a total 15 single family homes, one government building, one accessory building and a telephone equipment box within special flood hazard zones. Therefore, the potential proportion damaged within the town from severe flooding would range from 1-10% with injuries of 1-10%. Most services would be recovered in less than seven days, though help for specific property owners may take significantly longer.

2. Winter Storms

a. Description

Winter storms are frequent in Vermont. Winter storms may consist of heavy snow, mixed precipitation, or ice storms and all may be accompanied by strong winds. Potential damages can include power outages, traffic accidents, and isolation of some areas. For example, the October 4, 1987 storm stranded travelers in the area and knocked out power for several days. The "Blizzard of 93", one of the worst storms this century virtually shut down Vermont on the weekend of March 13-14 forcing the closure of roads and airports. This was one of the most powerful snowstorms on record. Snowfall amounts ranged from 10 to 28 inches across the state. In rare cases, the weight of snow may collapse roofs and cause other structural damage. Wind can also accompany snowstorms increasing the effect of the snow damages. In addition to snow, ice storms occur when the lower levels of the atmosphere and/or ground are at or below freezing, and rain is falling through warmer air aloft. The precipitation freezes upon contact with the ground, objects on the ground, trees and power lines.

Table 8. Total number of winter storm events by type and year for Bennington County. Source: NCDC 2014

Year	Blizzard	Heavy Snow	Ice Storm	Winter Storm	Winter Weather	Totals
1996		5		2		7
1997		1		7	2	10
1998				2	1	3
1999				4		4
2000		1		6		7
2001				6		6
2002				5		5
2003				5		5
2004				2		2
2005	1	3		2		6
2006						
2007		3	1	6	4	14
2008		4	1	1	11	17
2009		3		1	10	14
2010		3		1	2	6
2011				5	5	10
2012				4	2	6
2013		2		1	4	7
2014		2		4		6
Totals	1	27	2	64	41	135

b. Previous Occurrences

Table 8 below summarizes the 119 winter storm events that have occurred in Bennington County 1996 and 2012. As can be seen, a high numbers of events occurred in 1997, 2007, 2008, 2009 and 2011. Using NCDC data, we categorized the extent of each storm with storms ranked as “High” if they produced more than twelve inches of snow or were categorized by the NCDC as producing heavy or record snows or blizzards or significant icing. The Blizzard of 1993 was categorized as “Extreme.” Table 9 describes these events.

Table 9. Significant winter storm events in Bennington County and Stamford. Source: NCDC 2014.

Dates	Type	Description	Category	Area
2-3 Jan 1996	Heavy Snow	Heavy snow fell across southern Vermont with the average snowfall ranging from 10 to 12 inches.	High	Southern Vermont
12-13 Jan 1996	Heavy Snow	Heavy snow fell across southern Vermont with snowfall totals ranging from 6 to 10 inches with a few locations reporting up to one foot. A Cooperative Weather Observer recorded 7.0" in Pownal.	High	Southern Vermont
26 Nov 1996	Winter Storm	Snow and freezing rain downed trees and power lines, with 10,000 customers without power across southern Vermont.	High	Southern Vermont
7-8 December 1996	Winter Storm	A major storm dumped heavy, wet snow across Bennington and Windham Counties. Approximately 20,000 customers lost power. Cooperative Weather Observers reported 14.5 inches in Pownal and 12.8 inches in Sunderland during the period.	High	Southern Vermont
31 March 1997 to 1 April 1997	Winter Storm	A late season storm that changed from rain to snow brought 12 inches in Shaftsbury, 12 inches in Peru and 23 inches in Bennington. Power outages were widespread, and Route 9 between Bennington and Brattleboro was closed.	High	Southern Vermont Bennington, Shaftsbury, Peru
29-30 December 1997	Winter Storm	Heavy snow and gusty winds downed caused power outages across southern Vermont. Route 7 in Bennington County was closed and there was damage to a mobile home park and cinema in Bennington.	High	Southern Vermont Bennington, Peru
2-3 January 1999	Winter Storm	Sleet and freezing rain resulted in significant ice accumulations across the county.	Moderate	Southern Vermont
14-15 January 1999	Winter Storm	Snow, followed by sleet and freezing rain , along with very cold conditions resulted in heavy accumulations	High	Bennington County, Dorset
18-19 February 2000	Winter Storm	Eight to fourteen inches of snow fell in Bennington and Windham Counties. 14.3 inches were recorded in Peru	High	Southern Vermont, Peru
30-31 Dec 2000	Winter Storm	6-12 inches of snow fell, with 13 inches recorded in Pownal and 8 Inches in Bennington.	Moderate	Southern Vermont
5 February 2001	Winter Storm	Heavy snow fell resulting in 12 inches in Bennington, 14 Inches in Pownal Center and 9.6 inches in Sunderland	Moderate	Southern Vermont
5-6 Mar 2001	Winter Storm	This was considered the largest storm since the Blizzard of 93 with two feet of snow in some areas. Cooperative Weather Observers measured 20.0 inches in Peru, 25.0 inches in Pownal and 18.1 inches in Sunderland.	High	Southern Vermont, Pownal, Peru
30-31 March 2001	Winter Storm	Heavy wet snow resulted in 9.8 inches in Sunderland and 15.0 inches in Peru while Windham County had similar amounts	High	Southern Vermont, Sunderland, Peru
6-7 January 2002	Winter Storm	A snowstorm produced over a foot of snow across southern Vermont with 17 inches recorded in Peru, 15 inches in Pownal and 14 inches in Sunderland by Cooperative Weather Observers.	High	Southern Vermont, Pownal
17 November 2002	Winter Storm	A storm started with 2-4 inches of storm but changed to freezing rain and gusty winds. There were power outages from Arlington into New York	High	Southern Vermont, Arlington
25-26 December 2002	Winter Storm	Snow fell at a rate of 1-3 inches/hour for a time with 16..2 inches in Sunderland, 10.5 inches in Pownal and 16.5 inches in Windham County	High	Southern Vermont
6-8 Dec 2003	Winter Storm	The first major storm of the season produced 10-20 inches across Southern Vermont. Cooperative weather observers measured 21.5" in Pownal and 21.3 inches in Sunderland.	High	Southern Vermont, Pownal
28 January 2004	Winter Storm	Extreme southern Vermont experienced 7-13 inches of snow with 12.6 inches in Sunderland, 9 inches in Pownal and 7.5 inches in Windham County	High	Southern Vermont, Sunderland
23 Jan 2005	Blizzard	Frequent whiteout conditions were observed by plow crews. Whiteout conditions were most prevalent across the Green Mountains. Cooperative Weather Observers recorded 8.0" in Pownal and Sunderland and 14.0 inches in Peru.	High	Countywide

Table 9. Significant winter storm events in Bennington County and Stamford. Source: NCDC 2014.

Dates	Type	Description	Category	Area
15-16 Jan 2007	Ice Storm	Significant icing occurred from the freezing rain leading to widespread power outages Strengthening winds in the wake of the storm continued to exacerbate power outages across the region.	High	Southern Vermont
2 March 2007	Winter Storm	A mix of snow and sleet fell with over one foot in higher elevations, including in Woodford, and some freezing rain.	High	Southern Vermont, Woodford, Landgrove
16-17 Mar 2007	Heavy Snow	This storm brought widespread snowfall amounts of 10 to 18 inches across southern Vermont.	High	Southern Vermont
15-16 April 2007	Winter Storm	A heavy wet snow accumulated to 8 -12 inches with 12 inches in Woodford, 10.5 inches in Landgrove and 11 inches in Windham County. Gusty winds brought down power lines causing widespread outages. Damaging winds were reported by a Cooperative Weather Observer in Sunderland.	High	Southern Vermont
16-17 Dec 2007	Winter Storm	Snow, sleet and freezing rain, with total snow and sleet accumulations of 8-14 inches affected Bennington County and resulted in traffic problems and power outages. The Cooperative Weather Observer reported 12.4 inches in Sunderland along with damaging winds while 14 inches was reported in Woodford and 11.5 inches in Landgrove.	High	County wide
30-December 2007 to 2 January 2008	Heavy Snow	This storm brought heavy snow to eastern New York and western New England totaling from 6 to 12 inches across southern Vermont. Snowfall amounts ranged from 6 to 11 inches. This led to treacherous travel conditions and the closings, or delayed openings of numerous schools and businesses. A Cooperative Weather Observer reported just over 12 inches in Sunderland.	High	Southern Vermont
4-6 Mar 2008	Ice Storm	This storm system spread freezing rain and sleet across higher elevations of east central New York and portions of southern Vermont, resulting in significant ice accumulations of one half, to locally up to one inch in the higher elevations of western Windham county and one quarter to less than one half of an inch in lower elevations.	High	Southern Vermont
11-18 Dec 2008 FEMA DR-1816	Winter Storm	A series of snowstorms (two events reported by NCDC from 17-20 December) hit eastern New York and western and southern New England during this period resulting in 3-9 inches per storm, but accumulating to over a foot during the period.19 inches were reported by a Cooperative Weather Observer in Sunderland. Icing conditions followed on December 24th	High	Southern Vermont
12 to 22 Feb 2009	Heavy Snow Winter Storm	Several events were recorded by NCDC with snowfall amounts of 6-12 inches, especially in higher elevations	Moderate	Southern Vermont Higher elevations
1-3 Jan 2010	Heavy Snow	This storm brought widespread snowfall to southern Vermont along with blustery conditions, resulting in blowing and drifting of the snow. Snowfall totals across Bennington and western Windham counties ranged from about 10 inches, up to just over two feet. A Cooperative Weather Observer recorded 19.1" in Pownal from January 1-4 and another CWO reported 21.5 inches in Sunderland.	High	Southern Vermont
23-24 Feb 2010	Heavy Snow	This system blanketed the area in a heavy wet snow that resulted in treacherous travel conditions and widespread power outages across southern Vermont. Generally 1 to 2 feet of snow accumulated with the highest amounts above 1500 feet. A Cooperative Weather Observer recorded 16.2" in Pownal.	High	Southern Vermont

Table 9. Significant winter storm events in Bennington County and Stamford. Source: NCDC 2014.

Dates	Type	Description	Category	Area
26-27 Feb 2010	Heavy Snow	A powerful storm brought heavy rainfall and a heavy wet snow resulting in widespread power outages and dangerous travel conditions across southern Vermont. Strong and gusty winds developed along the east facing slopes of the Green Mountains of southern Vermont with gusts up to 50 mph. Snowfall totals of 1 to 2 feet were reported across the higher terrain, with lesser amounts of 3 to 6 inches below 1000 feet. Cooperative Weather Observers recorded 23.1" in Pownal and 25.0 inches in Sunderland.	High	Southern Vermont
26-27 Dec 2010	Winter Storm	A nor'easter brought snow and blizzard conditions to southern Vermont. A Cooperative Weather Observer measured in Sunderland measured 26.0 inches while the Pownal observer measured 20.0 inches.	High	Southern Vermont,
12 January 2011	Winter Storm	Heavy snow fell across southern Vermont with snowfall accumulations ranging from 14 inches up to 3 feet with snowfall rates of 3 to 6 inches an hour for a time. A cooperative weather observer measured 20.6" in Pownal.	High	Southern Vermont, Pownal
1-2 February 2011	Winter Storm	Snow fell at a rate of 1-2 inches/hour with totals of 12-17 inches in southern Vermont. Cooperative Weather Observers reported 7 inches in Pownal and 8 inches in Sunderland.	High	Southern Vermont
25 February 2011	Winter Storm	Twelve to seventeen inches of snow fell across southern Vermont	Moderate	Southern Vermont
29-30 October 2011	Winter Storm	An early storm produced 5-14 inches in Bennington County and 10-16 inches in Windham County.	High	Southern Vermont
29 February 2012	Winter Storm	A complex storm resulted in 8-16 inches of snow and sleet across southern Vermont between February 29th and March 1st with 4-8 inches across southeastern Bennington County.	High	Southern Vermont
18-19 March 2013	Winter Storm	A warm front brought snow to the southern Green Mountains and was enhanced by a coastal storm on the 19th. Together 4-9" fell in the values with 10-17" in the mountains	Minor	Southern Vermont
14 Dec 2013	Heavy Snow	A coastal storm brought heavy snow and winds gusting to 40-55 mph. Snowfall amounts varied, with 18 inches recorded in Woodford, VT.	Moderate	Southern Vermont
5 February 2014	Heavy Snow	Southern Vermont received6-12 inches of snow, particularly in higher elevations	Minor	Southern Vermont
13 Feb 2014	Winter Storm	A complex storm with snow, freezing rain and sleet affected the area with snowfall rates of up to 3"/hour at times along with wind gusts of up to 40 mph.	Moderate	Southern Vermont
26 Nov 2014	Winter Storm	An early season storm impacted southern Vermont over Thanksgiving with 8-15" of snow	Moderate	Southern Vermont Higher Elevations

Cooperative Weather Observer recorded 18.8" in Sunderland and 16.5" in Pownal between February 14 and 15, 2007 and 19.0" in Sunderland on December 27, 2010 and 26" in Pownal on December 27-28, 2010, but no damages were reported. There are no snow records from the Cooperative Observer in North Adams.

c. Extent and Location

The average annual snowfall in Bennington County is 64.4 inches, with December, January, February and March as the primary months for snowfall. Extreme snowfall events for one, two and three day events have ranged from 12 to over 20 inches (NOAA/National Climate

Data Center 2012 Cooperative Weather Observer reports). The skill of road crews in Vermont means that only the heaviest snowstorms (>12 inches) or ice storms affect the populations.

d. Probability, Impact and Vulnerability

There is a greater than 100% probability of a moderate or greater snowstorm affecting Bennington County, including Stamford in any given year. These are large-scale events, though local impacts may vary greatly. Roads and power lines are most vulnerable, with traffic accidents the most likely to create injuries. Power outages could be short term or last seven or more days. Some roads may remain impassable for long periods as well.

3. High Wind Events

a. Description

High wind events can occur during tropical storms and hurricanes, winter storms and frontal passages. Thunderstorms can produce damaging winds, hail and heavy rainfall, the latter potentially producing flash floods. The NCDC recorded 48 thunderstorms with damaging winds in Bennington County since 1996. Events categorized as “strong wind” tended to occur during the winter months.

Tornadoes are formed in the same conditions as severe thunderstorms. Intense, but generally localized damage can result from the intense winds. The primary period for tornado activity in New England is mid-summer (Zielinski and Keim 2003).Tornadoes will generally follow valleys in the northeast and dissipate in steep terrain. The NCDC recorded three tornadoes in Bennington County since 1996.

b. Previous Occurrences

Table10 below summarizes the total number of significant wind events including thunderstorms, strong winds, and tornadoes from 1996 to 2012.Wind speed data is not available for wind events due to the lack of weather stations. NCDC data (2014) rarely includes estimates of wind speed. Generally, wind speeds of greater than 55 miles per hour are considered damaging (NOAA Undated). Therefore, events were categorized based on damage assessments in the NCDC database. Damage greater than $10,000 and tornados were categorized as moderate. Most events resulted in minor damage. Significant events are described in Table 11.

Table10. Summary of wind events in Bennington County. Source: NCDC 2014

Year	High Wind	Strong Wind	Thunderstorm Winds	Tornado	Funnel Cloud	Totals
1996	5					5
1997	2	2	6			10

Table10. Summary of wind events in Bennington County. Source: NCDC 2014						
Year	High Wind	Strong Wind	Thunderstorm Winds	Tornado	Funnel Cloud	Totals
1998	1		8	1		10
1999	2		4			6
2000	1		1			2
2001			3			3
2002	1		3	1		5
2003	1			1		2
2004						
2005	1		3			4
2006	6		4			10
2007	3		6			9
2008		3	5			8
2009	2		1			3
2010	5		3		1	9
2011	1		8			9
2012	2		3			5
2013			6			6
2014			3			3
Totals	33	5	67	3	1	109

Table 11. Significant wind events in Bennington County. Source: NCDC 2014				
Dates	Type	Description	Area	Category
27 Jan 96	High Wind	Damaging winds downed trees, limbs and power lines	Southern Vermont	Moderate
21 Aug 97	Strong Wind	Winds gusting to 40 mph downed trees in Dorset, North Bennington and Sandgate. Approximately 1,000 customers lost power.	Countywide	Moderate
1 Nov 97	High Wind	Strong and damaging winds caused power outages in Windham and Bennington Counties with approximately 1,000 customers losing power	Southern Vermont	Moderate
27 Nov 97	High Wind	Passage of a cold front resulted in winds of 40-50 mph and downed trees and power lines in Windham and Bennington counties	Southern Vermont	Moderate
31 May 1998	Thunderstorm Wind Tornado	Several lines of thunderstorms formed ahead of a front. An F2 tornado that originated in Saratoga and Rensselaer Counties followed Route 67 through North Bennington and South Shaftsbury. Damaging winds were reported by a Cooperative Weather Observer in Pownal. Large hail was reported in Shaftsbury	Countywide; Bennington North Bennington Shaftsbury	High
6 July 1999	Thunderstorm Wind	A cold front generated thunderstorms in Southern 'Vermont. Power lines and trees were downed in Pownal and Stamford and significant rain fell in Sunderland. Winds were estimated to gust at 90 mph. Damaging winds were reported by the Pownal Cooperative Weather Observer.	Southern Vermont Stamford Pownal	Moderate
16 Sept 1999	High Wind	Winds from remnants of hurricane Floyd gusted to over 60 mph across Southern Vermont. Significant rains fell in Bennington, Peru and Sunderland	Southern Vermont	Moderate
31 May 2002	Thunderstorm Wind	Thunderstorms caused damage across Bennington County. Cooperative Weather Observers reported damaging winds in Sunderland and Pownal.	Countywide	Moderate

Table 11. Significant wind events in Bennington County. Source: NCDC 2014				
Dates	Type	Description	Area	Category
5 Jun 2002	Thunderstorm Wind Tornado	Thunderstorms that initially developed in New York produced a macroburst in extreme eastern New York and moved into southern Vermont. The storms spawned two tornados, one in Woodford Hollow, Bennington County assessed as an F1with winds of 80-100 mph and the other one near Wilmington, Windham County that was stronger with winds of 125-150 mph... Non-tornadic thunderstorm winds blew some trees down in the town of Pownal. Lightning struck a home in North Bennington causing a very small fire with minimal damage to the structure of the house.	Southern Vermont North Bennington; Pownal, Woodford	Moderate
21 July 2003	Tornado	A tornado touched down in Pownal, moved through Bennington and continued into western Windham County.	Sunderland Bennington Pownal	Moderate
2 July 2006	Thunderstorm Wind	On July 2, low pressure moved across southern Quebec Province. A cold front over the eastern Great Lakes at dawn moved into western New England late in the day. The air mass over western New England became marginally unstable enough to generate a few late-afternoon thunderstorms in western New England. A tight pressure gradient over the Northeast was associated with widespread brisk surface wind. A few thunderstorms enhanced the wind locally. A thunderstorm at Stamford, Vermont became severe late in the afternoon. Strong wind gusts associated with the thunderstorm blew down trees along Route 100 near the Stamford-Readsboro line. An emergency manager reported that trees were blown down along Route 100, at the Stamford-Readsboro line.	Stamford Readsboro	Moderate
16 April 2007	High Wind	Low pressure created strong winds resulting in extensive tree damage in Dorset. Damaging winds were reported by a Cooperative Weather Observer in Sunderland.	Dorset	Moderate
25 Aug 2007	Thunderstorm Wind	A 50 foot tall maple tree landed onto a van located on Route 8 in Stamford due to strong thunderstorm winds. The van sustained significant damage to the roof and windshield.	Stamford	Low
16 Dec 2007	High Wind	A storm brought sleet and snow as well as high winds resulting in downing of trees and power lines. Damaging winds were reported by a Cooperative Weather Observer in Sunderland.	Countywide	Moderate
9 Dec 2009	Wind	A strong low pressure system tracked northeast, into the eastern Great Lakes region creating strong east to southeast winds developed across southern Vermont during Wednesday morning, before gradually diminishing by Wednesday evening.	Countywide; Bennington, Pownal, Shaftsbury, Sunderland, Sandgate, Manchester, Dorset	Moderate
22 Aug 2010	Wind	Strong and gusty east to southeast winds occurred across southern Vermont, with the higher terrain of the southern Green Mountains being impacted the hardest. Trees and wires were reported down due to high winds in Arlington, Sunderland, Shaftsbury and Bennington. Power outages occurred across Bennington County.	Arlington, Sunderland, Shaftsbury, Bennington; Countywide	Moderate
29 May 2012	Thunderstorm Wind	Strong thunderstorm winds affected Southern Vermont. Falling trees blocked a road in Dorset	Southern Vermont	Moderate
4 July 2012	Thunderstorm wind	Numerous trees and power lines were reported downed in Manchester	Southern Vermont Manchester	Moderate
8 Sept 2012	Thunderstorm wind	Trees and wires were downed as a result of strong thunderstorms in Bennington	Southern Vermont Bennington	Moderate
29 Oct 2012	High wind	Wind gusts of 40-60 mph were reported as a result of the passage of ”Superstorm” Sandy	Western Vermont Woodford	Low
2 June 2013	Thunderstorm wind	Minor damage was reported in Bennington	Southern Vermont Bennington	Low
19 July 2013	Thunderstorm wind	Trees were downed in Manchester	Southern Vermont Manchester	Low

Table 11. Significant wind events in Bennington County. Source: NCDC 2014				
Dates	Type	Description	Area	Category
11 Sept 2013	Thunderstorm wind	Trees were downed in Arlington	Southern Vermont Arlington	Low
3 July 14	Thunderstorm wind	Scattered storms damaged trees and powerlines as a cold front moved across the region.	Southern Vermont	Low

c. Extent and Location

Damaging winds, including the previous occurrences described above, are those exceeding 55 miles per hour (NOAA 2006, NOAA undated). During December 2009 event, winds were measured at 59 mph at the Morse Airport in Bennington. Higher winds were likely created during the tornadoes and some thunderstorms. High wind events could strike anywhere, but the majority of development is close to Vermont Route 100/8. Where storms are funneled along the Hoosic valley, damage could be significant, but most likely less than 10% of structures would be affected. Again, power outages could last up to seven or more days.

d. Probability, Impact and Vulnerability

Wind events causing moderate or greater damage occur almost every other year (40-50%) in Bennington County. However, few affected Stamford, so the potential expected probability would be 1-10%% in Stamford.

4. Hail

a. Descriptions

Hail is frozen precipitation that forms in severe thunderstorms. Hailstones can range in size from ¼" (about the size of a pea) to over four inches (grapefruit sized), though most hail is in the smaller categories of less than 1.5 inches. The strong up and downdrafts within thunderstorms push to freeze and down to collect water and this repeated cycle results in accumulation of ice until gravity pulls the hailstone to Earth.

b. Past Occurrences

NCDC (2014) and Cooperative Weather Observer reports 20 hail events since 1996. Table 12 lists all hail events, which were highly localized with little damage.

Table 12. Hail events in Bennington County. Source: NCDC 2014		
Date	Description	Area
31 May 1998	A severe thunderstorm at Shaftsbury in Bennington County produced large hail. This was the same event involving a tornado described above.	Shaftsbury
18 July 2000	Across southern Vermont, scattered thunderstorms developed ahead of a cold front during the midday hours of July 18. In Bennington county, dime size hail fell at Sunderland, and nickel size hail fell at Bennington.	Bennington Sunderland
4 July 2001	Half dollar sized hail (1.25”) fell in Sunderland.	Sunderland
27 June 2002	Thunderstorms, developing ahead of a cold front, moved into southern Vermont during the late afternoon and early evening of June 27. One cell became severe as it deposited one inch hail in the North Bennington, Bennington County.	North Bennington
24 May 2004	No description	Bennington
6 June 2005	One-inch hail was reported by a trained weather spotter.	Dorset Sunderland West Rupert
1 August 2005	No description	East Dorset
19 June 2006	A trained spotter reported penny-sized hail in Sunderland	Sunderland
10 May 2007	Numerous showers and thunderstorms occurred, some became locally severe, and quarter sized hail in Arlington.	Arlington
21 June 2007	A strong cold front moved through east central New York and western New England producing numerous thunderstorms, some of which were locally severe. Nickel sized hail was reported in Sunderland	Sunderland
3 August 2007	Numerous and strong thunderstorms developed over eastern New York and western New England. Ping pong ball sized hail was reported in Shaftsbury.	Shaftsbury
10 June 2008	A cold front approaching from the west, along with a hot, moist and unstable air mass in place, led to the development of numerous showers and strong thunderstorms across eastern New York and western New England. Nickel size hail was reported near Rupert during a thunderstorm.	Rupert
24 June 2008	The passage of an upper level trough, and weak cold front produced isolated to scattered thunderstorms during Tuesday afternoon on June 24th. Large hail accompanied some of these thunderstorms. Quarter sized hail was reported in Pownal	Pownal
6 August 2008	A low pressure system tracked east across northern New England during the morning hours of Wednesday August 6th. An upper level disturbance in the wake of this system, combined with a moist and unstable air mass in place, led to the development of isolated severe thunderstorms across portions of southern Vermont. Quarter size hail fell approximately 4 miles north northeast of Arlington during a thunderstorm.	Sunderland
15 June 2009	The combination of a passing upper level trough, and unusually cold air in the mid and upper levels of the atmosphere, led to the development of numerous thunderstorms across southern Vermont, many of which contained large quantities of hail. Quarter size hail was measured at the Bennington Morse State Airport in Bennington during a thunderstorm. In addition, nickel to quarter size hail was also reported in the city of Bennington.	Bennington

Table 12. Hail events in Bennington County. Source: NCDC 2014		
Date	Description	Area
7 July 2009	A closed upper level low, and pool of unusually cold air in the mid and upper levels of the atmosphere moved over the region Tuesday, July 7th, leading to the development of thunderstorms across southern Vermont. Penny size hail was reported in Bennington during a thunderstorm.	Bennington
17 July 2010	A pre-frontal boundary and upper level disturbance moved across the region creating a cluster of strong to severe thunderstorms developed and moved across southern Vermont. Quarter size hail was reported during a thunderstorm in Bennington.	Bennington
1 June 2010	A low pressure system moved eastward across the region. This front lifted to the north during the ushering in a moist and unstable air mass. A cold front moved across the area during the evening. In addition, a vigorous disturbance in the upper levels of the atmosphere, along with strong winds, led to the development of multiple lines and clusters of strong to severe thunderstorms during the afternoon and evening hours. Half dollar size hail was reported during a thunderstorm in Arlington. Multiple reports of large hail were reported during a thunderstorm in Shaftsbury. Hail stones of 3.25 inches and 2.75 inches in diameter were measured.	Arlington Shaftsbury
1-2 June 2011	Multiple lines and clusters of strong to severe thunderstorms developed during the afternoon and evening hours. Half dollar size hail was reported in Arlington. Multiple reports of large hail were reported during a thunderstorm in Shaftsbury. Hail stones of 1 inch and 3 inch diameter-r were measured.	Arlington Bennington Shaftsbury
24 June 2013	Thunderstorms produced quarter sized hail in Manchester	Manchester

Hail was also reported by a Cooperative Weather Observers on May 25, 1999, May 8, 2000, July 18, 2000, July 5, 2001, August 4, 2001, June 2, 2002, August 1, 2008 and August 15, 2009 in Sunderland and on June 10, 2008 and May 8, 2010 in Peru.

c. Extent and Location

Hail can cover wide areas and has the potential for damaging crops, automobiles or glass within structures as well as cause injury. Generally, however, hail storms affect relatively small areas as they form in thunderstorms which are localized.

d. Probability, Impact and Vulnerability

Hail storms are generally local, affecting subareas within the town, though a group of thunderstorms could cause hail in multiple locations over a wide area. From past occurrences, one thunderstorm per year generates hail that was recorded. So, the possibility of hail occurring in Stamford could range from 10-100%, but impacts would be localized.

5. Temperature Extremes

a. Descriptions

Table 13 provides the normal high, low and average temperatures and average by month for the North Adams station.

Table 13. North Adams, MA normal temperatures and precipitation for 1981 to 2010. National Climate Data Center: http://www.ncdc.noaa.gov/land-based-station-data/climate-normals/1981-2010-normals-data

Month	High Temperature (^{0}F)	Low Temperature (^{0}F)	Mean Temperature (^{0}F)	Precipitation (in)
January	31.6	13.6	22.6	2.66
February	35.1	16.8	26.0	2.57
March	44.0	23.7	33.9	3.55
April	57.2	34.1	45.6	3.83
May	68.2	43.9	56.0	4.11
June	76.2	52.9	64.5	4.96
July	80.5	57.5	69.0	4.55
August	78.5	55.8	67.1	4.19
September	71.0	48.7	59.9	4.11
October	59.6	37.8	48.7	4.74
November	48.1	30.1	39.1	3.96
December	36.3	20.6	28.5	3.38
Annual	57.2 (Avg)	36.3 (Avg)	46.7 (Avg)	46.61 (T)

b. Past Occurrences

The station normal report for the Cooperative Weather Observer in North Adams indicates an average of just approximately 2-3 days per year when the maximum temperature would equal 90 degrees, 43 days when the maximum temperature would be less than 32 degrees and 151 days when the minimum temperature would be less than 32 degrees.

c. Extent and Location

Extreme temperature is a widespread phenomenon and occurs annually. The populations affected could be small if one is considering outdoor workers or the entire town in a power outage.

d. Probability, Impact and Vulnerability

Extreme heat is relatively rare with approximately occurrences 2-3 days a year. Extreme cold, here defined as less than freezing temperature, is a frequent phenomenon in Vermont. Impacts of either type of event could be widespread, and vulnerability is dependent on the populations exposed.

6. Drought

a. Description

There are several types and definitions of drought: meteorological, climatological, atmospheric, agricultural and hydrological. The latter is based on stream flow and groundwater availability and is probably most important from a natural hazard assessment perspective. Reductions in water availability can be critical in rural communities like Stamford where residents are dependent on groundwater for potable water. Reductions in precipitation over long enough periods, particularly during the growing season when plants take up moisture, can result in hydrologic drought.

b. Past Occurrences

The Palmer Hydrologic Drought Index (PHDI) is an indicator of potential surface and groundwater availability based on climatic conditions. Levels less than -2.0 to -3.0 indicate moderate drought, -3.0 to -4.0 indicate severe drought and less than -4.0 indicate extreme drought. Table 14 shows periods when the index showed severe and extreme droughts using data from 1985 to 2013.

Table 14. Years and number of months when the PHDI indicated severe or extreme droughts from 1985 to 2013. Source: National Climate Data Center. Source: ftp://ftpncdd.noaa.gov/pub/data/cirs/climdiv/ (Richard Heims, personal communication)

Year	Extreme	Severe
1907		1
1908	2	1
1909	1	2
1910		2
1911	5	4
1912		2
1913		5
1914		5
1915	3	1

Table 14. Years and number of months when the PHDI indicated severe or extreme droughts from 1985 to 2013. Source: National Climate Data Center. Source: ftp://ftpncdd.noaa.gov/pub/data/cirs/climdiv/ (Richard Heims, personal communication)

Year	Extreme	Severe
1921		2
1922		1
1930		1
1931		4
1941		5
1942		2
1949		1
1953		2
1957		1
1959		1
1963		3
1964	1	6
1965	8	1
1995		2
1999		1
2001	2	1
2002	1	

c. Extent and Location

The National Climate Data Center calculates this index back to 1895. Since then, the severe droughts occurred in 27 years or 22.7% while extreme drought occurred in 8 years or 6.7%. Severe and extreme droughts have been of short duration, except for some that occurred in the early 1960's. Mild to moderate droughts (PHDI -1.50 to -2.99) have been more frequent. Severe and extreme are likely to affect those properties with shallow wells. Based on well data from VT ANR, there are seven wells in Stamford with depths less than 100 feet. The Stamford Valley Golf Course and Stamford Elementary both have public wells.

d. Probability, Impact and Vulnerability

Based on past Palmer Hydrologic Drought Index data, there is a 20-25% chance of a severe drought occurring in any one year. Map 6 shows groundwater yields based on geologic formations, but detailed groundwater resource mapping has not been completed, and areas that could be affected by drought are unknown. Houses with shallow wells are most likely to be affected. Drought may affect the potential for wildfire, which is discussed below.

7. Wildfire

a. Description

Wildfire or wildland fire is any unplanned fire affecting open lands including forests, grasslands or other features. The potential for wildland fire varies with fuel types, which are based on vegetation, and with topography and weather. Fire intensity, measured by the amount of energy released in a fire and exhibited by the length of flames, and rates of spread dictate the degree of wildland fire hazard and methods of control. Table 15 shows how wildfires can be categorized based on size.

Table 15. Wildland fire size classes. Source: NWCG 2011

Magnitude (Size)	Description	Probability
Class A	< ¼ acre	High
Class B	¼ to 10 acres	High
Class C	10 to 100 acres	Moderate
Class D	100 to 300 acres	Low
Class E	300 to 1000 acres	Very low
Class F	1000 to 5000 acres	Very low
Class G	>5000 acres	Very low

In Vermont, forests tend to be dominated by northern hardwood species such as sugar maple (*Acer saccharum*), birch (*Betula* spp.), white pine (*Pinus strobus*) and hemlock (*Tsuga canadensis*). These species tend to create relatively low flammability fire, so that surface fires have low intensity and rates of spread, thereby limiting fire hazard (Anderson 1982). Map 7 shows fuel types mapped as part of the Landfire program (http://www.landfire.gov/), a national program to provide spatial and other data on fuels, topography and potential fire behavior. Most of the land area is covered by broadleaf litter fuels that exhibit fires of low intensity and slow rates of spread. There are pockets of fuels that could result in more intense fires, and areas of grass and grass shrub near structures pose the greatest threat when that vegetation is cured and dormant, in the spring and late fall.

In both forested and open settings, structures may be threatened by even small wildfires. These wildland-urban interface areas are the most likely areas where resources will be needed to suppress wildland fire and to reduce potential hazards.

Fire behavior is most extreme during periods when the relative humidity is low, generally less than 35-45%. These conditions are most prevalent in the spring, following snow melt, between March and late May or early June. After that, vegetation becomes increasingly green, and the resulting moisture in the live vegetation (fuel) reduces flammability significantly. Precipitation and evapotranspiration increase ambient relative humidity levels so that fires in the summer are generally rare and limited in size.

Fall again brings drying fuels and weather conditions increasing fire hazard. However, relative humidity levels increase after dark, and shorter days also limit the amount of time for fuels to dry and intense, fast moving fires to occur (North Central Research Station 2005).

b. Past Occurrences

According to records from the Vermont Department of Forests, Parks and Recreation, from 1992 to 2010, 156 wildfires occurred in Bennington County, two of which occurred in Stamford, both less than one acre in area.

c. Extent and Location

The two fires both approximately 0.5 acres and therefore Class B. Low intensity fires with slow rates of spread could occur in forested areas, large portions of which are in the National Forest, throughout the town, though there may be pockets of heavier fuel loads, such as brush, or more flammable fuels, such as cured herbaceous vegetation and shrubs.

d. Probability, Impact and Vulnerability

Natural fire return intervals in most forests in Vermont are greater than 50 years (Malamud et al. 2005), and more likely greater than 200 years, as reported in Landfire data for this area. Recurrence is likely related to precipitation rather than the buildup of fuels, so drought recurrence is already factored into these interval estimates. Therefore, the potential for large fires is very limited due to the fuel characteristics. However, large roadless areas and steep topography can make suppressing wildland fires that do occur very difficult. Settled areas have a low vulnerability to fire.

8. Landslide and Debris Flow

a. Description

Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Gravity is the force driving landslide movement. Factors that allow the force of gravity to overcome the resistance of earth material to landslide movement include saturation by water, steepening of slopes by erosion or construction, and alternate freezing or thawing. Table 16 shows how landslides can be categorized.

Table 16. Landslide and debris flow types. Source: USGS 2006		
Magnitude	Description	Probability
Localized	Falls: abrupt movements of rocks and boulders, generally on steep slopes	Low to moderate
Topples	Topples: movements involving some forward rotation as material moves downhill	Low to moderate
Flows	A range of land movement generally involving a mass of loose soil, rock, organic matter, air and water moving downhill rapidly and possibly covering a wide area One form called creep involves slow movement of material and is often recognizable by trees growing so as to remain vertical while bent near the ground as they grow to keep up with the slow material flow.	Highly variable but can be fairly common.

b. Past Occurrences

Mill Road has had periodic landslides and is a difficult area to maintain. There are also areas along that road where rip rap and other measures are needed and/or need regular repair.

c. Extent and Location

All of the mapped landslides would be categorized as localized. There have been no rockslides and landslides are relegated to an area along Mill Road.

d. Probability, Impact and Vulnerability

The primary area affected in Stamford has been small and, while this is a recurring problem, the resulting impact and vulnerability are minimal.

9. Earthquake

a. Description

Vermont has no active faults, but has experienced minor earthquakes. Table 17 below shows the most recent occurring within the state, though there have been others, located outside, that have been felt in Vermont (Springston and Gale 1998). The U.S. Geological Survey

predicts a two percent probability of an earthquake causing considerable damage in Vermont sometime in the next 50 years (Springston and Gale 1998).

b. Past Occurrences

Table 17. Earthquakes in Vermont. Source: Vermont Geological Survey: http://www.anr.state.vt.us/dec/geo/EBEL.htm consisting of excerpts from: A Report on the Seismic Vulnerability of the State of Vermont by John E. Ebel, Richard Bedell and Alfredo Urzua, a 98 page report submitted to Vermont Emergency Management Agency in July, 1995.

Location	Date	Magnitude	Mercalli Intensity
Swanton	July 6, 1943	4.1	Felt by nearly everyone; many awakened with some dishes and windows broken and unstable objects overturned
Brandon	March 31, 1953	4.0	Felt indoors by many, but by few outdoors. Sensation would be similar to a heavy truck striking a building
Middlebury	April 10, 1962	4.1	Felt by nearly everyone; many awakened with some dishes and windows broken and unstable objects overturned

c. Extent and Location

In 2003, the Vermont Geological Survey completed simulations using FEMA HAZUS software of potential damage within Bennington County from a 500 year recurrence earthquake centered in Middlebury, VT, Tamworth, NH and Goodnow, NY. The results indicated minimal damage and injury from any of these events to Stamford (Kim 2003).

d. Probability, Impact and Vulnerability

Based on the 2003 HAZUS analyses, both the probability and impact of an earthquake of a magnitude that could potentially occur in Vermont are low. However, earthquake prediction science is very limited.

10. Hazardous Materials Spill

a. Descriptions

Hazardous wastes are materials that are flammable, corrosive, toxic, flammable or labeled with warning or caution labels. These materials are used in industry, in the home or on farms and are transported regularly.

b. Past Occurrences

The Vermont spill site list indicates there have been seven spills reported in Stamford since 1979, and these are listed in Table 18 below.

Table 18. Hazardous materials spills in Stamford. Source: http://www.anr.state.vt.us/WMID/Spills.aspx

Report #	Year	Facility Name	Address	Responsible Party	Date Reported	Date Closed	Incident
WMD477	2013	Roadside	153 East Rd.	Green Mountain Power	10/17/2013		Release of 1 gallon of hydraulic fluid from GMP vehicle
WMD495	2011	roadside	County Rd	US Forest Service	8/24/2011		Two cylinders of anhydrous ammonia found
WMD312	2005	N/A	5172 Main Rd	Ginsburgs Food	8/31/2005	10/11/2005	50 gallon diesel spill from truck rollover
WMD366	2002	Regulator Structure	River Road	Green Mountain Power	11/18/2002	11/21/2002	84 gallons of oil from electrical regulator leak
WMD009	2000	Stamford AOT Garage	Rt 100 and Rt. 8	VT AOT	01-08-2000	01-11-2000	25 gallon spill from tank leak; chloride recovered
WMD330	1997	Pole 12-01	Lincoln Rd	Green Mountain Power	9/19/1997	9/19/1997	1 gallon from leaking transformer
227	1991	N/A	Rt 8 & 100	Bodine And Sons	9/18/1991	9/18/1991	Sheen on road and in brook
111	1990	Beaudreau Residence	Route 8	Francis Beaudeau	5/17/1990	5/17/1990	Oil in private well

c. Extent and Location

All of the spills listed in Table 17 affected small sites or areas. Route 8 is a major connector from Massachusetts to Routes 100 and 9 to the north. Therefore, there is a possibility of a larger spill that could affect large portions of the town and beyond.

d. Probability, Impact and Vulnerability

Given the number of past spills, hazardous materials spills occur at least annually and affect very small areas. The overall likelihood is probably between one and ten percent.

11. Infectious Disease Outbreak

a. Descriptions

Infectious diseases are caused by bacterial infections, viruses, fungi and other organisms that can spread through the human population.

b. Past Occurrences

Infectious diseases are a regular occurrence. The Vermont Department of Health (2015) lists 9 different diseases occurring in Bennington County as of December of 2014 with Lyme disease the highest with 105 cases through the end of the year.

c. Extent and Location

In general, individuals and families are most affected by infectious diseases, but schools could be affected as well.

d. Probability, Impact and Vulnerability

Infectious diseases are ongoing, but affect a small portion of the population. Given past history, there is a low probability of a disease affecting a large portion of the town, but high probability of continued, isolated occurrences.

12. Invasive Species

a. Descriptions

Invasive species are organisms that are not native to a geographic area and which could or do cause economic or environmental harm. Invasive species are characterized by organisms that spread rapidly, can outcompete native species, and have few or no predators to keep their populations in check. At the same time, they have characteristics that may reduce the value and use of natural resources. For example Japanese barberry (*Berberis thunbergii*) can become a dominant, short shrub in some forests and, given that this is a thorny plant, can reduce the use of an area for recreational purposes (Vermont Agency of Natural Resources 2010). Vermont lists Class A species as those on the Federal Noxious Weed List but not known to occur in Vermont. There are listed in 7 C.F.R. 360.200, a section of the Code of Federal Regulations. Class B species are those that occur in the state and are considered a threat.

Table 19. Designated Class B noxious weeds in Vermont. Source: Vermont Agency of Agriculture, Food and Markets: http://agriculture.vermont.gov/plant_pest/plant_weed/invasive_noxious_weeds/noxious_weeds_list Those with a * have been identified in Bennington County. Source: Early Detection and Mapping System: http://www.eddmaps.org/tools/query/

Scientific Name	Common Name
*Acer ginnala**	Amur maple
Acer platanoides	Norway maple
*Aegopodium podagraria**	Bishop's goutweed
Ailanthus altissima	Tree of heaven

Table 19. Designated Class B noxious weeds in Vermont. Source: Vermont Agency of Agriculture, Food and Markets: http://agriculture.vermont.gov/plant_pest/plant_weed/invasive_noxious_weeds/noxious_weeds_list Those with a * have been identified in Bennington County. Source: Early Detection and Mapping System: http://www.eddmaps.org/tools/query/	
Scientific Name	Common Name
*Alliaria petiolata**	Garlic mustard
*Berberis thunbergii**	Japanese barberry
*Berberis vulgaris**	Common barberry
Butomus umbellatus	Flowering rush
*Celastrus orbiculatus**	Oriental bittersweet
*Euonymous alatus**	Burning bush
Fallopia japonica	Japanese knotweed
Hydrocharis morsus-ranae	Frogbit
*Iris pseudacorus**	Yellow flag iris
Lonicera japonica	Japanese honeysuckle
Lonicera maackii	Amur honeysuckle
*Lonicera morrowii**	Morrow honeysuckle
*Lonicera tatarica**	Tartarian honeysuckle
*Lonicera x bella**	Bell honeysuckle
*Lythrum salicaria**	Purple loosestrife
*Myriophyllum spicatum**	Eurasian watermilfoil
Najas minor	European naiad
Nymphoides peltata	Yellow floating heart
*Phragmites australis**	Common reed
Potamogeton crispus	Curly leaf pondweed
*Rhamnus cathartica**	Common buckthorn
*Rhamnus frangula**	Glossy buckthorn
Trapa natans	Water chestnut
Vincetoxicum nigrum	Black swallow-wort

In addition, Table 20 lists the following aquatic invasive species identified by the Agency for Natural Resources.

Table 20. Aquatic invasive species in Vermont. Source: Watershed Management Division, Vermont Department of Environmental Conservation: http://www.vtwaterquality.org/lakes/htm/ans/lp_ans-index.htm	
Scientific Name	Common Name
Dreissena polymorpha	Zebra mussel
Alosa pseudoharengus	Alewife
Orconectes rusticus	Rusty crayfish
Didymosphenia geminata	Didymo

b. Past Occurrences

Invasive species represent a continual event.

c. Extent and Location

The extent has not been fully mapped. In addition to the species listed above, the following are potential invasive species:

Pastinaca sativa (Wild parsnip) is abundant along roadsides and can cause skin burns when chemicals in the plant on exposed skin interact with sun. *Anthriscus sylvestris* (cow parsely also dominates roadsides and can invade meadows. *Polygonum cuspidatum* (Japanese knotweed) colonizes disturbed areas, including streams and roadsides, and can be seen along Route 8. *Phalaris arundinacea* (reed canary grass) can invade wetlands and crowd out native plants and can be highly flammable during wildfires.

Adelges tsugae (Hemlock wooly adelgid) has dramatically reduced hemlock trees south of Vermont and was recently found in Pownal, Vt. *Agrilus planipennis* (Emerald Ash Borer) is a significant threat to forests as it kills all ash species. Borers are often dispersed through movement of firewood.

d. Probability, Impact and Vulnerability

The likelihood of increased abundance of invasive species is 75-100% and potential impacts to forested areas are very high. Invasive insects that can cause tree death, particularly the emerald ash borer, could result in road closures, power outages and property damage.

B. Vulnerability Analysis

Table 21. Hazard impact summary	
Hazard	Potential Impacts
Floods and flash floods	Damage or loss of structures and infrastructure Loss of life and/or injury
Winter storms	Power outages Road closures
High wind events	Power outages Road closures
Hail	Property damage Crop damage or loss
Temperature extremes	Loss of life and/or injury Water supply loss
Drought	Water supply loss Crop damage or loss
Wildfire	Damage or loss of structures and/or infrastructure Loss of life and/or injury Loss of forest resources
Landslide and debris flow	Damage or loss of structures and infrastructure Loss of life and/or injury Road closures Power outages
Earthquake	Damage or loss of structures and infrastructure Loss of life and/or injury Road closures Power outages Water supply loss
Hazardous materials spill	Loss of life and/or injury Road closures Water supply loss
Infectious disease outbreak	Loss of life and/or injury
Invasive species	Road closures Power outages (fallen trees) Loss of forest resources

Table 22 summarizes probabilities, area affected and likely warning times for each hazard. Floods and flash floods have caused the greatest damage in the past and are likely to be the priority hazard in the future. In addition, threats to water supplies such as drought or hazardous materials spills could affect large portions of the community. Other hazards would likely be localized, but could affect vulnerable populations such as the elderly, children or those who might be particularly affected by power outages or isolation during storm events. Mobile homes can be particularly vulnerable to hazards (Vermont Department of Housing and Community Development 2013). There are 11 mobile homes in Stamford, but these are scattered and none are in mobile home parks.

Table 22. Vulnerability assessment for the Town of Stamford								
Hazard	Date/Event (# events)	Recurrence Interval	Geographic Extent	Proportion of town damaged	Injuries/ deaths	Loss of facilities/services	Vulnerable Facilities/Populations	Warning Time
Flood/Flash Flood	49 events from 1996 to 2014	10-50% probability in next any given year	Community to statewide	<10%	1-10%	Minimal to seven days. Roads may become impassable and power outages in some areas	Roads, bridges and culverts town wide	>12 hours
Winter storm (snow and ice)	135 events from 1996 to 2014	100% probability in any given year	Community to statewide	<10%	1-10% primarily traffic accidents	Minimal to seven days with some areas impassable and power outages in some areas	Primarily power supplies but also roads	>12 hours
High Wind Event	109 events from 1996 to 2014	10-50% occurrence in any given year	Community to region-wide	<10%	<=1%	Minimal for the entire town, but may be significant in localized areas. Power outages may occur.	Power lines primarily	3 to > 12 hours
Hail	20 events from 1996 to 2014	10-100% probability in any given year	Subarea of community	<=1%	M=1%	Minimal	Minimal	3 to 12 hours
Temperature Extremes	Annual >90 F 2-3 day Annual < 32 F 43 days	100% probability in any given year	Community to statewide	100%	<=1%	Minimal	Elderly and ill individuals without adequate heating or air conditioning	>12 hours
Drought	Severe droughts have occurred in 25 years from 1895 to 2014	20-25% probability in any given year	Community to statewide	<10%	<=1%	Minimal but water could be unavailable for significant lengths of time.	Homes with shallow wells lose water	>12 hours

Table 22. Vulnerability assessment for the Town of Stamford								
Hazard	Date/Event (# events)	Recurrence Interval	Geographic Extent	Proportion of town damaged	Injuries/ deaths	Loss of facilities/services	Vulnerable Facilities/Populations	Warning Time
Wildfire	2 between 1992 and 2010	1-10% probability in any given year	Subarea of community	<10%	<=1%	Minimal	Likely confined to the National Forest	None or minimal
Landslide/Debris Flow	Small scale events on Mill Rd.	1-10% probability in any given year	Subarea of community	<10%	<=1%, but traffic accidents possible	Minimal depending on scale and ability to remove material	Limited as affecting one road.	None or minimal
Earthquake	One in 2011	<1% probability in any given year	Community to region-wide	<10%	<=1%, but larger in a significant earthquake	Minimal	Town wide	None or minimal
Hazardous Materials Spill	8 events from 1979 to 2014	1-10% probability in any given year	Community to region-wide	<=1%	<=1%	Minimal	Water supplies and aquatic resources	None or minimal
Infectious Disease Outbreak	Annual	100% probability in any given year	Community to state-wide	<=1%	<=1%	Minimal	Varies with type of infectious disease	None or minimal
Invasive Species	Ongoing	100% probability in any given year	Community to state-wide	1-10%	<=1%	Power outages from tree fall	Forests, roadsides, water bodies and streams	>12 hours

V. Mitigation Programs

A. Mitigation Goals for the Town of Stamford

The Town identified the following mitigation goals:

1. Significantly reduce injury and loss of life resulting from natural disasters.
2. Significantly reduce damage to public infrastructure and other critical facilities, minimize disruption to the road network and maintain both normal and emergency access.
3. Establish and manage a program to proactively implement mitigation projects for roads, bridges, culverts and other municipal facilities to ensure that community infrastructure is not significantly damaged by natural hazard events.
4. Design and implement mitigation measures so as to minimize impacts to rivers, water bodies and other natural features, historic structures, and neighborhood character.
5. Significantly reduce the economic impacts incurred by municipal, residential, industrial, agricultural and commercial establishments due to disasters.
6. Encourage hazard mitigation planning to be incorporated into other community planning projects, such as Town Plan, Capital Improvement Plan, and Town Local Emergency Operation Plan
7. Ensure that members of the general public continue to be part of the hazard mitigation planning process.

B. Review of Existing Plans and Programs that Support Hazard Mitigation in Stamford

1. Stamford Town Plan

The Town Plan, adopted in 2011 has the following goals:

a. Support efforts to strengthen economic prosperity for Stamford residents and businesses.
b. Plan development to maintain the town's historic development pattern of a defined village area with a diversity of land uses surrounded by rural countryside.
c. Protect significant natural, scenic, and historic resources.
d. Support policies, public investments, and projects undertaken by both private and nonprofit developers that help ensure the availability of an adequate supply of housing that is affordable and desirable for all of the town's residents.
e. Provide a safe, convenient, and efficient transportation system that includes roads and bridges as well as facilities that encourage and accommodate other modes of travel including bicycling, walking, and public transportation.

f. Ensure that community facilities and services are sufficient to meet the needs of the Community.
g. Promote the safe and efficient use of energy and utilization of renewable energy resources.

The plan recognizes the importance of protecting residents from flooding. The town is currently working to revise their flood bylaws. The current bylaws limit development on slopes greater than 25% and regulate mining operations. The Town Plan lists a series of policies relevant to hazard mitigation:

> "Development in flood hazard and fluvial erosion hazard areas must meet local, state, and federal requirements to protect public safety and minimize property damage. The town should complete a well-publicized review of the flood hazard maps and regulations to ensure continued conformance with the National Flood Insurance Program." (p. 16)
>
> Natural resource policies emphasize the importance of water, forests and other resources for the continuation of a sustainable community:
>
> "Surface waters should be protected through comprehensive watershed planning that includes erosion and stormwater control and by maintaining undisturbed buffers between development and stream banks and shorelines." (pp. 27-28)
>
> Transportation policies relevant to hazard mitigation include:
>
> "Continue to provide adequate funding for town roadway maintenance and equipment needs to ensure that roads and bridges do not deteriorate to the extent that costly and/or unexpected repairs or reconstruction are necessary." (p. 37)
>
> "Maintain traffic carrying capacity and safety on local and state highways through implementation of planned improvements and application of access management and traffic calming techniques." (p. 38)
>
> "Require that new public and private roads and driveways be designed according to town standards. Such construction also should avoid adverse impacts to natural or scenic resources." (p. 38)
>
> Community Facilities and Services policies relevant to hazard mitigation include:
>
> "Require strict conformance with local and state regulations designed to protect water quality and the supply of drinking water." (p. 46)

"If well contamination becomes a severe problem in the village center area, or to support higher densities of development in that area, consider undertaking a study of a potential small public water supply system." (p. 46)

2. Bennington Regional Plan Policies and Actions (adopted March 19, 2015)

The Bennington Regional Plan lists the following policies and actions supporting hazard mitigation:

a. Several policy recommendations emphasizing protecting natural resources, maintaining village and urban centers and avoiding development on sensitive lands including areas of steep slope and wetlands along with the protection of surface and groundwater resources and forested lands (Sections VII and VIII).
b. A flood resilience section (IX) as required by Vermont statute that identifies hazards from flooding and fluvial erosion. The section encourages avoiding development in flood hazard areas, reconstruction of bridges and culverts that impede flows, undisturbed buffer areas along streams to provide for lateral movement and attenuation of overland flow, participation in the National Flood Insurance Program, updating of flood bylaws, adoption of up to date road and bridge standards and participation in the community rating system.

3. Vermont Hazard Mitigation Plan (2013)

The Vermont Hazard Mitigation Plan (2013) identified a series of hazards shown in Table 23 below along with those we considered in this plan. The Stamford plan tracks the state plan except some hazards are combined and a few, including nuclear plant accident, were not considered.

Table 23 Comparison of hazards considered in the Vermont Hazard Mitigation Plan vs. the Stamford Hazard Mitigation Plan

VT Hazard Mitigation Plan	Alternative
Atmospheric Hazards	**Natural Hazards**
Drought	Drought
Earthquake	Earthquake
Flooding	Flooding/Flash Floods/Fluvial Erosion/Ice Jams
Fluvial Erosion	*See Flooding/Flash Floods/Fluvial Erosion/Ice Jam*
Hail	Hail
High Winds	High Winds
Hurricane/Tropical Storm	*See High Winds and Flooding/Flash Floods/Fluvial Erosion/Ice Jams*
Ice Storm	*See Severe Winter Weather/Ice Storm*

Table 23 Comparison of hazards considered in the Vermont Hazard Mitigation Plan vs. the Stamford Hazard Mitigation Plan	
VT Hazard Mitigation Plan	Alternative
Ice Jams	*See Flooding/Flash Floods/Fluvial Erosion/Ice Jam*
Infectious Disease Outbreak	Infectious Disease Outbreak
Landslide/Debris Flow	Landslide/Debris Flow
Severe Thunderstorm	*See High Winds and Flooding/Flash Floods/Fluvial Erosion/Ice Jams*
Severe Winter Weather	Severe Winter Weather/Ice Storm
Temperature Extremes	Temperature Extremes
Tornado	*See High Winds*
Wildfire	Wildfire
Technological Hazards	**Technological Hazards**
Dam Failure	Dam Failure
Hazardous Materials Spill	Hazardous Materials Spill
Invasive Species	Invasive Species
Nuclear Power Plant Accident	Not addressed
Rock Cuts	*See Landslide/Debris Flow*
Terrorism	Not addressed

The Vermont Hazard Mitigation Plan identified flooding and fluvial erosion, winter storms, high winds and severe thunderstorms as high risk for Bennington County and radiological accident risk and hazardous materials spills as moderate risk. There are no vulnerable state facilities in Stamford.

C. Current Programs

Vermont, municipalities have the authority to regulate development in flood hazard areas under 24 Vermont Statues Annotated (VSA), Chapter 91. Under 10 VSA, Chapter 32, the Secretary of the Agency of Environmental Conservation has the authority to designate flood hazard areas and to assist the towns with flood hazard regulations. Stamford participates in the National Flood Insurance Program (NFIP) and has bylaws in place to implement that program. This program is overseen by the Town Zoning Administrator. Currently there are six polices in effect for a total value of $916,000. Two claims have been made since 1978 totaling $35,180. There are no repetitive loss structures.

The Town does not have mapped river corridors (fluvial erosion zones), and VT ANR is working on maps that should be available late in 2014. In some cases, land may fall into a fluvial erosion hazard zone but not in the flood zones identified in FEMA flood map. Therefore, property owners who own land in the fluvial erosion hazard zone should be encouraged to purchase flood insurance.

The Town bylaws have been reviewed and amended to reflect changes in the flood insurance maps prepared by FEMA. The current FIRM is dated September 18, 1985. More recently, DFIRM maps have been developed using LIDAR, a technology that can be used to develop highly accurate elevations and, thereby, predict potential flood elevations from different storm events (FEMA 2010). The locations of critical facilities are shown on Map 4.

Table 24 below lists the capabilities of Stamford and the parties responsible for implementing those capabilities. The Select Board is the legislative authority and develops the town budget, oversees staffing, appoints the Emergency Management Director and members of the Planning Commission and adopts bylaws and ordinances. Vermont has a town meeting form of government, and the budget is approved by voters at town meeting day.

Table 24 Town of Stamford Capabilities for Hazard Mitigation

Town Capability	Responsible Party (ies)
Development of annual town budget	Select Board
Emergency management	Select Board; Emergency Management Director Stamford Fire Department
Outreach to residents and businesses through mailings, web site and newsletters	Town Clerk; Select Board; Emergency Management Director
Town road, bridge, and culvert construction and maintenance	Road Foreman
Implementation and update of the Town Plan	Planning Commission; Select Board
Implementation of land use, including flood, bylaws	Town Zoning Administrator; Planning Commission

Stamford is a small town with limited ability to expand services. However, in many cases, outside contractors can be used to implement specific construction programs and members of the Select Board can assist the Town Clerk in developing outreach materials. The Emergency Management Director participates as a member of Local Emergency Planning Committee #7 and receives information and training on emergency and disaster management. The Town can get support from the Vermont Department of Homeland Security and the Bennington County Regional Commission. In addition, the U.S. Forest Service has capabilities in wildfire management and the Vermont Agency of Transportation provides training and maintains state roads. All of these support the programs of Stamford in serving their residents.

D. Mitigation Projects

Table 25 below lists mitigation actions for each of those hazards. Some will be implemented by the Town of Stamford and others by agencies such as the Vermont Agency of Transportation. Mitigation actions are listed by the type of hazard. The following criteria were used in establishing project priorities, with ranking based on the best available information and best judgment as these proposed projects would need further study and design work:

1. The overall assessment of the potential damage from a given hazard.
2. Whether the proposed action reduce potential damage to from the hazard.
3. Consistency of the proposed action consistent with the goals of the town.
4. Whether the action could be implemented within the specified time frame.
5. Whether the proposed action was technically feasible.
6. Whether the action could be implemented to reduce potential damage at a reasonable cost while avoiding or mitigating potential impacts to natural, cultural, social and economic resources? Costs considered included a) likely capital and maintenance costs of the action, b) potential short and long-term impacts to natural, cultural and scenic resources and c) potential short and long-term impacts to residents and businesses from implementing the action.

Prior to the implementation of any action, a benefit-cost analysis would be completed to assure the action would be feasible and cost-effective.

Table 25. Mitigation actions						
Hazard	Type[2]	Action	Responsible Party	Time Frame	Funding Source(s)	Priority
All Hazards	Local Planning and Regulations	Assess need for driveway standards to assure adequate emergency access particularly to assure adequate access in winter storms, floods and for wildfire protection	Town Planning Commission	2015 to 2017	Town general fund	High
All Hazards	Local Planning and Regulations	Encourage proper construction techniques and use of appropriate materials to address hazards, particularly flooding, winter storms, wind events, earthquakes, landslides and wildfire	Town Planning Commission; Zoning Administrator	2015 to 2016	Town general fund	High
All Hazards	Local Planning and Regulations	Maintain the Local Emergency Operations Plan annually and develop a continuity of operations plan	Town Select Board Emergency Management Director	2015 to 2016 and annually	Town general fund	Medium
All Hazards	Education and Outreach	Provide a "be prepared" section of the Town website with links to information for residents	Town Select Board Emergency Management Director	2015 to 2016	Town general fund	High
All Hazards	Education and Outreach	Identify and develop methods to communicate with populations vulnerable to potential hazards, particularly drought, extreme temperatures and infectious diseases, but also those in need of assistance for evacuation and/or sheltering	Town Emergency Management Director	2015 to 2017	Town general fund	High

[2] Follows FEMA 2013 Mitigation ideas; a resource for reducing. Federal Emergency Management Agency, U.S. Department of Homeland Security, Washington, DC

Table 25. Mitigation actions						
Hazard	Type[2]	Action	Responsible Party	Time Frame	Funding Source(s)	Priority
Floods and Flash Floods	Education and Awareness	Educate owners on importance of securing propane tanks and other items that could float or blow away in storms	Town Zoning Administrator	2015 to 2017	Town general fund	Medium
Floods and Flash Floods	Local Planning and Regulations	Adopt and enforce updated flood hazard and river corridor (fluvial erosion hazard zone) bylaws	Town Select Board Town Planning Commission; Zoning Administrator	2015 to 2016	Town general fund	High
Floods and Flash Floods	Local Planning and Regulations	Encourage appropriate stormwater and erosion control measures in new developments	Town Planning Commission	2015 to 2020 as ongoing program	Town general fund	High
Floods and Flash Floods	Local Planning and Regulations	Participate in the Community Rating System to help reduce flood insurance premiums	Town Select Board	2017 to 2018	Town general fund	High
Floods and Flash Floods	Local Planning and Regulations	Complete Phase I, II and III studies of the Hoosic and selected tributaries to identify river alterations, areas of potential ice and debris jams, and other factors and develop recommendations to reduce flooding hazards and improve habitat	Town Select Board VT ANR Bennington County Conservation District Bennington County Regional Commission	2018 to 2019	VT Watershed Grants or Ecosystem Restoration Grants	Medium
Floods and flash floods	Structure and Infrastructure Projects	Implement a long-term program to improve and upgrade culverts to Road and Bridge Standards	Town	2015 to 2020 as ongoing program	Town VT AOT FEMA Hazard Mitigation Grants	High

Table 25. Mitigation actions						
Hazard	Type[2]	Action	Responsible Party	Time Frame	Funding Source(s)	Priority
Floods and flash floods	Structure and Infrastructure Projects	Where possible, upgrade culverts both for storm flows and for aquatic organism passage.	Town Trout Unlimited	2015 to 2020 as ongoing program	Town VT AOT FEMA Hazard Mitigation Grants Trout Unlimited	High
Floods and flash floods	Structure and Infrastructure Projects	Road crew should regularly survey culverts for blockages including photographs and records of damages and costs	Town Road Foreman	Annually on a rotating basis	Town highway fund	High
Floods and flash floods	Structure and Infrastructure Projects	Encourage property owners in flood or river corridor areas (fluvial erosion hazard zones) to consider selling their properties (buy out) or implementing flood proofing including elevating structures	Town Select Board	2015 to 2020 as ongoing program	FEMA HMGP, PDM, FMA	High
Floods and flash floods	Structure and infrastructure projects	Construct salt/sand shed so material does not wash into streams	Town	2015 to 2018	Town VT AOT	High
Floods and flash floods	Structure and infrastructure projects	Increase the height and length of span of Roaring Brook Bridge to eliminate constriction causing ice jams	VT AOT	2017 to 2018	VT AOT	High
Floods and flash floods	Structure and infrastructure projects	Properly size culverts along Route 8	VT AOT	2017 to 2018	VT AOT	High

Table 25. Mitigation actions						
Hazard	Type[2]	Action	Responsible Party	Time Frame	Funding Source(s)	Priority
Floods and flash floods	Natural Systems Protection	Acquire lands or work with conservation organizations to acquire lands subject to frequent flooding or wetlands within or adjacent to flood prone areas to provide flood storage	Town Select Board; Vermont Land Trust	2015 to 2020 as ongoing program	State of Vermont Watershed Grants, Vermont Ecosystem Restoration Program, Nonprofit organizations	Medium
Winter storms	Education and Outreach	Provide materials and post on website on methods to shelter in place including preparation for long-term power outages or transportation disruptions	Town Emergency Management Director	2015 to 2018	Town FEMA Hazard Mitigation Grant	High
Winter storms	Education and Awareness	Provide materials for residents on methods to protect property from wind events	Town Emergency Management Director; Zoning Administrator	2017 to 2018	Town general fund FEMA HMGP, PDM, FMA	High
Winter storms	Local Planning and Regulations	Develop agreements with adjacent towns for sharing of highway equipment	Town Select Board; Town Road Foreman	2015 to 2016	Town general fund	High
Winter storms	Structure and Infrastructure Projects	Acquire generator for Town Hall/School/Shelter	Town	2015 to 2018	Town FEMA Hazard Mitigation Grant	High
Winter storms	Structure and Infrastructure Projects	Place utilities underground for critical facilities (town hall, fire house, highway garage)	Town Select Board	2017 to 2017	FEMA HMGP, PDM, FMA	Medium
High Wind Events	Local Planning and Regulations	Require boats, propane tanks and other items stored outdoors to be secured	Town Planning Commission; Zoning Administrator	2015 to 2016	Town general fund	High

Table 25. Mitigation actions						
Hazard	Type[2]	Action	Responsible Party	Time Frame	Funding Source(s)	Priority
High Wind Events	Local Planning and Regulations	Require boats, propane tanks and other items stored outdoors to be secured	Town Planning Commission; Zoning Administrator	2015 to 2016	Town general fund	High
High wind events	Education and Outreach	Provide educational materials on sheltering in place and preparation for high wind events, including long-term power outages	Town Emergency Management Director	2015 to 2016	Town general fund	High
High wind events	Structure and Infrastructure Projects	Place power lines underground to the Town Hall/School/Shelter and the Highway Garage	Town	2015 to 2018	Town FEMA Hazard Mitigation Grant	Medium
High wind events	Structure and Infrastructure Projects	Coordinate with VT AOT and Green Mountain Power on maintaining rights-of way for both power lines and roads	Town Green Mountain Power	2015 to 2020 as ongoing program	Town VT AOT Green Mountain Power	Medium
High wind events	Local Planning and Regulation	Encourage appropriate plantings to avoid future damage from downed trees	Town Emergency Management Director Planning Commission	2015 to 2016	Town general fund	Medium
High wind events	Structure and Infrastructure Projects	Retrofit existing buildings to withstand high winds including protection of power lines and other utilities	Town Select Board Private Owners	2016 to 2017	FEMA HMGP, PDM	Medium
Hail	Structure and Infrastructure Projects	Retrofit existing buildings to minimize hail damage	Town Select Board; Private Owners	2017 to 2018	FEMA HMGP, PDM	Low
Temperature extremes	Education and Awareness	Identify vulnerable community members through a survey and outreach	*Town Emergency Management Director*	2015 to 2016	*Town general fund* *FEMA HMGP, PDM*	*High*

Table 25. Mitigation actions						
Hazard	Type[2]	Action	Responsible Party	Time Frame	Funding Source(s)	Priority
Temperature extremes	Education and Awareness	Provide information on insulation, protecting pipes and other measures to prevent damage during extreme cold	Town Emergency Management Director	2015 to 2016	Town general fund FEMA HMGP, PDM	High
Drought	Local Planning and Regulation	Monitor drought conditions	Town Emergency Management Director	2015 to 2020 as ongoing program	Town general fund	High
Drought	Education and Awareness	Provide information for residents on preparing for drought	Town	2015 to 2016	Town	Low
Drought	Natural System Protection	Develop improved assessment of groundwater sources and amend bylaws to assure their protection	Vermont Geological Survey Town Planning Commission	2017 to 2019	FEMA HMGP, PDM State of VT	Medium
Drought	Local Planning and Regulation	Incorporate planning for droughts in the emergency management plan	Town Emergency Management Director	2015 to 2016	Town general fund	High
Wildfire	Education and Outreach	Provide information on outdoor burning safety prior to the spring and fall fire seasons	Fire wardens	2015 to 2020 as ongoing program	Fire wardens	High
Wildfire	Education and Outreach	Acquire materials from Firewise for homeowners and make available for landowners	BCRC Town Emergency Management Director	2015 to 2016	BCRC	High
Wildfire	Local Planning and Regulations	Work with BCRC and the U.S. Forest Service to complete a community wildfire protection plan	BCRC US Forest Service	2017 to 2020	FEMA HMGP, PDM State of VT	Medium

Table 25. Mitigation actions						
Hazard	Type[2]	Action	Responsible Party	Time Frame	Funding Source(s)	Priority
Wildfire	Structure and Infrastructure Projects	Assure adequate water supplies are available	Town Select Board; Emergency Management Director	2015 to 2020 as ongoing program	Town general fund /State of Vermont grants for dry hydrants/ Vermont Department of Parks, Forestry and Recreation	High
Landslide and debris flow	Local Planning and Regulations	Following receipt of river corridor maps from VT ANR, consider adopting fluvial erosion hazard bylaws	Town Select Board; Town Planning Commission	2015 to 2018	Town general fund	High
Landslide and debris flow	Structure and Infrastructure Projects	Continue to maintain Mill Rd.	Town Road Commissioner	2015 to 2020 as ongoing program	Town	High
Landslide and debris flow	Structure and Infrastructure Projects	Assess alternative designs to provide a more lasting solution on Mill Rd.	Town Road Commissioner	2016 to 2018	Town	High
Landslide and debris flow	Structure and Infrastructure Projects	Stabilize and replant stream corridor areas subject to landslides	Hoosic River Watershed Association	2015 to 2020 as ongoing program	State of VT Watershed grants	High
Landslide and debris flow	Structure and Infrastructure Projects	Implement visual monitoring in potential landslide areas	Town Emergency Management Director; Road Foreman	2016 to 2017	Town general fund	High
Landslide and debris flow	Education and Outreach	Educate property owners on proper construction techniques to reduce potential for creating or suffering damage from landslides	Town Zoning Administrator	2015 to 2018	Town general fund	Medium

Table 25. Mitigation actions						
Hazard	Type[2]	Action	Responsible Party	Time Frame	Funding Source(s)	Priority
Earthquake	Education and Awareness	Educate property owners on proper construction techniques to reduce potential damage from earthquakes	Town Zoning Administrator	2015 to 2016	Town general fund	Medium
Hazardous materials spill	Local Planning and Regulation	Provide hazardous materials awareness training for the fire department	Fire Department	2015 to 2016 and ongoing	Town general fund	Medium
Hazardous materials spill	Natural Systems Protection	Identify groundwater source areas and develop ordinances to protect those areas	Vermont Geological Survey	2016 to 2019	VT Geological Survey funds	Medium
Infectious disease outbreak	Local Planning and Regulations	Monitor disease occurrences and potential outbreaks	Town Health Officer	2015 to 2020 as ongoing program	Town general fund	High
Infectious disease outbreak	Education and Outreach	Provide educational materials in printed form and on the town web site on potential infectious diseases	Town Health Officer	2015 to 2018	Town general fund /State of Vermont Health Department	High
Invasive species	Local Planning and Regulations	Monitor extent of invasive species, particularly forest invasive species such as Emerald Ash Borer	Town Select Board	2015 to 2020 as ongoing program	Town general fund	High
Invasive species	Local Planning and Regulations	Complete surveys for ash trees vulnerable to Emerald Ash Borer	BCRC; Bennington County Conservation District	2015 to 2018	FEMA HMGP, PDM VT Department of Forests, Parks and Recreation	Medium
Invasive species	Local Planning and Regulations	Survey for invasive species (e.g., Japanese knotweed)s along streams to identify potential erosion areas	Batten Kill Watershed Alliance	2015 to 2018	State of Vermont Department of Parks, Forestry and Recreation	Medium
Invasive species	Local Planning and Regulations	Encourage use of native species in plantings for commercial and residential development	Town Planning Commission	2015 to 2020 as ongoing program	Town general fund	Medium

Table 25. Mitigation actions						
Hazard	Type[2]	Action	Responsible Party	Time Frame	Funding Source(s)	Priority
Invasive species	Education and Awareness	Provide outreach materials for landowners on using native plants and controlling invasive species	Bennington County Conservation District	2015 to 2018	Town general fund /State of Vermont Department of Parks, Forestry and Recreation	High

E. Monitoring, Evaluating and Updating This Plan

1. Annual Monitoring and Continued Public Involvement

Copies of this plan will be kept at the town office and made available via the town and BCRC website. The Select Board intends to involve the public in the implantation, review and update of this plan. This plan will be integrated into existing planning efforts including updates to the Town Plan, which expires in 2016 as well as the annual Local Emergency Operations Plan. Vermont statutes require that the Town Plan incorporate a flood resilience section, and the hazard mitigation plan will be used to develop this new section. New data from a variety of studies completed by the Bennington County Regional Commission, the State of Vermont, the U.S. Forest Service and others will be used in updating the town plan, as they were used to develop this hazard mitigation plan. The process of updating the town plan will incorporate the public involvement, agency review and adjacent town review requirements of Vermont statutes.

During the annual budget process, the Stamford Select Board will review the status of hazard mitigation actions in this plan. At that time, the Board will also consider new actions following discussions with the road foreman, the Vermont Agency of Transportation, the Bennington County Regional Commission and by soliciting comments from other agencies and from members of the public. If necessary, the plan will be amended to include these new projects. During Town Meeting Day, which occurs in March of each year, members of the public will be afforded the opportunity to comment on the status of any projects and on any needed changes to the hazard mitigation plan.

2. Plan Evaluation and Update

The Stamford Select Board will be responsible for serving as or creating a planning team for evaluating and updating the plan at least one year before the five year period covered by this plan, the planning team will initiate a review of the plan, by:

1. Updating the descriptions and analyses of events using new information since completion of the 2015 draft
2. Identification of any new buildings or infrastructure or changes in critical facilities.
3. Estimation of potential probability and extent of hazards based on any new information since completion of the 2015 plan and the updated Town Plan.
4. Review of completed hazard mitigation projects
5. Identification of new projects given the revised hazard evaluation
6. Review of any changes in priorities since adoption of the 2015 plan
7. Revision of the assessment of risks and vulnerability from identified hazards
8. Development and use of criteria to assess the potential benefits and costs of identified actions for use in prioritizing those actions

9. Integration of the updated plan into the Stamford Town Plan and other plans and programs

The planning team will hold open meetings to solicit opinions and to identify issues and concerns from members of the public and stakeholders. The planning team and the Town of Stamford Select Board will work with the Bennington County Regional Commission and the State Hazard Mitigation Officer (SHMO) to review and update their programs, initiatives and projects based on changing local needs and priorities. BCRC will assist in any necessary coordination and communication with neighboring towns to assure that mitigation actions address regional issues of concern. The revised plan will be submitted for review by the State Hazard Mitigation Officer and FEMA and revised based on their comments. Following approval by FEMA, the Select Board will adopt the completed plan.

Should a declared disaster occur, Stamford may undertake special review of this plan and the appropriate updates made. After Action Reports, reviews, and debriefings should be integrated into the update process. The plan should also be updated to reflect findings of the river corridor plan, culvert study and other studies.

3. Local Emergency Operations Plan

The Local Emergency Operation Plan (LEOP) provides contact information and list the steps to setting up an incident command structure, assessing risks and vulnerabilities, and providing for resources and support. The plan primarily forms the basis for managing emergencies using the Incident Command System. This plan must be updated by May 1 of each year. During the update process, events of the past year will be used to expand the plan as needed. Most events in the Town of Stamford involve accidents, structure fires, weather events that may close roads or down powerlines or involve search and rescue activities. Where such events point to actions that could serve to mitigate such hazards, these can be incorporated into the LEOP as well as used to amend the hazard mitigation plan, the Town Plan, the budget or road maintenance and construction plans.

VI. References and Sources of Information

A. Literature and Reports

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B. Map Data Sources

The Vermont Center of Geographic Information provides data on transportation systems, the location of structures (E911), critical facilities, jurisdictional boundaries, and other information. That data was used in all maps. Data from other sources were used in specific maps as noted below.

Map 1. Vermont Center for Geographic Information, http://vcgi.vermont.gov/
U.S. Department of Agriculture Geospatial Data Gateway for NAIP orthoimagery and topography, http://datagateway.nrcs.usda.gov/
Map 2. Vermont Center for Geographic Information, http://vcgi.vermont.gov/
Digital Coast, NOAA Coastal Services Center for 2010 land cover, http://www.csc.noaa.gov/digitalcoast/tools/lca

Map 3. Vermont Center for Geographic Information, http://vcgi.vermont.gov/
U.S. Department of Agriculture Geospatial Data Gateway for NAIP orthoimagery and topography, http://datagateway.nrcs.usda.gov/

Map 4. Vermont Center for Geographic Information, http://vcgi.vermont.gov/
U.S. Department of Agriculture Geospatial Data Gateway for NAIP orthoimagery and topography, http://datagateway.nrcs.usda.gov/

Map 5 Vermont Center for Geographic Information, http://vcgi.vermont.gov/
U.S. Department of Agriculture Geospatial Data Gateway for NAIP orthoimagery and topography, http://datagateway.nrcs.usda.gov/
Vermont Agency of Natural Resources Natural Resources Atlas, http://anrmaps.vermont.gov/websites/anra/

Map 6. Vermont Center for Geographic Information, http://vcgi.vermont.gov/
U.S. Department of Agriculture Geospatial Data Gateway for NAIP orthoimagery and topography, http://datagateway.nrcs.usda.gov/
Vermont Geological Survey, http://www.anr.state.vt.us/dec/geo/grndwaterinx.htm

Map 7. Vermont Center for Geographic Information, http://vcgi.vermont.gov/
U.S. Department of Agriculture Geospatial Data Gateway for NAIP orthoimagery and topography, http://datagateway.nrcs.usda.gov/
LANDFIRE Program, www.landfire.gov

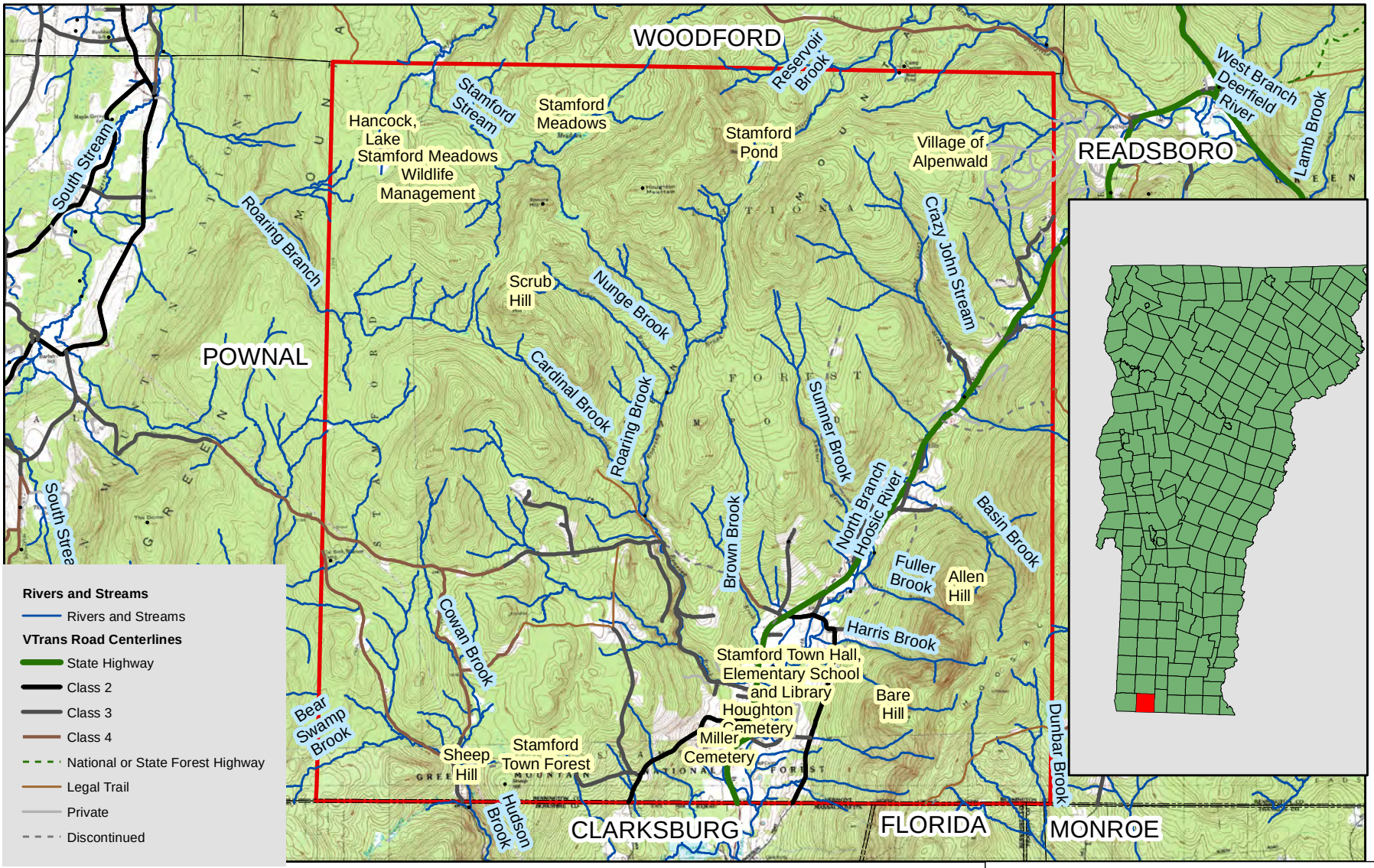
C. Personal Communication Sources

Richard Heims, NOAA regarding drought indices, richard.heim@noaa.gov

Stuart Hinson, NOAA regarding NCDC data, stuart.hinson@noaa.gov

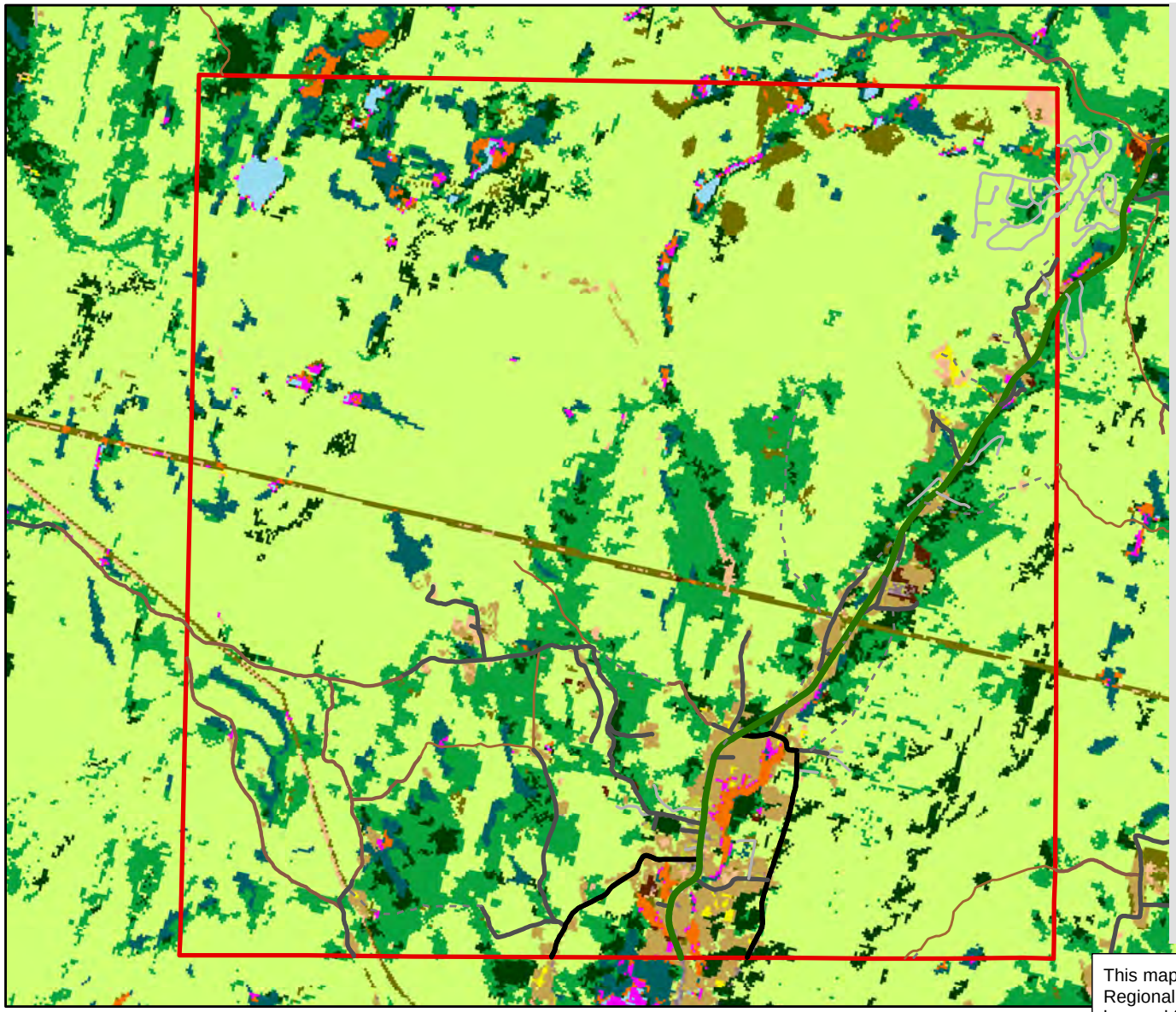
George Springston, Norwich University, Northfield, VT gsprings@norwich.edu

Map 1. Town of Stamford, Vermont



This map was prepared by the Bennington County Regional Commission in July of 2014. This map should be used for planning purposes only. See Section VI for sources of information and consult those sources for data use limitations.

Map 2. Stamford Land Cover



VTrans Road Centerlines

- State Highway
- Class 1
- Class 2
- Class 3
- Class 4
- National or State Forest Highway
- Legal Trail
- Private
- Discontinued

NOAA Land Cover 2010

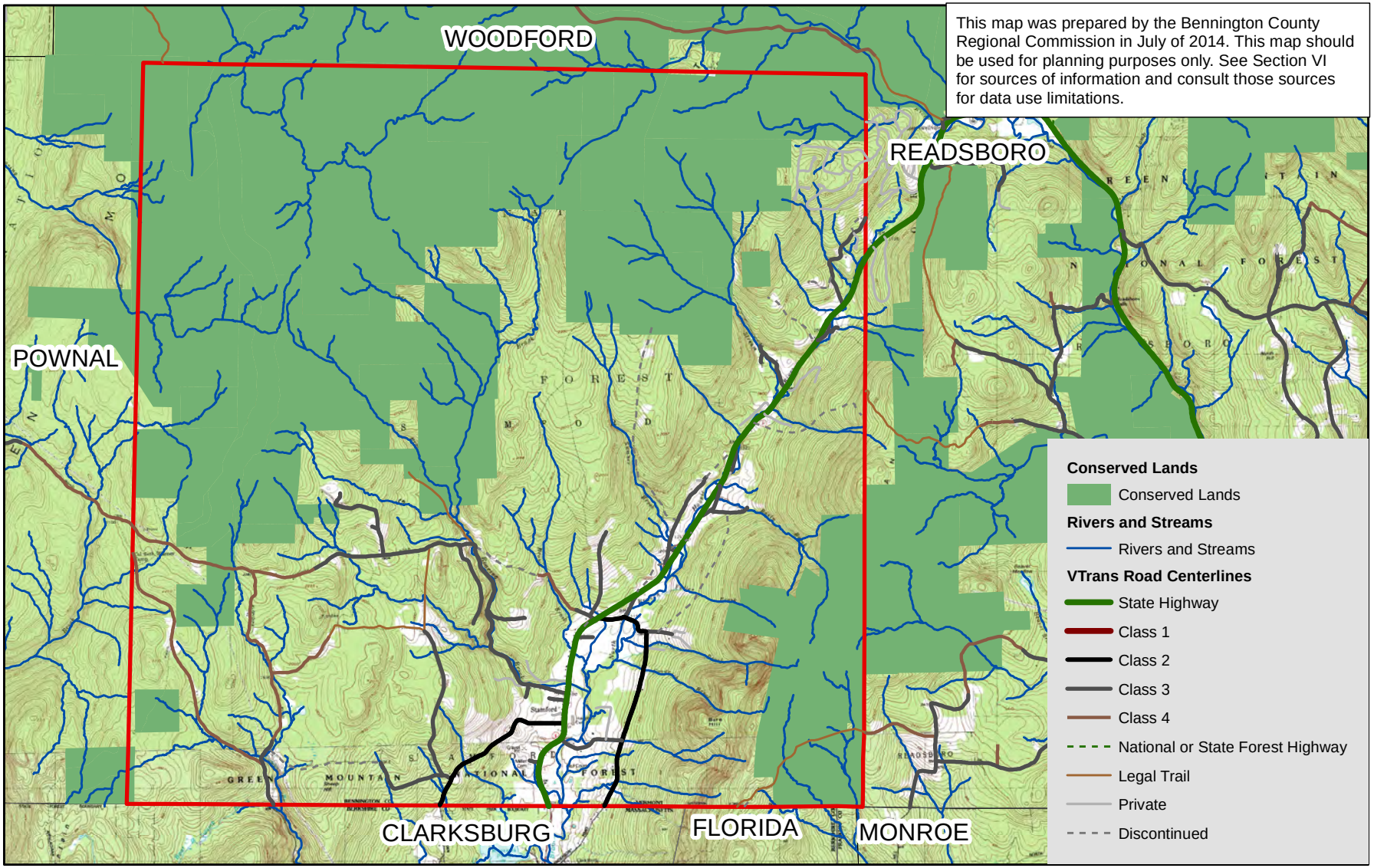
- Developed, High Intensity
- Developed, Medium Intensity
- Developed, Low Intensity
- Developed, Open Space
- Cultivated Crops
- Pasture/Hay
- Grassland/Herbaceous
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Scrub/Shrub
- Palustrine Forested Wetland
- Palustrine Scrub/Shrub Wetland
- Palustrine Emergent Wetland
- Bare Land
- Open Water
- Palustrine Aquatic Bed

N

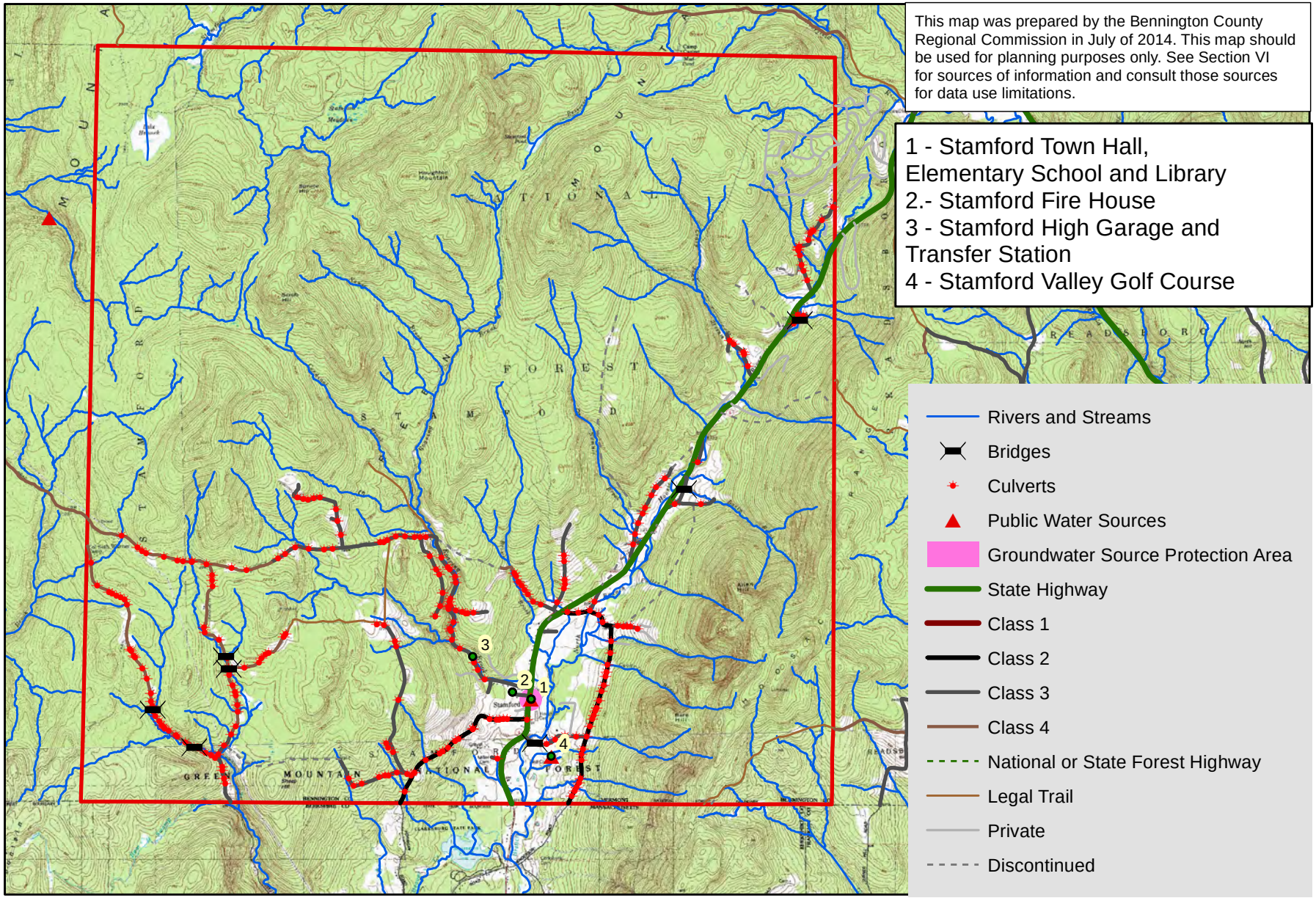
0 0.5 1 2 3 4 5 Miles

This map was prepared by the Bennington County Regional Commission in July of 2014. This map should be used for planning purposes only. See Section VI for sources of information and consult those sources for data use limitations.

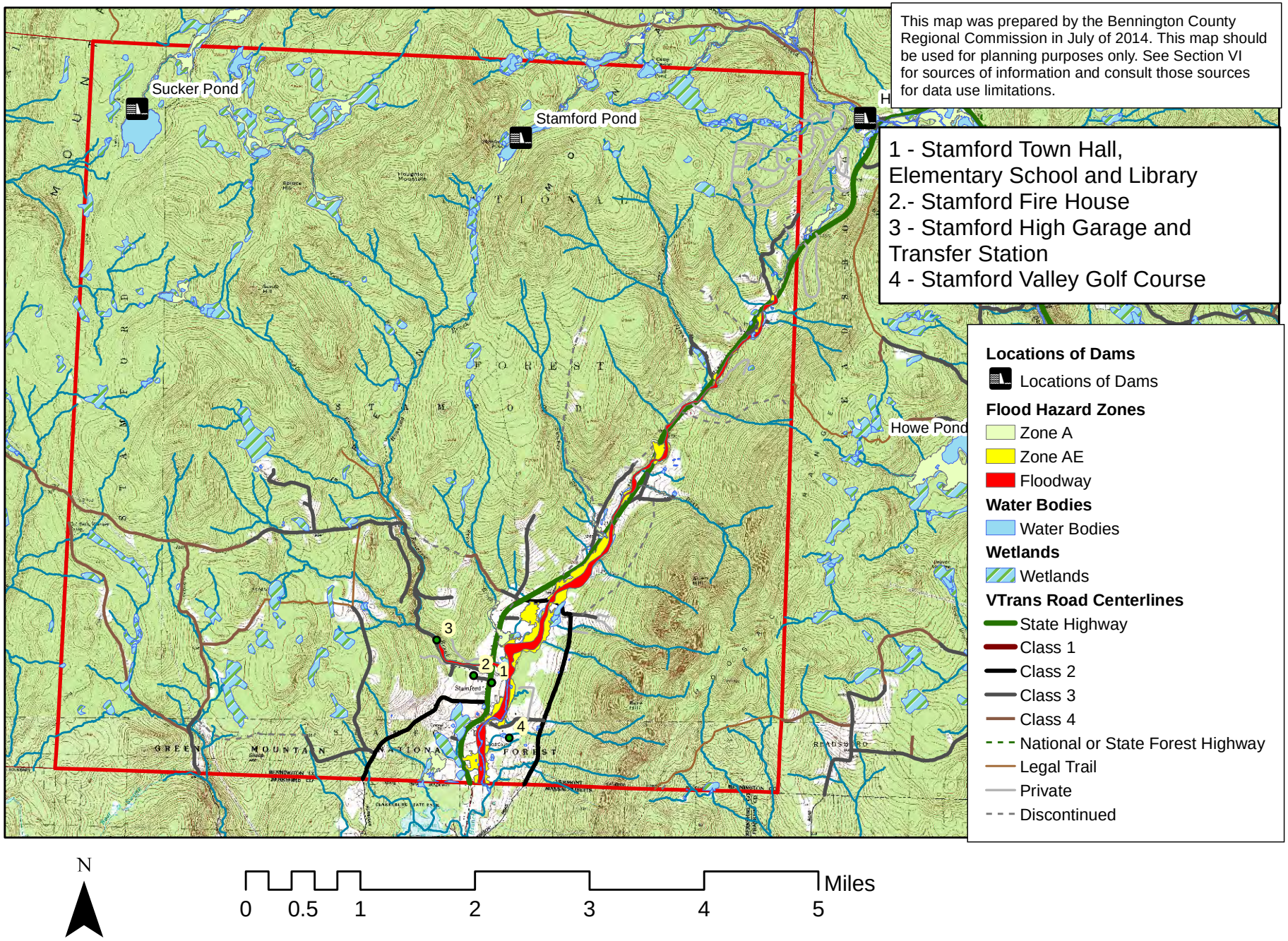
Map 3. Stamford Conserved Lands



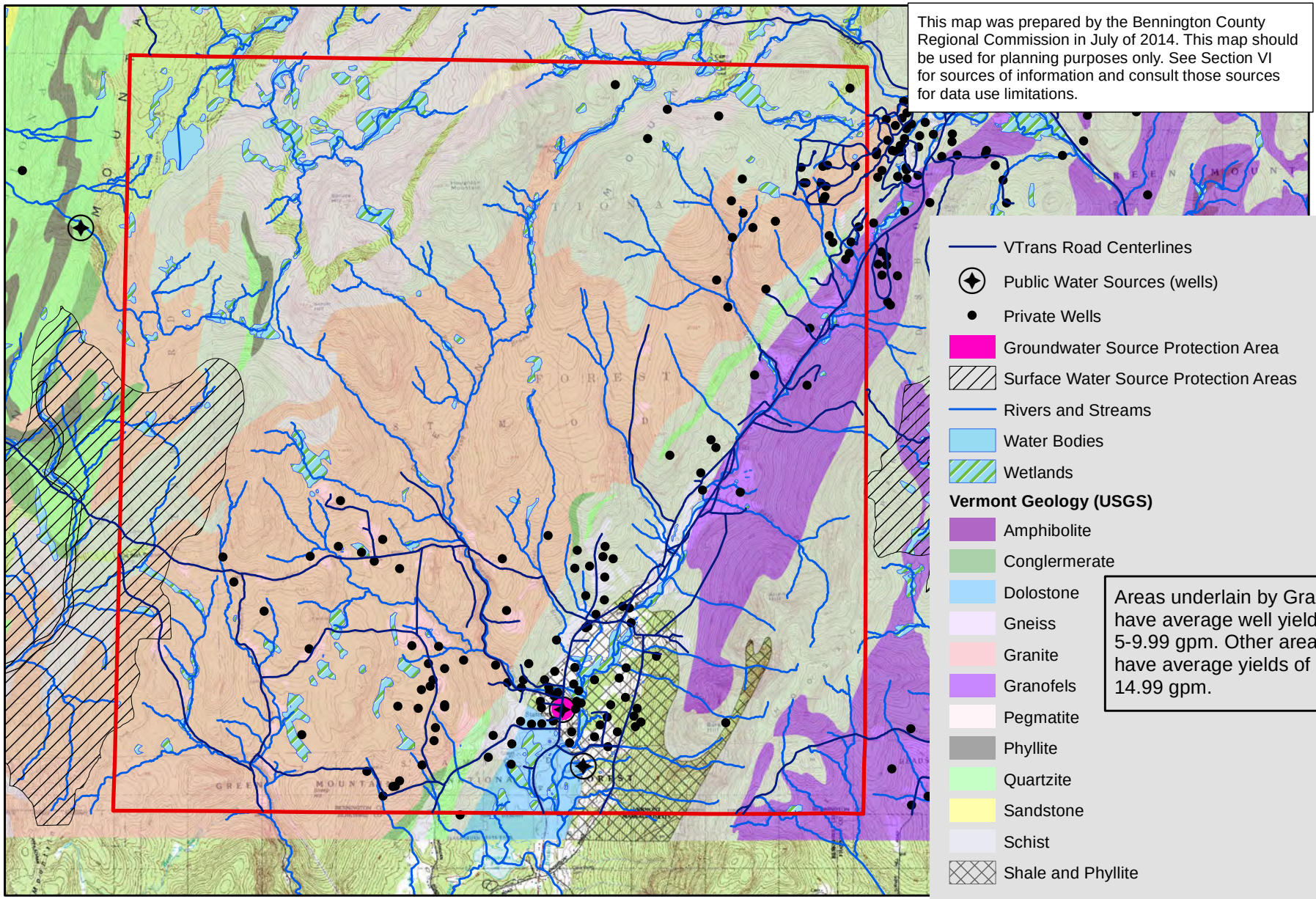
Map 4. Stamford Critical Facilities



Map 5. Stamford Flood Hazard Zones



Map 6. Stamford Water Resources



Map 7. Stamford Wildland Fuel Types