Town of Rupert
Hazard Mitigation Plan

Rupert, Vermont

Draft: September 28, 2021
Revised November 4, 2021

Town of Rupert
187 East Street
West Rupert, VT 05776

Resolution of Adoption

Date of Adoption: December 14, 2021

A Resolution adopting the Town of Rupert Hazard Mitigation Plan

WHEREAS, the Town of Rupert has worked with the Bennington County Regional 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 Rupert has developed a hazard mitigation plan that provides a series of potential projects and actions to mitigate damages from disasters that could occur in the Town, and

Whereas, the Town of Rupert has provided an opportunity for members of the public, surrounding towns, and other agencies and organizations to comment on the draft hazard mitigation plan, and

Whereas, both Vermont Emergency Management and the Federal Emergency Management Agency reviewed and provided substantive comments on the draft plan, and

Whereas, changes requested by Vermont Emergency Management and the Federal Emergency Management Agency have been incorporated in the Town of Rupert Hazard Mitigation Plan dated November 4, 2021, and

Whereas, a duly noticed public meeting was held by the Town of Rupert Selectboard to formally adopt the Town of Rupert Hazard Mitigation Plan dated November 4, 2021,

NOW THEREFORE BE IT RESOLVED that the Town of Rupert hereby adopts the Town of Rupert Hazard Mitigation Plan dated November 4, 2021 and intends to implement the actions in this plan if funding is available.

Linda Montague, Select Board Co-Chair — Date 12/14/21

Tom Wilson, Select Board Co-Chair — Date 12/14/21

Deborah Baker 12-14-2021

Deborah Baker, Select Board Member — Date

Philip Mazzucco 12/14/21

Phillip Mazzucco, Select Board Member — Date

C E Rockwell 12/14/21

Charles Rockwell, Select Board Member — Date

Andrea Lenhardt 12/14/2021

Attested by Andrea Lenhardt, Town Clerk — Date

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

January 3, 2022

Stephanie A. Smith, State Hazard Mitigation Officer
Vermont Emergency Management
45 State Drive
Waterbury, Vermont 05671-1300

Dear Ms. Smith:

As outlined in the FEMA-State Agreement for FEMA-DR-4474, your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. Our Agency has been notified that your office completed its review of the Town of Rupert Hazard Mitigation Plan and approved it effective **December 17, 2021** through **December 16, 2026** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

With this plan approval, the jurisdiction is eligible to apply to Vermont Emergency Management for mitigation grants administered by FEMA. Requests for funding will be evaluated according to the eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in this community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region I Mitigation Division for approval every five years to remain eligible for FEMA mitigation grant funding.

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Jay Neiderbach at (617) 832-4926 or Josiah.Neiderbach@fema.dhs.gov.

Sincerely,

Paul F. Ford
Acting Regional Administrator
DHS, FEMA Region I

PFF:jn

cc: Ben Rose, Recovery and Mitigation Section Chief, VEM

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I. Introduction

A. Purpose

Hazard mitigation actions are intended to reduce potential losses from natural hazards such as flooding, landslides, wildland fire, and similar events. Hazard mitigation plans identify, assess, and prioritize those hazards and present actions that a community can undertake to reduce risks and damage from those natural hazards (Federal Emergency Management Agency 2013a).

This plan identifies, describes, and prioritizes potential natural hazards that could affect the Town of Rupert in Bennington County, Vermont and provides specific measures to reduce or avoid those effects. The Federal Emergency Management Agency (FEMA), within the U.S. Department of Homeland Security and the Vermont Department of 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 team and dates of meetings and public and agency review. Section IV analyzes the following hazards:

- Flooding and Fluvial Erosion
- Winter Storms
- High Wind Events
- Hail
- Temperature Extremes
- Drought
- Wildfire
- Earthquake
- Landslides and Rock Falls
- Invasive Species
- Hazardous Materials Spill
- Infectious Disease Outbreak

Section V assesses vulnerability, and Section VI discusses mitigation goals and actions, including current programs and town capabilities. Section VII describes how the plan will be maintained and updated.

B. Mitigation Goals

The Town identified the following mitigation goals:

1. Reduce injury and loss of life resulting from natural disasters.
2. Reduce damage to public infrastructure, 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, water supply systems 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. Increase the economic resiliency of Rupert by reducing the economic impacts incurred by municipal, residential, agricultural, and commercial establishments due to disasters.
6. Incorporate hazard mitigation planning into other community planning projects, such as Town Plan, Capital Improvement Plan, and Town Local Emergency Management Plan
7. Ensure that members of the general public continue to be engaged in the hazard mitigation planning process.

Implementation of the actions in this plan to achieve the above goals would also help achieve the statutory requirements of 24 V.S.A. Chapter 117 requirements including those to protect natural and cultural resources, provide affordable housing, support economic development and maintain a working landscape. These are also expressed in the Rupert Town Plan (2021).

II. Town Profile

A. Demography and Land Use

Rupert is located in the northwest corner of Bennington County, on the Vermont-New York line, and is bordered by Dorset to the west, Manchester to the southeast, Sandgate to the south, Pawlet in Rutland County to the north, Danby in Rutland County to the northeast, and Hebron and Salem in New York to the west (Map 1). The 2010 population was 714. Population growth has slowed significantly, and future growth is expected to be minimal by 2020 and 2030. Rupert has a population density of approximately 16.2 persons per square mile, compared with an average county density of 55.1 persons per square mile. Rupert's seasonal population is difficult to estimate but, based on the number of seasonal or vacation homes in town, there may be an additional 200 to 300 seasonal residents in town at any given time

(Town of Rupert 2015). Table 1 shows the number of structures by type within the town. Most of the town is forested (Map 2).

Table 1. Number of buildings by type. Source: Vermont Geoportal 2020 E911 data	
Type	Number
Single-family residential	371
Mobile home	20
Multi-family	3
Seasonal home	0
Other residential	2
Commercial/Industrial	20
Lodging	0
Camp	75
Government	2
Fire station	1
Education	0
Library	1
House of Worship	3[1]
Health clinic	0
Utility	1
Other	35
Total	534

B. Economic and Cultural Resources

Rupert is a residential community though, according to the 2020 Draft Town Plan, 27% were self-employed and 12% worked from home. Most workers commute. There are 20 employers in the town, including the town government. Farming and forestry operations, including maple sugar, are significant parts of the economy. Rupert and West Rupert were designated as Village Centers by the Agency of Commerce and Community Development in 2017 (Map 3).

Other cultural centers include the Rupert Methodist Church, Sherman Store, the Congregational Church, the Town Library, and the Town Hall.

C. Critical Facilities

Map 3 shows the locations of critical facilities including town hall, the town garage, fire stations, shelters, and post offices. These are listed in Table 2 below.

[1] One public gathering site is in an old field shown on East Road.

Table 2. Rupert critical facilities	
Label	Facility
1	Town Hall
2	Church of Christ
3	Communications Tower
4	Sherman's Store
5	Post Office
6	Fire House/Primary Shelter
7	Town Garage
8	Congregational Church/Secondary Shelter
9	Historical Society/Library
10	Post Office
11	Sheldon's Store Community Center

III. Planning Process

A. Planning Team

The Select Board appointed a planning team on April 28, 2020.

Table 3. Planning committee members	
Name	Affiliation
Linda Montague	Rupert Select Board
Deborah Baker	Rupert Select Board
Tom Wilson	Rupert Select Board

B. Public Involvement

All meetings were public meetings announced on the town web page, Front Porch Forum, and in notices posted around town.

Table 4. Dates of planning meetings and public and agency review	
Meeting	Date (s)
Meeting #1	July 14,2020
Meeting #2	August 18, 2020
Meeting #3	July 9, 2021
Meeting #4	September 21, 2021

The town sent the plan to the following representatives of the surrounding towns of Pawlet, Danby, Dorset, Manchester, and Sandgate in Vermont, d to Hebron and Salem in New York (Map 1), to the Bennington County Regional Commission , and concurrently with sending the draft to Vermont Emergency Management for review as authorized by the Select Board at a warned public meeting on September 28, 2021:

Rob Gaiotti, Town Manager, Town of Dorset, VT
John O'Keefe, Town Manager, Town of Manchester, VT.
Karen Dzialo, Select Board Chair, Town of Sandgate, VT
Deb Hawkins, Pawlet Town Clerk, Town of Pawlet, VT
Mike Beecher, Chair, Pawlet Town Clerk, Town of Pawlet, VT
Bradley J. Bender, Select Board Chair, Town of Danby, VT
Janice Arnold, Danby Town Clerk, Town of Danby, VT
Brian R. Campbell, Supervisor, Town of Hebron, NY
Dorothy Worthington, Town Clerk, Town of Hebron, NY
Evera Sue Clara, Supervisor, Town of Salem, NY
Patricia Gilchrist, Town Clerk, Town of Salem, NY
James Sullivan, Director, Bennington County Regional Commission, Bennington, VT

The plan was sent to all recipients via email and posted on the Town of Rupert website. Recipients were asked to share the document with other town officials who may wish to comment and to send any comments to Michael S. Batcher, Bennington County Regional Commission, 210 South St., Suite 6, Bennington, VT 05201 via mail, or via email at mbatcher@bcrcvr.org by November 1, 2021.

At the September 28, 2021 meeting, there were no members of the public present during the discussion of the hazard mitigation plan, and no comments were received.

No comments were received from any of the adjacent towns. The Bennington County Regional Commission provided the following comments, and responses are below each comment:

Comment #1: In the Goals, section, is there a place to explicitly state that mitigation/resiliency efforts can support local and state goals for development of housing and mixed-use development in villages planned for compact development (i.e., Rupert and West Rupert)?

Additional language to address this comment was added to I. B. and VI. A.

Comment #2: Does Sheldons' Store in Rupert Village (community center) qualify as a critical facility (or deserve some special mention)?

Comment #3: Pages 12-14, seems to take a while to get around to the real impacts of TS Irene (erosion), but it is there!

No response necessary.

Comment #4: The scientist in me couldn't abide the "100%" chance statement regarding moderate or greater snowstorms, but it is a minor point.

The range suggested in the Vermont Hazard Mitigation Plan of >75% was substituted for 100%.

Comment #5: Probably just my abhorrence of hot weather, but do we really only average on {sic} 90+ degree days per year? Should we include days with a high heat index (i.e., including relative humidity?

Weather records indicate few days exceeding 900, though this will likely increase with climate change. The discussion in IV. F. addresses this. Relative humidity data is not recorded by area weather stations.

Comment #6: Should mention be made of the August (or was it late July) 2021 flash flooding in northern Bennington County that resulted in the federal disaster declaration?

Comment #7: The Rupert Town Plan was adopted on May 25, 2021.

The updated plan is now referenced.

Comment #8: The regional plan was actually adopted in its entirety (with the addition of the energy section) on March 23, 2017.

The reference has been updated.

Comment #9: Should mention the August (or was it late July) 2021 flash flooding in northern Bennington County that resulted in the federal disaster declaration?

Additional language was added to IV. B. 2. to address this comment.

Following a review by Vermont Emergency Management, the Select Board adopted the plan, dated November 4, 2021, at their regularly scheduled meeting on November 23, 2021.

IV. Hazard Assessment

A. Hazard Assessment

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

a. Local knowledge

b. Village Center Designation from the Vermont Agency of Commerce and Community Development FEMA lists and descriptions of past disaster declarations
c. The National Climate Center storm events (National Oceanographic and Atmospheric Administration 2019 site)
d. FEMA lists and descriptions of past disaster declarations
e. The Vermont Department of Forests, Parks and Recreation data on wildfires
f. HAZUS runs on potential earthquake damage
g. The Pownal, Sunderland, Peru, Danby, and Bennington cooperative weather stations have data, temperature, and precipitation normals from 1981 to 2010
h. Palmer Hydrologic Drought Index calculated from 1985 to 2019 from NOAA
i. Hazardous materials spills from VT ANR
j. Infectious disease outbreaks listed from the Vermont Department of Health (note these fluctuate, so only recent data are used)
k. Observations of invasive species compared to the state and federal lists of noxious species
l. Fuel types and potential for wildfire from LANDFIRE (http://www.landfire.gov/) and from the Vermont Department of Parks, Forests and Recreation
m. Earthquake data from the Northeast Earthquake Maps and Catalog (http://www.bc.edu/research/westonobservatory/northeast/eqcatalogs.html)
n. Vermont Agency of Natural Resources and Vermont Agency of Agriculture, Food and Markets on invasive species and surveys completed within Sunderland.
o. Identification of ranking of the potential for landslides by Josh Duncan (2015), a student at Green Mountain College using a modified protocol based on Clift and Springston (2012)
p. The Vermont Hazard Mitigation Plan (2018)
q. New England Weather, New England Climate (Zielinski and Keim 2003), Vermont Weather Book (Ludlum 1996)
r. FEMA 2015 Flood Insurance Study, Bennington County, Vermont and Incorporated areas, Federal Emergency Management Agency Study Number 5003CV000A
s. National Weather Service 2014. Advanced Hydrologic Prediction Service, stream gauge information for the Hoosic River near Williamstown, MA. Available via: http://water.weather.gov/ahps2/hydrograph.php?wfo=aly&gage=wilm3
t. SHELDUS records which were not as complete as NOAA and, therefore, not used.
u. Vermont Agency of Natural Resources and Vermont Agency of Agriculture, Food and Markets on invasive species.

With respect to NOAA data, there have been numerous changes to that database in just the last few years. While NOAA 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, for 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, Danby Four Corners and Pownal in Vermont have the most consistent long-term data, though some is available from the North Adams, MA observer. We used Sunderland and Danby as the closest stations. The only stream gauge is in Bennington

near the New York border. There are no weather stations that record or keep long term data records in Rupert.

B. Flooding and Fluvial Erosion

1. Description

a. Flooding

Flooding and associated fluvial erosion are the most frequent and damaging natural hazards 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 creek 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. 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 Mettawee River flows northward from East Rupert through North Rupert to the Pawlet town line, eventually emptying into Lake Champlain at Whitehall, NY. The northwest part of town drains into the Indian River, which forms near the hamlet of Rupert and flows north, joining the Mettawee in Pawlet. The southwest part of town includes the headwaters of Mill Brook and White Creek which drain south, through the Rupert Valley, to the Batten Kill and then to the Hudson River (Town of Rupert 2021).

While these rivers are relatively low gradient, they are also flashy, and flood damage that occurs results from fluvial erosion rather than inundation. 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 Rupert. 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 the January thaw (late January) and in March and April as spring approaches.

Flash floods can occur after spring melt of mountain snow, following large storms such as Tropical Storm Irene, or after significant thunderstorms. Map 4. Rupert Flood Zones and River Corridors shows the location of both flood hazard zones and river corridors in the town. Rupert had previously incorporated fluvial erosion hazard zones, also shown on Map 4 in their bylaws. (formerly fluvial erosion hazard zones). The other areas designated by the Vermont Agency of Natural Resources as river corridors are not regulated under the town bylaws as of the drafting of this plan.

Most development in Rupert is in the valleys along the above streams and following Sandgate-Rupert Road, Kent Hollow Road, Pawlet Mountain Road, Routes 153 and 315 as well as other roads following valleys in the steep terrain. 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. Fluvial erosion can range from gradual bank erosion to catastrophic changes in the location of the river channel (Vermont River Management Program 2010). There are no dams located in Rupert.

b. Fluvial Erosion

In Vermont, most rivers flow through relatively confined valleys, but still meander over time across the floodplain. The Vermont Hazard Mitigation Plan (2018) states that 75% of flood damages as measured in cost are due to erosion rather than inundation. River corridors provide an area within which a river can move across the landscape as it dissipates energy and transports and deposits sediments. Where rivers are constricted by bridges and other structures or rip rap, the water moves at higher velocity, resulting in downcutting and collapse of the banks. This may undermine structures within the corridor.

2. 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. The remnants of Hurricane Belle (August 9-10, 1976; DR-518) caused flooding damage in portions of Vermont.

Table 5 shows a total of 59 flood events in Bennington County from 1996 to 2019, using NOAA data. These have been primarily minor and affected either specific streams, such as the Batten Kill, the Hoosic and the Walloomsac, or specific towns.

Table 5. Total number of flood events by type and year for Bennington County. Source: National Oceanographic and Atmospheric Administration 2019

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
2007	1	1	2
2008			
2009	2		2
2010			
2011	3	3	6
2012			
2013	4		4
2014			
2015			
2016			
2017		1	1
2018		1	
2019		8	8
2020			
Total	22	37	59

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. Rupert has been subjected to two major tropical storms in the past twenty years. Hurricane Floyd was a Category 4 storm before hitting North Carolina, and then was reduced to a tropical storm when it reached southern New England. Tropical Storm Irene was the remnant of Hurricane Irene, which was a Category 1 hurricane. . A category 1 storm has winds of 74-95 miles per hour and could damage roofs, down shallow-rooted trees, and damage power lines (http://www.nhc.noaa.gov/aboutsshws.php).

The following describes ten flooding events that have occurred since 1996, using the National Weather Service (2010) categories, which affected Rupert or nearby areas. These events were described in the National Climate Database records (2015). It should be noted that only the January 1996 event occurred in the winter, with all other events in the spring, summer, or fall.

January 19 to 20, 1996 (DR-1101): An intense area of low pressure which was located over the Mid-Atlantic region on Friday morning January 19th 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. *Note that this was also categorized as a High Wind event.

September 16 to 17, 1999 (DR-1307): 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 hill towns. Power outages occurred across southern Vermont. A Cooperative Weather Observer recorded 4.94” of rain in Sunderland.

July 14 to 17, 2000 (DR- 1336): Thunderstorms caused torrential rainfall with flash flooding washing out sections of roadways in northeast Bennington County and southern Bennington

County. Route 7 was closed due to flooding and rockslides and 67 was closed due to flooding. Numerous other roads were closed, with some washed out. A Cooperative Weather Observer recorded 3.39" of rain in Sunderland.

December 17, 2000 (DR-1358): Unseasonably warm and moist air brought a record-breaking rainstorm to southern Vermont. Rainfall averaged 2-3 inches. The rain fell very heavily at times, up to an inch per hour. The rain, combined with snowmelt and frozen ground, lead to a significant runoff and flooding. A bridge across White Creek in West Rupert was flooded and damaged.

March 29 to 30, 2003: Up to two inches of rain fell across southern Vermont.

July 21 to 18 August 2003 (DR-1488): Severe storms and flooding affected Vermont including Bennington County. (Note: this event does not appear in the NOAA data.) A Cooperative Weather Observer recorded sporadic and sometimes large amounts of precipitation during that period in Sunderland.

March 31 through April 2, 2004: As much as three inches of rain fell from March 31st through April 2nd across southern Vermont. This rain combined with the last of the snow melt to produce an excessive runoff of water. As a result, flooding took place in Bennington County. The Manchester Schools were closed due to flooding.

April 16 to 17 2007 (DR-1698): An intense coastal storm spread heavy precipitation across southern Vermont, starting as a mixture snow, sleet and rain which changed to all rain. Liquid equivalent precipitation totals ranged from three to six inches leading to minor flooding across portions of southern Vermont. A Cooperative Weather Observer recorded 3.54" of rain in Sunderland. This led to minor flooding across portions of southern Vermont from Monday afternoon into early Tuesday.

August 28 to 29, 2011 (DR-4022): Tropical Storm Irene produced widespread flooding, and damaging winds across the region. Rainfall amounts averaged four to eight inches and fell within a twelve-hour period. A Cooperative Weather Observer recorded 5.16" of rain in Sunderland. 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. 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.

September 7, 2011: 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 inches led to widespread minor to moderate flooding across southern Vermont. A Cooperative Weather Observer recorded 4.63" of rain between September 5th and 9th.

January 24, 2019: A heavy snowfall event on January 19-20 was followed by warm temperatures and rain on the 24th. Four inches of rain were recorded in Southern Vermont. An individual was stranded in their residence on Route 30 in Rupert and several gravel roads were washed out. In addition, a house on Route 133[2] was evacuated when floodwaters entered the first floor and the house sustained major damage.

The events described above cover the period from 1996 through 2020 as 2021 data is not yet available from the National Oceanographic and Atmospheric Administration. However, there was a storm event from July 29 to July 30, 2021 involving storms that affected both Bennington and Windham Counties. This event was declared a disaster on September 29, 2021 (FEMA-4621-DR) to address the damages from flooding from that event.

c. Extent and Location

The primary damages from past events have been from flooding and fluvial erosion with secondary damage from wind. There have been no NFIP-designated repetitive losses within Rupert. Flash floods are the most common type of flooding as waters flow rapidly from higher elevations (Map 4). Thunderstorms have become entrained in the mountains to the east. Routes 153 and 315 are close to the brook, and culverts have been damaged by these flash floods. Generally, water recedes quickly after these storms. Flooding can occur after spring melt of mountain snow, following large storms such as Tropical Storm Irene, or after significant thunderstorms. During Irene, there were washouts along several area roads.

During Irene, Route 153 to Salem, NY was flooded blocking access to and from Rupert in that direction. Portions of Rupert Green were also flooded. On Route 315 a portion of the road was undermined and required construction of a retaining wall. As can be seen on Map 5, there were three sites where the roads were subject to temporary failures where damage took several days to repair (Sandgate Road bridge replaced; Cross Road where 0.7 miles of road were washed out; and Route 315 where a bridge was undermined). One site on Sandgate Road was closed while the bridge was replaced. In addition, portions of a bridge on Saunders Lane were washed out. Several culverts became blocked resulting in water washing down or over some road sections along Sykes Hollow Road, Perkins Road and Ebenville Road. The Perkins Road culvert has suffered damage in previous flooding as well. Route 153 and near the intersection with East Street was under water.

There have been no NFIP-designated repetitive losses within the jurisdiction. Based on local knowledge and past events and FEMA and VT ANR mapping, Map 4 show the most likely potential extent of damages from flooding or fluvial erosion. The capacity to measure, track, and assess fluvial erosion data after storm events is not within the capability of either the town or the Vermont Agency of Natural Resources.

[2] Note this was recorded as occurring in Rupert.

In addition to the above events, the Peru, Pownal and Sunderland Cooperative Observer recorded precipitation, Table 6 shows those months by year where that value exceeded the 90th percentile, which varies by site and month. Several events of that magnitude have occurred where flooding was not recorded in NOAA records or local knowledge. High precipitation events could indicate unreported localized flooding events and, therefore, provide additional information on potential flooding extent.

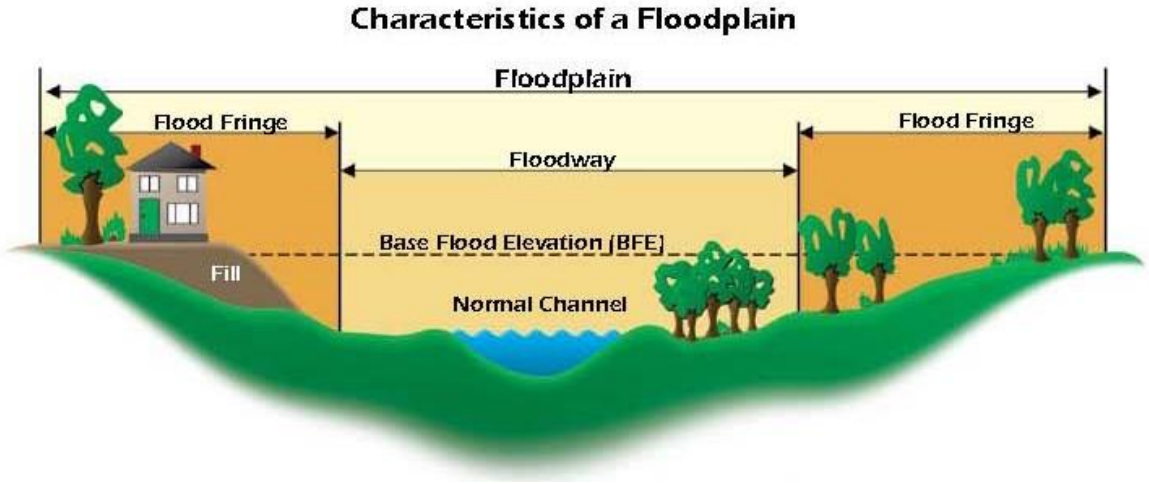
Table 6. Months where rainfall exceeded the 90th percentile (precipitation totals, in inches, in parentheses) of monthly precipitation at the Peru, Pownal and Sunderland Cooperative Observer Stations from 1990 to 2013 for Pownal, 1980 to 2017 for Peru and 1990 to 2013 for Sunderland.

Sunderland		Pownal	Peru
Month	Year	Year	Year
January	1990, 1998, 1999 (5.97”)	1996, 1998, 1999, 2006 (3.88”)	1990, 1999, 2006, 2012 (5.04”)
February	2002, 2008, 2011 (3.58”)	1981, 1984, 2008 (3.54”)	1981, 2002, 2008, 2016 (5.28”)
March	2001, 2007, 2008 (5.35”)	1980, 1999, 2001, 2007 (4.65”)	1980, 1986, 2001, 2008 (6.13”)
April	1993, 1996, 2002, 2007, 2011 (4.75”)	1983, 1990, 1993, 1996 (4.80”)	1983, 1996, 2007, 2017 (6.43”)
May	1990, 2000, 2006 (6.31”)	1984, 1990, 2013 (6.47”)	1984, 1990, 2012, 2017 (8.29”)
June	1998, 2002, 2006 (7.66”)	1998, 2000, 2002, 2013 (7.32”)	1998, 2006, 2013, 2015 (9.26”)
July	1996, 2004, 2008 (6.87”)	1984, 2004, 2010 (6.20”)	1988. 1996, 2000, 2013 (7.31)”
August	1990, 2003, 2011 (7.37”)	1990, 1991, 2003, 2011 (7.37”)	1985. 1990, 2003, 2011 (8.32”)
September	1999, 2003, 2011 (5.75”)	1999, 2004, 2011 (6.03”)	1987, 1999, 2003, 2011 (6.92”)
October	2005, 2007, 2010 (7.05”)	1987, 1995, 2010 (5.81”)	1987, 1995, 2010 (9.02”)
November	2002, 2004, 2005 (5.28”)	1985, 1988, 2005 (5.81”)	1983, 1986, 1988, 2002 (6.36”)
December	1996, 2003, 2008 (6.42”)	1983, 1990, 2003, 2011 (4.77”)	1983, 1996, 2008, 2014 (6.74”)

The average annual precipitation in Vermont has increased 5.9” since 1960. This trend is predicted to continue so that Vermont streams will have higher flows and possibly experience more frequent and greater flooding events (Galford et al. 2014).

Special Flood Hazard Areas: these are areas mapped by FEMA and using the LIDAR derived zones that were adopted in late 2015. Table 7 shows the number of structures, by type, in the special flood hazard and river corridors, and both areas are shown in Map 4. Figure 1 below shows the parts of a typical floodplain.

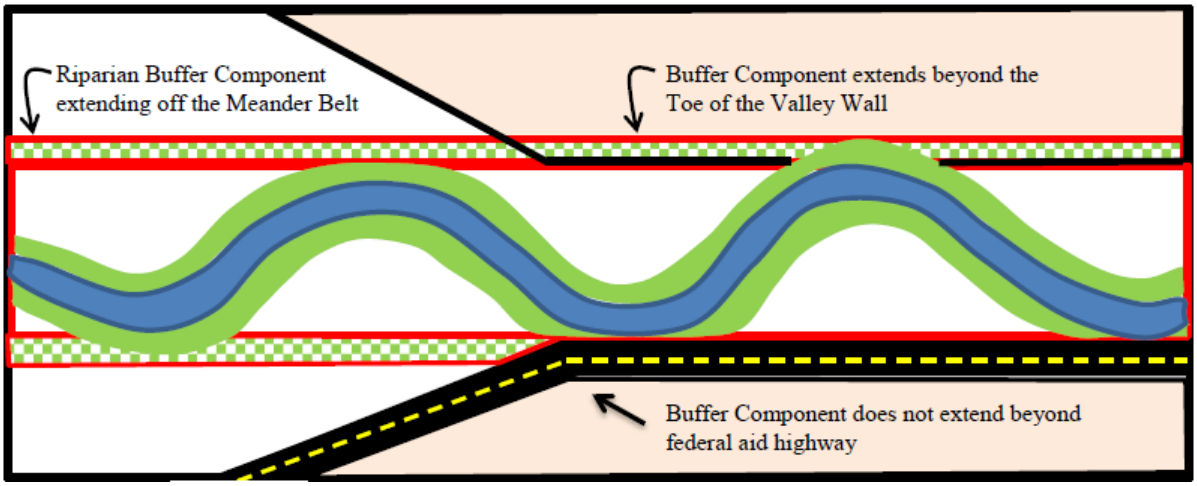
Figure 1 Typical floodplain



The Vermont Hazard Mitigation Plan (2018) states that large portions of the state have rivers with no mapped special flood hazard areas though damages from flooding still occur on those streams.

River Corridors: River corridors (Figure 2) have been mapped by the Vermont Agency of Natural Resources using geospatial data and will be modified by VT ANR river scientists using available field data. The data were used to calculate the "meander belt width" or area within which a river would move across the valley. As rivers shift their location both vertically and horizontally, erosion of adjacent lands can occur and threaten properties that may be outside of special flood hazard areas. The additional buffer allows for placement of structures beyond the meander belt width and provides for space for the changes in river geometry, bank stabilization and establishment of woody buffers to provide resistance to erosion from the movement of the channel (Vermont River Management Program 2010).

Figure 2. River corridors



d. Probability, Impact, and Vulnerability

Based on data from 1996 to 2019, 10 moderate or major flood events have affected areas within or near Rupert resulting in a 10-20% chance of such an event occurring in any given year. Table 7 tallies the number of structures by type within the river corridor and special flood hazard area. Rupert has a total of 371 single family residences, 20 mobile homes, 3 multi-family dwellings, 20 commercial/industrial establishments, 75 camps, and 7 government, church recreation, public gathering school facilities as shown in Table 7, there are 9 structures in the special flood hazard area and 77 in the river corridor recently mapped by VT ANR, and since these areas overlap, some structures are in both. No additional dwelling units, government buildings, commercial structures of public gathering places were constructed in the special flood hazard zone since the 2011 Rupert Hazard Mitigation Plan was completed. Therefore, the potential proportion damaged within the town from severe flooding would range from 1-10% with injuries of 1-10%. Most services recover in less than seven days, though help for specific property owners may take significantly longer.

Table 7. Structures by type in flood hazard zones in Rupert, VT. Source: Vermont Open Geodata Portal: https://geodata.vermont.gov/

Type	Number in special flood hazard zone	Number in fluvial erosion hazard zone	Number in VT ANR River Corridor
Single-family	6	14	40
Mobile Home	1	2	4
Government (Rt. 315 U.S. Post Office)	1		1[3]
Commercial	1		1
Public Gathering			1

[3] U.S. Post Office on Route 315

Table 7. Structures by type in flood hazard zones in Rupert, VT. Source: Vermont Open Geodata Portal: https://geodata.vermont.gov/			
Type	Number in special flood hazard zone	Number in fluvial erosion hazard zone	Number in VT ANR River Corridor
Camp	1	2	12
Other	3	2	5
Total	13	20	64

C. Winter Storms

1. 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. Members of the planning team working on the 2014 plan recalled this storm as particularly troublesome as trees still had leaves on, so power outages were extensive. 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.

2. Previous Occurrences

Table 8 summarizes the 182 winter storm events that have occurred in Bennington County since 1996. As can be seen, a high number of events occurred in 1997, 2007, 2008, 2009, 2011, 2017, 2018 and 2019. Using NOAA 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 NOAA as producing heavy or record snows or blizzards or significant icing. The Blizzard of 1993 was categorized as “Extreme.” The NOAA also reports numerous storms producing one to over three feet of snow in the Green Mountains, but these were not listed as they did not affect major population centers. The following is a summary of significant events.

Table 8. Total number of winter storm events by type and year for Bennington County. Source: National Oceanographic and Atmospheric Administration 2021.

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				2		2
2003				5		5
2004				2		2
2005	1	3		2		6
2006						0
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	3	7
2014		2		4		6
2015		2			6	8
2016		1			5	6
2017	1	3		1	7	12
2018		2		5	4	11
2019		1		5	4	10
2020		1		2	8	11
Totals	2	37	2	77	76	192

January 2 to 3, 1996 Heavy Snow: A major winter storm developed over the Gulf coast states on January 2nd and tracked northeast along the eastern seaboard during January 3rd. Heavy snow fell across southern Vermont with the average snowfall ranging from ten to twelve inches.

November 26, 1996 Winter Storm: Snow and heavy freezing rain brought down trees and power lines with 10,000 customers losing power.

January 1 to 4 2003 Winter Storm: A large storm brought several days of snow totaling approximately one foot.

January 23, 2005 Blizzard: Frequent whiteout conditions were observed by plow crews.

January 15 to 16, 2007 Ice Storm: Freezing rain and sleet resulted in widespread downed trees and power lines with accompanying widespread power outages.

February 14, 2007 Heavy Snow: Snowfall in excess of two feet across portions of Bennington County resulted in closed schools and businesses. Strong winds created near blizzard conditions during parts of the event.

March 16 to 17, 2007 Heavy Snow: Widespread snow of 10-18 inches fell across southern Vermont resulting in adverse impacts to travel and businesses.

April 12, 2007 Winter Storm: Heavy, wet snow, ranging from 8-12 inches downed trees and power lines causing widespread outages.

December 16 to 17, 2007 Winter Storm: Heavy snow mixing with sleet and accumulating 8 to 14 inches resulted in difficult travel and the closing of schools and some businesses Monday morning with some power outages. The Planning Team reported that four feet of snow accumulated in Rupert during this storm closing everything down.

February 12 to 13, 2008 Winter Storm: Snow accumulated to 4-7 inches but was accompanied by freezing rain with ¼ to 1/3 of an inch of ice.

March 4 to 5, 2008 Winter Storm/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. This storm followed a March 1, 2008 Heavy Snow event that brought 6-12 inches across southern Vermont.

December 11 to 12, 2008 Ice Storm and 11-18 Winter Storm (DR-1816): Rainfall in rates of ¼ to 1/3 of an inch/hour fell creating ice accumulations of ½ to ¾ of an inch. Snow and sleet mixed in in some areas. An estimated 15,000 customers lost power and businesses and schools were shut for several days. Very cold temperatures followed the storm. In addition, a series of storms from the 11th to the 18th resulted in more than a foot of accumulated snow. FEMA-DR-1816 was issued.

January 1 to 3, 2010 Heavy Snow: A strong storm brought 10 inches to over two feet of snow across Bennington and Windham counties.

February 23 to 24, 2010 Heavy Snow: Heavy snow totaling one to two feet fell across southern Vermont with highest amounts in elevations above 1500 feet.

February 26 to 27, 2010 Heavy Snow: Just after the storm described above, a second storm brought one to two feet in higher elevations with lesser amounts below 1000 feet in elevation.

December 26 to 27, 2010 Winter Storm: Heavy snow falling at rates of 1-3 inches/hour resulted in one to two feet of snow. Winds were strong and gusted to 35-45 mph.

January 12, 2011 Winter Storm: A strong storm resulted in 14 inches to three feet of snow falling at rates of three to six inches/hour.

February 1 to 2, 2011 Winter Storm: Snowfall was generally 10-18 inches but ranged to 25 inches in some areas.

February 25, 2011 Winter Storm: Snow fell at rates of one to two inches/hour with totals of 12 to 17 inches across southern Vermont.

October 29 to 30, 2011 Winter Storm: While not yet winter and with trees with much of their foliage still on, 5 to 14 inches fell across Bennington County. Trees and power lines came down due to the weight of the wet snow.

January 1 to 2, 2014 Heavy Snow: Widespread snow accumulated 8-17 inches followed by very cold temperatures.

February 13 to 14, 2014 Winter Storm: Snow fell at rates of up to three inches/hour. Over the two days of the storm, 8-21 inches fell in southern Vermont. At times, winds gusted to 40 mph as the storm left the area.

November 26 to 27, 2014 Winter Storm: An early storm affected southern Vermont over the Thanksgiving period with 8-15 inches of total accumulation.

February 2, 2015 Heavy Snow: Snow accumulations ranged from 9-15 inches.

February 7 to 10, 2015 Heavy Snow: One to two feet of snow fell, with higher amounts in higher terrain.

February 9, 2017 Heavy Snow: A Nor'easter left 8-14 inches of snow across Bennington County. A February12, 2017 Winter Storm brought 7-12 inches.

March 14 to 16, 2017 Blizzard: This significant coastal storm resulted in 18 inches of snow at low elevations and 35 at high elevations. High winds and blizzard conditions resulted in poor visibility

January 3 to 4, 2018 Heavy Snow: Snowfalls of 7 to 15 inches accompanied by winds gusting between 30 and 45 miles per hour spread show across the county. The event was followed by very cold temperatures.

February 4 to 5, 2018 Heavy Snow: Snowfalls of 5 to 14 inches were widespread across the county.

March 7 to 8, 2018 Winter Storm: Heavy snow with rates of up to three inches/hour resulted in one to three feet of snow in upslope locations.

November 26 to 28, 2018 Winter Storm: Heavy, wet snow resulted in power outages.

December 1 to 3, 2019 Heavy Snow: Snow amounts of 18-28 inches were recorded and many schools were closed.

December 16, 2020 Heavy Snow: Snow on the 16th and 17th fell at 1-2 inches/hour at times and up to 3-6 inches/hour on the 17th. Total accumulation was 15-25 inches in southern Bennington and Windham counties and 24-40 inches across the north. This caused transportation delays, accidents and school closings.

3. Extent and Location

The National Climate Data Center publishes climate "normals" or averages for various stations including Pownal and Sunderland. The average annual snowfall for the period 1981 to

2020 was 60.8 inches for Pownal and 75.1 inches for Sunderland. 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 2017 Cooperative Weather Observer reports). The skill of road crews in Vermont means that only the heaviest snowstorms (>12 inches) or ice storms affect roads and populations.

Increasing temperatures that are predicted to occur will likely reduce total winter snowfall. If precipitation falls as rain in the winter, river flows will be higher due to the lower evapotranspiration in the winter. Freezing rain may become more frequent, with resulting impacts to the transportation and power systems (Galford et al. 2014).

4. Probability, Impact and Vulnerability

There is a >75% probability of a moderate or greater snowstorm affecting Bennington County, including Rupert 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.

D. High Wind Events

1. 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 NOAA recorded 81 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 NOAA recorded three tornadoes in Bennington County since 1990.

2. Previous Occurrences

Table 9 below summarizes the total number of significant wind events including thunderstorms, strong winds, and tornadoes from 1996 to 2019. The 1998 tornado registered F2 on the Fujita damage scale. The 2002 tornado in Bennington County registered F1 while the 2003 tornado was an F0 to F1 (NOAA 2019). The Fujita scale is based on wind speed and typical damage. An F0 tornado has winds of less than 73 miles per hour and could damage chimneys, branches, and down shallow rooted trees. An F1 tornado has winds of 73-112 miles per hour

and could damage roofs, push mobile homes off foundations and blow cars off roads. An F2 tornado has winds of 113-157 miles per hour and could tear off roofs, destroy mobile homes and snap trees (http://www.spc.noaa.gov/faq/tornado/f-scale.html).

Wind speed data is not available for most wind events due to the lack of weather stations. The only recording gauge is at the Bennington Airport. NOAA data (2015) rarely included estimates of wind speed. Generally, wind speeds of greater than 55 miles per hour are considered damaging (NOAA 2006). Events that occurred in or near Rupert are described below.

Table 9. Summary of wind events in Bennington County.
Source: National Climate Data Center 2015

Year	High Wind	Strong Wind	Thunderstorm Winds	Tornado	Funnel Cloud	Totals
1996	5					5
1997	2	2	6			10
1998	1		8	1		10
1999	2		4			6
2000	1		1			2
2001			3			3
2002			3	1		4
2003	1			1		2
2004						0
2005	1		3			4
2006	3		3			6
2007	3		6			9
2008		3	5			8
2009	2		1			3
2010	5		3		1	9
2011	1		8			9
2012			3			3
2013			6			6
2014			3			3
2015			2			
2016		1	7			8
2017	4	3	5			12
2018	2	5	7			14
2019	1	9	3			13
2020		4	9			13
Totals	40	27	100	3	1	171

January 19 and 27, 1996 High Wind: Events on those two days damaged trees and power lines.

July 15 through 18, 1997 Thunderstorm Winds: Severe thunderstorms downed trees in Dorset, Manchester, and Shaftsbury.

May 29 through 31, 1998 Thunderstorm Winds and Tornado: Strong thunderstorms generated an F2 tornado in New York, which became an F1 after crossing into Vermont. The tornado followed Route 67 through North Bennington and South Shaftsbury.

July 18, 1999 Thunderstorm Winds: A severe thunderstorm downed power lines along Route 153 in Rupert.

September 16 to 18, 1999 (DR-1307): Remnants of Hurricane Floyd (see flooding and flash flooding) brought winds gusting to over 60 mph and downed trees and power lines in southern Vermont.

November 2, 1999 High Wind: A wind gust of 66 mph was recorded at the Bennington Airport, though no damages were reported.

June 27, 2005 Thunderstorm Winds: A thunderstorm near Manchester Center blew down several trees.

March 2, 2007 High Winds: High winds were associated with snow and freezing rain. Winds measured at Bennington Morse Airport reached 59 mph.

April 16, 2007 High Winds: Low pressure caused strong winds with 175 downed trees near Route 30 in Dorset.

December 16, 2007 High Winds: A snowstorm brought 8-14 inches of snow along with strong winds that combined to down trees and powerlines.

December 24 and 30, 2008 Strong Wind: Events on those days resulted in wind gusts of 45-55 mph.

June 10, 2008 Thunderstorm Winds: Thunderstorms generated high winds resulting in trees down in Rupert.

December 30, 2008 High Winds: Strong wind gusting 45-55 mph brought down trees and caused power outages.

December 9, 2009 High Winds: High winds, measured up to 59 mph at the Bennington Airport, caused power outages in Bennington, Dorset, Manchester, Pownal, Sandgate, Shaftsbury, and Sunderland.

January 25, 2010 High Winds: Winds gusted between 40 and 50 mph with some higher winds due to topographic conditions.

August 22, 2010 High Winds: Strong winds formed during passage of a cold front and downed trees and wires in Arlington, Bennington, Shaftsbury, and Sunderland.

September 30 to October 1, 2010 High Winds: a low-pressure system and remnants of an off sure Tropical Storm Nicole created winds gusting to over 55 mph with power outages reported.

June 9, 2011 Thunderstorm Winds: A pre-frontal trough formed a line of severe thunderstorms that moved across eastern New York and southern Vermont.

December 1, 2010 High Wind: Winds gusted to 55 mph along with 1.5-3" of rain resulting in downed trees and power lines.

June 9, 2011 Thunderstorm Wind: a line of storms resulted in downed trees and power lines across the county.

August 28-29, 2011 (DR-402): Along with flooding described above, Tropical Storm Irene brought 35-55 mph winds with gusts exceeding 60 mph resulting in downed trees and powerlines.

October 29 to 30, 2012 High Winds: Superstorm Sandy brought strong winds of 40-60 mph, with a gust of 58 mph recorded at the Bennington Morse Airport.

June 21, 2016 Thunderstorm Winds: Strong storms occurred throughout southern Vermont.

October 22 to 23, 2016 High Winds: Winds with gusts up to 50 mph affected parts of southern Vermont.

January 10 to 11, 2017 High Winds: Winds of 40-60 mph caused some power outages in the county.

March 2, 2017 High Winds: Winds of 30-45 mph were widespread across the county.

May 5, 2017 High Winds: Winds up to 68 mph were observed in Bennington.

May 18, 2917 Thunderstorm Winds: Thunderstorms created winds that brought down power lines in some areas.

July 1, 2017 Thunderstorm Winds: A microburst brought down trees in Sandgate. The estimated windspeed based on the damage was 100 mph.

October 30, 2017 High Winds: Winds brought downed trees, limbs, and wires across the county.

April 4, 2018 High Winds: Strong winds with gusts of 40-50 mph brought down power lines across southern Vermont.

April 15, 2018 High Winds: Peak gusts of 64 mph were recorded in Arlington with wires and trees downed. The planning team also noted an April 23, 2018 windstorm that caused damage.

May 4, 2018 Thunderstorm Winds: Strong winds resulted in trees and power lines down in Dorset, Manchester.

June 18, 2018 Thunderstorm Winds: A hot airmass in the daytime lead to thunderstorms in the evening with numerous power outages and trees down. Route 7A in Shaftsbury and Sunderland was closed for a time.

February 24, 2019 Strong Wind: Winds gusts greater than 50 mph resulted in some downed trees.

c. Extent and Location

Damaging winds, including the previous occurrences described above, are those exceeding 55 miles per hour (National Oceanographic and Atmospheric Administration 2006 and undated). During a November 1999 event, winds were measured at 66 mph at the Morse Airport in Bennington. Higher winds were likely created during the tornadoes. High wind events can strike anywhere. Where storms are funneled up the valleys, damage can be significant, but most likely less than 10% of structures would be affected. Again, power outages could last up to seven or more days. Most development is along the major roads, Routes 153 and 315. Damage to powerlines along these areas is most likely to cause widespread outages.

d. Probability, Impact and Vulnerability

Wind events causing moderate or greater damage occur almost every other year (10-75%) in Bennington County, and can range from localized events from thunderstorms to wide ranging events from larger storms. The primary vulnerability would be power outages from downed trees and lines and the potential expected probability would be 10-75% in Rupert.

E. Hail

The National Climate Data Center has 30 reports of hailstorms in Bennington County between 1996 and 2019, all associated with thunderstorms. Nickle sized hail was reported in Rupert on June 10, 2008.

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, on May 8, 2010 in Peru, and on April 29, 2005and August 1, 2005 in Danby . One-inch hail was reported in Dorset, Sunderland, and West Rupert on June 6, 2005.

c. Extent and Location

Hail can be very localized or can cover wide areas and has the potential for damaging crops, automobiles, or glass within structures, as well as causing injury. Generally, however, hailstorms affect relatively small areas as they form in thunderstorms, which are localized. Storms with the largest hail stones occurred in 2005 during which one-inch hail was reported in Dorset and Rupert.

d. Probability, Impact and Vulnerability

Hailstorms are generally local, affecting subareas within the town, though a group of thunderstorms can 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 Rupert could range from 10-75%. The potential vulnerability would be localized to damage to structures or automobiles, though there could also be damage to vegetation. In general, these impacts would be localized.

F. Temperature Extremes

1. Descriptions

Temperature extremes entail periods of either excessive heat or extreme cold. Excessive heat is generally defined as periods when the normal high temperature is exceeded by ten degrees. So, in the summer, this would equal 88-89 degrees in Rupert (Table 10). Excessive heat is recorded at other times but does not have the health consequences of summer periods. In addition, the heat index, which factors in the high relative humidity levels of summer, is also a factor. However, relative humidity is not recorded at area weather stations, so the history of heat index can't be calculated. The Vermont Department of Health has determined that serious heat related injuries and deaths occur when the temperature reaches or exceeds 87^0 F (Vermont Department of Health 2016). Using the Sunderland Cooperative Observer data this occurred 151 times between 1990 and 2017 or about eight time per year. In Danby, between 2002 and 2016, this occurred 79 times or about twice a year.

Extreme cold is not well defined. For those involved in outdoor activities, extreme cold, accompanied by wind, is when exposed skin would be subject to frostbite. However, for periods of power outages that might accompany winter storms, extreme cold could be thought of as when temperatures fall below freezing as that would not only affect health but could result in pipes freezing and the loss of water supplies.

Table 10. Danby Four Corners and Sunderland normal temperatures and precipitation for 1981 to 2010.
Source: National Oceanographic and Atmospheric Administration: *http://www.NOAA.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)	
	Sunderland	Danby	Sunderland	Danby	Sunderland	Danby	Sunderland	Danby
January	28.5	30.2	9.5	8.2	19.0	19.2	3.44	3.19
February	33.7	33.4	11.2	10.8	22.5	22.1	2.82	2.48
March	40.9	42.0	19.5	19.0	30.2	30.5	3.55	4.05
April	54.3	54.9	31.0	31.1	42.7	43.0	3.47	4.38
May	65.8	66.1	41.3	42.2	53.5	54.2	4.33	4.22
June	75.3	75.1	49.6	51.4	62.5	63.3	4.66	4.57
July	78.5	79.1	54.5	55.8	66.5	67.5	4.55	4.69
August	77.1	77.6	53.0	53.5	65.0	65.6	4.40	4.19
September	69.6	70.4	44.2	45.5	56.9	58.0	3.83	3.90
October	57.3	58.3	34.4	35.5	45.8	46.9	4.28	4.35
November	45.9	47.2	27.9	26.9	36.9	37.1	3.98	4.24
December	34.4	35.0	17.2	15.0	25.8	25.0	3.95	3.60
Annual Average	55.1	55.8)	32.8	32.9	43.9	44.0	47.26 Total	47.86 Total

The station normal report for the Cooperative Weather Observer in Sunderland indicates an average of one day per year when the maximum temperature would equal 90 degrees, 55 days when the maximum temperature would be less than 32 degrees and 172 days when the minimum temperature would be less than 32 degrees. The station normal report for the Cooperative Weather Observer in Danby Four Corners indicates an average of one to two days per year when the maximum temperature would equal 90 degrees, 50.8 days when the maximum temperature would be less than 32 degrees and 167.9 days when the minimum temperature would be less than 32 degrees.

2. Extent and Location

Extreme temperature is a widespread phenomenon. The populations affected could be small if one is considering outdoor workers or the entire town in a power outage. Temperatures above 90^{0}F occur approximately one or two days per year. The highest recorded temperature at the Sunderland Cooperative Weather Observer station was 95^{0}F on August 24. 2002 and 94^0 in

Danby on August 15, 2002. High temperatures of 94^{0}F were recorded on August 15, 2002, and again on July 22 and 23, 2011. The coldest recorded temperatures by the Sunderland Cooperative Weather Observer were -24^0 F on January 28, 2005 with -22^0 F recorded on both January 22nd and 29th in 2005. In Danby, the lowest temperature of -27^{0}F occurred on January 24, 2011. The planning team noted a low temperature of -30^{0}F in the recent past as well.

Over the past several years, a phenomenon known as the "polar vortex" has affected the United States due to distortions in high level winds. These have resulted in prolonged cold periods in Vermont. Wind chill, which factors wind speed with air temperature, can result in greater effects of cold, including frostbite. Data on wind chill is not maintained, but temperatures of less than 0 and winds greater than 15 mph can result in frostbite in less than 30 minutes and shorter as temperatures fall and wind speed increases (Vermont Hazard Mitigation Plan 2018).

Average temperatures in Vermont have risen 2.7^{0}F since 1941 with an increase of 1.5^{0}F since 1990. Winter temperatures have risen more than summer temperatures. If these trends continue, the number of days above 90^{0}F will likely increase and minimum temperatures also increase (Galford et al 2014).

3. Probability, Impact and Vulnerability

Extreme heat is relatively rare with occurrences of approximately less than one day 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.

G. Drought

1. 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 precipitation over long enough periods, particularly during the growing season when plants take up moisture, can result in hydrologic drought.

2. Past Occurrences

The Palmer Hydrologic Drought Index (PHDI) is an indicator of potential surface and groundwater availability based on climatic conditions. The categories of drought include

Table 11. Years and number of months when the PHDI indicated severe or extreme droughts from 1895 to 2018. 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
1921		2
1922		1
1930		1
1931		1
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	1
2016		1
Total	23 months; 8 years	59 months; 27 years

moderate drought, severe drought, and extreme drought. Table 11 shows periods when the index showed severe and extreme droughts using data from 1985 to 2018. No drought conditions were recorded from 2003 through 2015 or since 2016. However, members of the planning team reported that some wells were low in 2015, which did have some months with moderate drought conditions.

3. Extent and Location

The National Climate Data Center calculates this index back to 1895. Since then, severe droughts occurred in 27 years or 22% while extreme drought occurred in 8 years or 6%. Severe and extreme droughts have been of short duration, except occurrences in the early 1960s. Mild to moderate droughts have been more frequent. Severe and extreme droughts are likely to affect those properties with shallow wells.

4. Probability, Impact and Vulnerability

The water supply system for Rupert consists of 289 private wells. The data indicate a public well at the former West Rupert School, which is now the town hall, but that data may no longer be valid. Fifteen of the private wells are less than 100 feet deep, which may make them more vulnerable to severe or extreme drought.

Source protection areas were mapped by the Vermont Agency of Natural Resources and are primarily dependent on topography. There are no surface or groundwater protection areas in Rupert except for a small portion of one primarily in Dorset. Map 6 shows the locations of wells, surface waters and the transportation system.

Based on the Palmer Drought Severity data, there is a 22% chance of a severe or extreme drought occurring in any one year. Except for long-term drought, most wells should supply sufficient water, though structures with shallow wells are most likely to be affected. Drought may affect the potential for wildfire, which is discussed below. Increasing temperatures or changes in precipitation patterns due to climate change may affect the frequency, length, and degree of drought.

Table 12 below shows categories from the U.S. Drought Monitor for Vermont. From about 2018 to more recently, much of southwestern Vermont, including Rupert, had been under the D0 category (Abnormally dry). The planning team had not observed the types of conditions listed in Table 11 for that category, though they may have occurred at times and in scattered locations. Currently (November 2021) the U.S. Drought Monitor shows no drought conditions.

Table 12. Potential impacts of drought in Vermont.
Source: United States Drought Monitor – Vermont, Available via https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?VT

Category	Impact
D0	Crop growth is stunted; planting is delayed
	Fire danger is elevated; spring fire season starts early
	Lawns brown early; gardens begin to wilt
	Surface water levels decline
D1	Irrigation use increases; hay and grain yields are lower than normal
	Honey production declines
	Wildfires and ground fires increase
	Trees and landscaping are stressed; fish are stressed
D2	Voluntary water conservation is requested; reservoir and lake levels are below normal capacity
	Specialty crops are impacted in both yield and fruit size
	Producers begin feeding cattle; hay prices are high
	Warnings are issued on outdoor burns; air quality is poor
	Golf courses conserve water

Table 12. Potential impacts of drought in Vermont.
Source: United States Drought Monitor – Vermont, Available via https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?VT

Category	Impact
	Trees are brittle and susceptible to insects
	Fish kills occur; wildlife move to farms for food
	Water quality is poor; groundwater is declining; irrigation ponds are dry; outdoor water restrictions are implemented
	Crop loss is widespread; Christmas tree farms are stressed; dairy farmers are struggling financially
	Well drillers and bulk water haulers see increased business
D3	Water recreation and hunting are modified; wildlife disease outbreak is observed
	Extremely reduced flow to ceased flow of water is observed; river temperatures are warm; wells are running dry; people are digging more and deeper wells
D4	Vermont has had little or no experience in D4 so no impacts have been recorded at that level in the Drought Impact Reporter

H. Wildfire

1. Description

Wildfire or wildland fire is any unplanned fire affecting open lands including forests, grasslands, or other features. The potential for wildland fire is dependent on fuel types, which vary with vegetation, 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 13 shows how wildfires can be categorized based on size.

Table 13. Wildland fire size classes.
Source: National Wildfire Coordinating Group 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). Most of

the land area in Rupert is covered by broadleaf litter fuels that exhibit fires of low intensity and slow rates of spread.

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).

2. Past Occurrences

According to records from the Vermont Department of Forests, Parks and Recreation, from 1992 to 2019, 169 wildfires occurred in Bennington County, the largest of which was 110 acres in Sandgate in 1994. According to those records sixteen wildfires occurred in the Rupert. Nine of those were less than one acre, five were from one to four acres and the largest, 24.5 and 25 acres occurred in 2006 and 2013, respectively. Mark Lourie, the local Forest Fire Warden reports a 2.5-acre fire that occurred on August 16, 2015, which did not appear in the Department of Forests, Parks and Recreation data.

3. Extent and Location

Low intensity fires with relatively slow rates of spread could occur in the forested areas which comprise most of Rupert's land cover. Fires on steep slopes could present control problems due to terrain and as fire will spread more rapidly. Throughout the town there may be pockets of heavier fuel loads, such as brush, or more flammable fuels, such as cured herbaceous vegetation and shrubs. These areas are generally located in the valleys near developed areas.

4. Probability, Impact and Vulnerability

Map 7 shows wildfire risk, as determined by the Vermont Department of Forests, Parks and Recreation (2010) and mean fire return interval from LANDFIRE. For most of the forested area, the return interval exceeds 100 years, meaning that the natural return interval is relatively long. This return interval is shorter for areas dominated by herbaceous vegetation in the fields

within valley, and these areas tend to be the locations of the small, more frequent brush fires that are suppressed by the Rupert Fire Department. Overall, the wildfire risk is low or nonexistent, especially in developed areas where there is little or no fuel.

The area deciduous and coniferous forests create litter that is relatively low in flammability so that wildfires have relatively low intensity and rates of spread. The main hazard is for wildland fire fighters working in steep terrain. The natural fire return intervals in most forests in Vermont are more than 50 years and greater as shown in Map 7 (Malamud et al. 2005). 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 limited due to the fuel characteristics. However, large roadless areas and steep topography can make suppressing wildland fires that do occur difficult. Settled areas have a low vulnerability to fire.

I. Earthquake

1. Description

Vermont has no active faults but has experienced minor earthquakes. Table 14 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).

Table 14. Earthquakes in Vermont. Source: Vermont Geological Survey (Ebel et al. 1995).*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 like 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
Plattsburgh	April 20, 2002	5.1	Resulted in shaking felt in Vermont

2. Past Occurrences

Data from the Weston Observatory at Boston College (Northeast Earthquake Maps and Catalog) was used to identify earthquakes occurring within 100 miles of Bennington County since 1990. No earthquakes occurred in either Rupert or Bennington County during that period. Figure 3 below plots the number of earthquakes by year by magnitude, which is described in Table 15below. The Planning Team noted an earthquake, centered in Hudson Falls and occurring in the summer of 2020 did shake some houses, but no damage was reported.

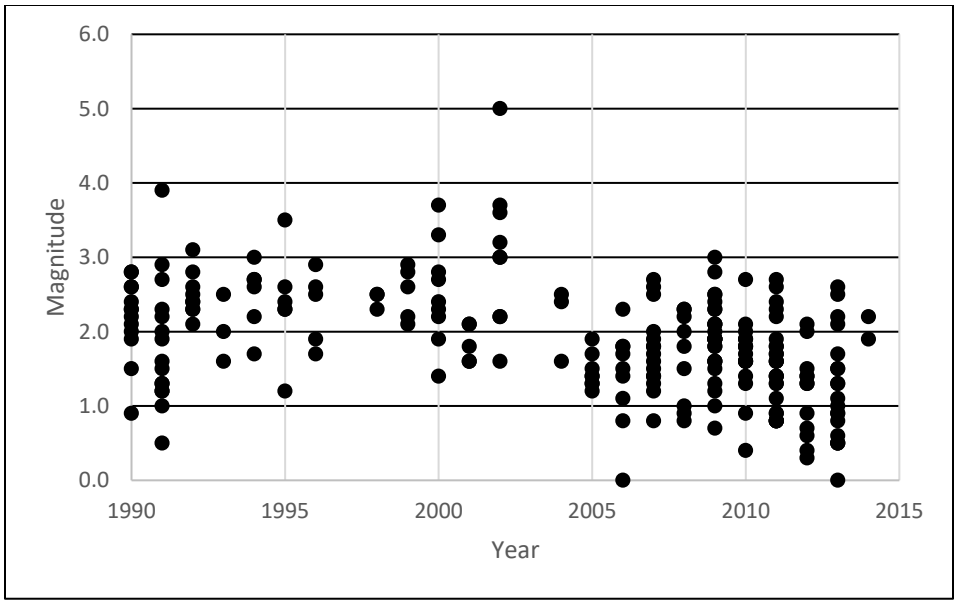
Table 15. Earthquake magnitude and intensity scale descriptions.
Source: *http://earthquake.usgs.gov/learn/topics/mag_vs_int.php*

Magnitude	Modified Mercalli Intensity	Description
1.0-3.0	I	I. Not felt except by a very few under especially favorable conditions
3.0- 3.9	II-III	**II**. Felt only by a few persons at rest, especially on upper floors of buildings. **III**. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations like the passing of a truck.
4.0-4.9	IV-V	**IV**. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. **V**. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0-5.9	VI-VII	**VI**. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. **VII**. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.

Table 15. Earthquake magnitude and intensity scale descriptions.
Source: *http://earthquake.usgs.gov/learn/topics/mag_vs_int.php*

Magnitude	Modified Mercalli Intensity	Description
6.0-6.9	VII-IX	**VII**. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. **VIII**. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. **IX**. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	VIII or higher	**VIII**. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. **IX**. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. **X**. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. **XI**. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly. **XII**. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Figure 3. Plot of earthquake and magnitude for occurrences within 100 miles of Bennington County, VT. Source: Northeast Earthquake Maps and Catalog 2015



3. Extent and Location

Table 14 shows earthquakes that have occurred in Vermont based on the 1995 report. No earthquakes have been recorded in Rupert or in Bennington County. The Planning Team noted an earthquake, centered in Hudson Falls and occurring in the summer of 2020 did shake some houses, but no damage was reported. Those occurring within 100 miles have ranged in magnitude from barely registered to 5.0, with most in the range of 1.0 to 3.0 (Figure 3). No damage was recorded in any of these in Rupert. 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 Rupert (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 limited.

J. Landslide

1. 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 to remain vertical while bent near the ground as they grow to keep up with the slow material flow.	Highly variable but can be common.

2. Past Occurrences

According to the Planning Team a landslide occurred near the junction of Rt. 315 and Pawlet Mountain Road during Tropical Strom Irene. No landslides have been reported from previous storm events or since, though a number of mass failures along streams were identified during stream geomorphic assessments.

3. Extent and Location

Using a protocol developed for the Vermont Geological Survey (Clift and Springston 2012), Dale (2015) used geographic information system data and analyses to develop a potential landslide map for the town. Map 8 shows that the areas of medium and high potential for landslides are primarily on the steeper slopes. There are only limited areas of high landslide potential, and these far from settled areas, the road system and other infrastructure. Map 8 also shows the locations of mass failures collected during stream geomorphic assessments.

4. Probability, Impact and Vulnerability

Map 8 shows few areas of high potential for landslides, so the probability of those affecting settled areas is low and therefore the potential impact and vulnerability are both low. The potential for rockfalls is limited as well.

K Invasive Species

1 Descriptions

Invasive species are organisms that are not native to a geographic area and which can or do cause economic or environmental harm. Invasive species are characterized by organisms that spread rapidly, can displace 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, bush honeysuckle can become a dominant shrub in some forests reducing the potential for tree regeneration. Japanese knotweed colonizes stream banks, and does hold soil well, leading to increased streambank erosion (Vermont Invasives 2016, Vermont Hazard Mitigation Plan 2018).

Vermont has two invasive species lists: Class A species are on the Federal Noxious Weed List but are not known to occur in Vermont. These are listed in 7 C.F.R. 360.200, a section of the Code of Federal Regulations. Class B species are known to occur in the state and are considered a threat (Table 17).

There has been limited mapping of invasives in Rupert. The EDD Maps system provides for mapping of invasives by professionals and citizen scientists in New England.

Table 17. 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/;
Those marked with an (A) are also on the aquatic invasives list (Table 17).

Scientific Name	Common Name
Acer ginnala	Amur maple
Acer platanoides	Norway maple
Aegopodium podagraria	Bishop's goutweed or goutweed
Ailanthus altissima	Tree of heaven
Alliaria petiolata	Garlic mustard
Berberis thunbergii	Japanese barberry
Berberis vulgaris	Common barberry
Butomus umbellatus (A)	Flowering rush
Celastrus orbiculatus	Oriental bittersweet
Euonymus alatus	Burning bush
Fallopia japonica[4]	Japanese knotweed
Hydrocharis morsus-ranae (A)	Frogbit
*Iris pseudacorus (*A)	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 (A)	Purple loosestrife
Myriophyllum spicatum (A)	Eurasian watermilfoil
Najas minor	European naiad
Nymphoides peltata (A)	Yellow floating heart
Phragmites australis (A)	Common reed
Potamogeton crispus (A)	Curly leaf pondweed
Rhamnus cathartica	Common buckthorn
Rhamnus frangula	Glossy buckthorn
Trapa natans (A)	Water chestnut
Vincetoxicum nigrum	Black swallowwort

Table 18 shows aquatic invasive species listed by the Vermont Agency of Natural Resources.

In addition to the species listed above, the following should be considered invasive species: Wild parsnip (*Pastinaca sativa*) is abundant along roadsides in Bennington County and

[4] The Town Highway Department has identified Japanese Knotweed as the primary invasive species, which they try to avoid spreading when mowing or ditching.

can cause skin burns when chemicals in the plant on exposed skin interact with sun, which can harm those who work on or along roads or utility rights of way. Cow parsnip or wild chervil (*Anthriscus sylvestris*) also dominates roadsides and can invade meadows. Reed canary grass (*Phalaris arundinacea*) can invade wetlands and crowd out native plants and has been observed. Multiflora rose (*Rosa multiflora*), while not listed as an invasive, is an invasive species in many states and has invaded roadsides and streams, though not documented in Rupert.

Table 18. Aquatic invasive species in Vermont.
Source: Watershed Management Division, Department of Environmental Conservation: http://dec.vermont.gov/watershed/lakes-ponds/aquatic-invasives/

Scientific Name	Common Name
Dreissena polymorpha	Zebra mussel
Alosa pseudoharengus	Alewife
Orconectes rusticus	Rusty crayfish
Bythotrephes longimanus	Spiny Waterflea
Corbicula fluminea	Asian clam
Didymosphenia geminata	Didymo[5]
Nitellopsis obtusa	Starry Stoneword
Myriophyllum heterophyllum	Variable-leaved Watermilfoil

2. Past Occurrences

The extent of invasive plants in Rupert and in Bennington County has not been fully mapped. They are likely present and represent a continuous hazard that will vary with their abundance and their impacts on structures and infrastructure.

3. Extent and Location

The extent of invasive plants in Rupert and in Bennington County has not been fully mapped. Only two locations are shown for bush honeysuckle within Rupert and no other invasives have been documented, though they have been observed. The Planning Team noted that Japanese Knotweed (*Fallopia japonica)* is a primary concern for road maintenance and the road crews avoid spreading the species.

Insects and pathogens have the potential for dramatically altering the composition and structure of forests as well as affecting trees in settled areas. Hemlock wooly adelgid (*Adelges tsugae*) has dramatically reduced hemlock trees south of Vermont and has been found in Pownal, VT. Emerald ash borer (*Agrilus planipennis*) is a significant threat to forests as it kills all ash species. Borers are often dispersed through movement of firewood. Emerald Ash Borer was recently found in Stamford and Pownal.

[5] Recently this species has been determined to be native, but that status may change.

In addition to the above insects, there are other insects and pathogens that are affecting Vermont forests. These may constitute an emerging hazard (Schultz et al 2015). Climate change may increase the abundance and ranges of forest pest species such as hemlock wooly adelgid and invasive species currently found in more southerly locations (Rustad 2012).

4. Probability, Impact and Vulnerability

The likelihood of increased abundance of invasive species is >75% 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. Increases in the abundance of invasive plant species could limit regeneration of native trees and shrubs and affect the long-term integrity of the forests (Vermont Department of Forests, Parks and Recreation 2010, Vermont Invasives 2016). Invasive species such as Japanese knotweed along streams can exacerbate fluvial erosion and that species outcompetes native species that have a greater capability of holding soil in place (Vermont Hazard Mitigation Plan 2018).

L. Hazardous Material Spill

1. Descriptions

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

2. Past Occurrences

The Vermont spill site list indicates there have been 18 spills reported in Rupert since 1983, and these are listed in Table 19 below.

3 Extent and Location

All the spills listed in Table 18 affected small sites or areas. Vermont Routes 30, 153 and 315 traverse portions of the town and carry substantial traffic, and a spill on these roads could affect a large portion of the town. Of concern in any hazardous materials spill would be the impact on water resources. Map 6 shows the transportation system in relation to surface waters including streams and wetland and groundwater protection areas. Roads with average grades greater than 10% also present hazards, particularly when roads are wet or during winter storms.

4. Probability, Impact and Vulnerability

Given the number of past spills, hazardous materials spills occur less than annually and affect small areas. Increased truck traffic also increases the possibility of a major spill. However, many areas are vulnerable due to the extensive transportation system and proximity of surface and groundwater resources to that system. However, all local roads carry materials that could spill and affect aquatic resources as well as individual wells.

The overall likelihood of a hazardous materials spill on an annual basis is probably between one and ten percent. Injuries, except in the case of direct injuries from a traffic accident, are likely low. However, the long-term impacts of a spill could be extensive if aquatic resources and/or water supplies were affected.

Table 19. Hazardous materials spills in Rupert, VT
Source: Vermont Department of Environmental Conservation Spills Database: https://anrweb.vt.gov/DEC/ERT/Spills.aspx

Complaint	Facility Name	Address	Year	Product	Nature of Incident	Quantity	Responsible Party
WMD562	power pole GMP line 4 pole 55	near 3572 VT Route 315	2018		Transformer/Capacitor release	2 Gallons	GMP
WMD019	Rupert Post Office	84 Main St	2016		damaged coolant system	<1 Gallons	USPS
WMD067	Residence	926 Hebron Road	2014		Heating oil spill in basement of unoccupied home.	10 Gallons	Unknown
WMD227	Roadside	2023 Rte. 153 (just West of this)	2013		4,000-gallon manure truck spilled liquid manure into drainage	200 Gallons	Rupert Valley Holsteins
WMD280	Roadside - Rupert/Pawlet town line	Route 30	2013		Broken hydraulic line	5 Gallons	VTrans - E. Dorset Garage
WMD280	Roadside - Rupert/Pawlet town line	Route 30	2013		Broken hydraulic line	5 Gallons	VTrans - E. Dorset Garage
WMD284	Roadside - Rupert/Pawlet town line	Route 30	2013		Broken hydraulic line	2-3 Gallons	VTrans
WMD765	Loomis Residence	2824 VT Rt. 153	2011		Homeowner smelled petroleum odors	Odor --	Zoe Loomis
WMD273	roadside	15 Derby Rd	2010	hydraulic oil	hydraulic line broke	1/4 Gallons	CVPS
WMD582	Jessica Sprague residence	613 Rte. 153	2009	Fuel Oil	Failed AST	100-150 Gallons	?
WMD447	Line 51 Pole 88	3924 Kent Hollow Rd	2008	transformer oil	transformer fell to brook	Unknown	CVPS
WMD106	Sherman's Store	Rt 153 (West Rupert)	2007		spill at pump	5 Gallons	N/A
WMD168	N/A	Lewis Rd	2006	mineral oil	transformer leak	1 Gallons	N/A

Table 19. Hazardous materials spills in Rupert, VT
Source: Vermont Department of Environmental Conservation Spills Database: https://anrweb.vt.gov/DEC/ERT/Spills.aspx

Complaint	Facility Name	Address	Year	Product	Nature of Incident	Quantity	Responsible Party
WMD099	Hermanson/Fram residence	Hebron Rd	2002	motor oil	vandalism	20 Gallons	N/A
WMD049	Sykes Hollow Kennel	Sykes Hollow Rd	2001	#2	above ground tank leak	180 Gallons	Wm Ferrore
WMD157	Sitnik Residence		1996	Road Salt	Road Salt Contam To Pond	Unknown	N/A
131	N/A		1989	Transformer Oil	Car Hit Pole	Unknown	Cvps
196	N/A	Rt 30 & 15	1983	Diesel Fuel	Truck Accident	100 Gallons	Claude Dern

M. Infectious Disease Outbreak

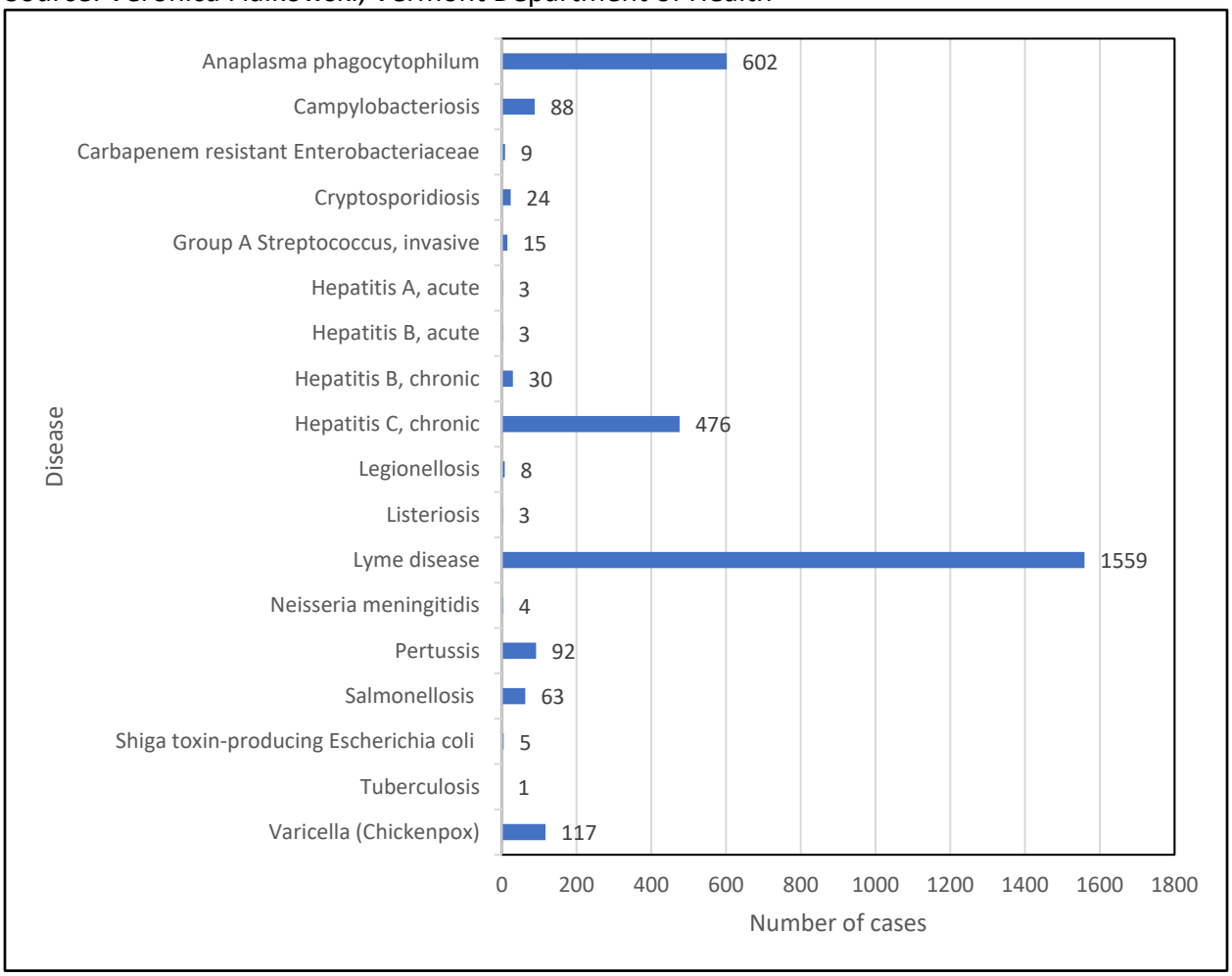
1. Descriptions

Infectious diseases are caused by bacterial infections, viruses, fungi, and other organisms that can spread through the human population. COVID-19 is currently affecting much of the world. As of November 1, 2021, there have been 40,191 cases in Vermont with 364 deaths (Source Vermont Department of Health Daily Update) . There have been 3,186 cases in Bennington County with 26 deaths (Source: New York Times daily update). The potential for transmission of COVID-19 has required people to wear protective masks and practice social distancing. As a result, businesses have been disrupted and, in some cases, closed; schools have been closed with students learning remotely, and many work from home if they can. The United States and Vermont went through a spike in cases in the spring and are experiencing a second spike with fall and winter. A vaccine has been developed and distribution is ongoing. The pandemic has become politicized with many viewing it as a hoax, and how many will actually accept vaccination is in question. However, vaccine doses are becoming more available and there is a major push to vaccinate much of the U.S. population.

2. Past Occurrences

The most prevalent infectious disease in Bennington County has been Lyme disease, carried by and transmitted by ticks. The symptoms can range from minor to very severe and are a clear threat to anyone in the town. Figure 4 shows those diseases tracked by the Vermont Department of Health.

Figure 4. Disease cases in Bennington County from 2006 to 2019.[6]
Source: Veronica Fialkowski, Vermont Department of Health



3. Extent and Location

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

4. Probability, Impact and Vulnerability

[6] The 2020 case counts are not comparable to other years because surveillance activities were affected by the COVID-19 pandemic. Disease estimates do not accurately reflect the true burden of disease in 2020. 2020 numbers are preliminary and subject to change. They will be finalized in October 2021 (Veronica Fialkowski, Vermont Department of Health, personal communication).

Prior to COVID-19, there has been a low probability of a disease affecting a large portion of the town. However, COVID-19 has affected the state, regional and national economies, which has in turn affected Rupert. Lyme disease, and other tickborne diseases could affect residents and those using recreational trails and visiting natural areas. Many of the carriers of infectious disease, such as ticks and mosquitoes, may be exacerbated by climate change and increased abundance of invasive species (Vermont Hazard Mitigation Plan 2018).

V. Vulnerability Assessment

A. Prioritization of Hazards

The information described above was used to prioritize hazards using criteria form the Vermont Hazard Mitigation Plan as described in Table 20 below.

Table 20. Vulnerability assessment factors (Vermont Hazard Mitigation Plan 2018)
Frequency of Occurrence: Probability
1 = Unlikely <1% probability of occurrence per year
2 = Occasionally 1–10% probability of occurrence per year, or at least one chance in next 100 years
3 = Likely >10% but <75% probability per year, at least 1 chance in next 10 years
4 = Highly Likely >75% probability in a year
Potential Impact: Severity and extent of damage and disruption
1 = Negligible Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries
2 = Minor Isolated occurrences of moderate to severe property damage, brief disruption of critical facilities and infrastructure, and potential for injuries
3 = Moderate Severe property damage on a neighborhood scale, temporary shutdown of critical facilities, and/or injuries or fatalities
4 = Major Severe property damage on a metropolitan or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities

B. Priority Hazards

As can be seen in Section IV, the planning team undertook an exhaustive assessment of hazards that could affect Rupert. They then scored those hazards based on the criteria in Table 19 to determine for which hazards actions would be needed. Table 20 shows the results of the scoring, with Flood and Flash Floods, Winter Storms, High Wind Events, Drought, Hazardous Materials Spills, Infectious Diseases, and Invasive Species ranked highest. Geographic area affected and potential impacts were key criteria in determining whether mitigation actions would be developed for specific hazards. The planning team determined that, while earthquakes ranked high, the score was likely due to the short warning time and, therefore, was not an accurate representation of the threat of this hazard.

Table 21. Vulnerability assessment. Priority hazards are shaded.

Hazard	Number of Events	Frequency of Occurrence	Potential Impacts	Total Score	Notes
Floods and Flash Floods	59 events from 1996 to 2020	3	3	6	Erosion in West Rupert occurred during TS Irene along with flooding in a basement
Winter Storms	192 events from 1996 to 2020	4	4	8	Travel can be impaired
High Wind Events	171 events from 1996 to 2020	3	3	6	Downed trees and limbs affecting roads and power lines
Hail	30 events from 1996 to 2019	3	3	3	
Temperature Extremes	Annual >90 F – 1 day on average Annual maximum <32 F – 55 days Annual minimum < 32 F – 172 days	2>90 3< 32	3	5-6	
Drought	Severe droughts have occurred in 27 years from 1895 to 2020	3	3	6	Shallow wells could be affected

Table 21. Vulnerability assessment. Priority hazards are shaded.					
Hazard	Number of Events	Frequency of Occurrence	Potential Impacts	Total Score	Notes
Wildfire	16 events from 1992 through 2019	2	2	4	
Landslides and Debris Flows	No records	1	1	2	TS Irene caused a landslide on Rt 315 an Pawlet Mountain Rd.
Earthquake	No events causing damage	1	1	2	
Hazardous Materials Spills	72 events from 1979 to 2019	3	2	5	
Infectious Disease Outbreak	Annual	4 ongoing	4	8	Generally minimal direct impacts
Invasive Species	Ongoing	4 ongoing	3	7	

Table 22 below lists hazards and vulnerable sites identified by the Planning Team. This shows area subject to flooding, snow plowing difficulties and potential drought identified in the 2014 plan.

Table 22. High hazards/vulnerable sites. Source: Planning Team	
Site Type (e.g., dam, culvert, bridges, railway crossing, low-lying area)	Site Location (physical location)
Flooding	Special flood hazard areas, particularly along Route 315 including portions of Rupert Village near the brook. Some infrastructure along 315 has had multiple damage episodes and needs to be replaced.
Fluvial erosion	Mill Brook and Mettawee fluvial hazard zones as well as more recently mapped river corridors
Snow	Portions of Route 315 as well as higher elevations. The town highway department does not plow some sections during the winter such as parts of Lang Rd.
Drought	Valley areas where well depths may be shallow. More driven point wells being replaced by drilled wells.

Map 5 is shows damages documented during Tropical Storm Irene and roads identified by Tom Wilson as locally important. These include Routes 153 and 315, Pawlet Mountain Road, East Road, Sandgate Road, and others (in red on map). Clearly the transportation system has

been vulnerable in the past and continues to require monitoring, maintenance, and upgrades. Map 6 shows the relationship of the transportation system to water resources. Map 7 shows wildfire potential. The landslide potential (Map 8) also shows limited vulnerabilities to the transportation system. Other priority hazards such as infectious diseases could not be mapped as those hazards would likely affect the entire town and beyond.

VI. Mitigation Measures

A. Hazard Mitigation Goals

As part of the planning process, the Town identified the following mitigation goals:

1. Reduce injury and loss of life resulting from natural disasters.
2. Reduce damage to public infrastructure, 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 to minimize impacts to rivers, water bodies and other natural features, historic structures, and neighborhood character.
5. Increase the economic resiliency of Rupert by reducing the economic impacts incurred by municipal, residential, agricultural, and commercial establishments due to disasters.
6. Incorporate hazard mitigation planning 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.

Implementation of the actions in this plan to achieve the above goals would also help achieve the statutory requirements of 24 V.S.A. Chapter 117 requirements including those to protect natural and cultural resources, provide affordable housing, support economic development and maintain a working landscape. These are also expressed in the Rupert Town Plan (2021).

The following sections review planning activities since completion of the 2014 hazard mitigation plan. Priorities for this 2021 plan are largely the same as for that plan as the population and development patterns of the town have remained largely the same. There has been come increase in storm events, and the Town continues to work to maintain infrastructure so as to address those. The Town has seen the potential impact of infectious diseases and climate change weather extremes in the years leading up to this plan update, and priorities for hazard mitigation planning reflect not only new data, but lived experiences.

B. 2014 Rupert Hazard Mitigation Plan

Rupert completed a town hazard mitigation plan in 2014, which was approved by FEMA in 2014. Actions from that plan are listed in Appendix I. Since 2014, the town regularly applies for and received funding from Vermont in the form of Grants in Aid and Better Back Road grants. The town highway department regularly upgrades culverts on an annual basis or as needed.

The town annually updates the Local Emergency Management Plan. In 2018, the town completed a survey of culverts and has been actively improving culverts and bridges as well as addressing stormwater management areas. The vulnerability assessment in this current hazard mitigation plan addresses the same impacts from the priority natural hazards as the 2012 plan. The actions to upgrade flood drainage structures and to work with landowners to flood proof structures are retained as actions in this current plan. There have been no new developments within the Flood Hazard Overlay or Fluvial Erosion Hazard Overlay zones since 2015. The Town constructed a new town garage and salt shed.

River corridors have been delineated by VT ANR (Map 4). Rupert regulates fluvial erosion hazard areas along Mill Brook and White Creek, and the Mettawee River but does not regulate all mapped corridors

Rupert joined the National Flood Insurance Program (NFIP) in 1978. There are 12 flood insurance policies in effect (Floodready Vermont 2020; Available via: https://floodready.vermont.gov/). The current FIRM (Flood Insurance Rate Maps) became effective on December 2, 2015. The Town Zoning Administrator and Development Review Board review permits for development, including any proposed within Special Flood Hazard Overlay and Fluvial Erosion Hazard Overlay (Mill Brook and White Creek and Mettawee River) , but not all mapped VT ANR river corridors. These regulations were adopted on August 23. 2011 and became effective on September 11, 20.

The VT ANR boundaries are generally larger, i.e., wider than and in some cases differ from the two FEHO (flood hazard overlay) boundaries. A portion of Rupert Village Center is in the Mill Brook FEHO zone, the VT ANR corridor and in the FEMA A zone, which is in the FHO or flood hazard overlay in the bylaws. A 50-foot VT ANR corridor on an unnamed stream runs through West Rupert Village Center. There are no repetitive loss properties in Rupert. As noted in Section IV. A. most of the vulnerable structures are single family homes, with few commercial properties in either the special flood hazard area or river corridor.

C. 2021 Rupert Town Plan

The 2021 Rupert Town Plan (Town of Rupert 20210) has several policies related to hazard mitigation including:

1. Directing intensive development within village areas as well as areas served by roads and infrastructure
2. Protecting prime agricultural soils and limiting new infrastructure so as not to lose farms and farmland.
3. Protecting forest land to maintain timber protection, wildlife habitat, recreation, aquifer recharge areas and headwaters as well as avoiding forest fragmentation.
4. Promoting clustering of new development
5. Limiting uses in the Flood Hazard Overlay District and continuing participation on the National Flood Insurance Program.

Neither the 2021 nor the 2015 town plan specifically mention the previous or current draft hazard mitigation plan. However, both support the protection of flood hazard and fluvial erosion hazard areas. The 2021 plan also recommends an action to further assess hazard areas in the town, for which this hazard mitigation plan would prove useful. The 2021 plan will not need to be updated for eight years, and amendments to incorporate specific measures listed in this plan are unlikely to be developed.

D. Rupert Town Land Use Regulations

The Rupert Town Land Use Regulations, adopted in 2011, place restrictions on development in both special flood hazard areas and fluvial erosion hazard areas. The regulations have not been updated to include recommendations from VT ANR model ordinances nor recent mapping of river corridors by VT ANR. The fluvial erosion hazard areas are limited to Mill Brook and Mettawee River (Map 4).

Wetland buffers consistent with VT ANR regulations have been incorporated into the regulations, and the development review board is charged with considering steep slopes, wetlands, and flood zones when reviewing applications for development. A 50-foot buffer is required from streams. The regulations also include a Forest Conservation Overlay Zone in which uses are limited to agriculture, forestry , seasonal dwellings, and accessory structures.

E. Road Management and Stormwater Management

The Town has installed numerous bridges and culverts with increased capacity to handle higher volumes of water. Other problem areas have been identified and prioritized. The town annually applies for grants to repair one or two priority projects per year. The Town has also identified several clay stream banks (slides) which need attention. They look out for debris jams during winter/spring thaws to prevent flooding. Most flooding events are short-term with water rising and then dissipating quickly.

The Vermont Clean Water Act, Vermont Act 64/H.35 and the Lake Champlain Phase 1

total maximum daily load (TMDL)[7] require that municipalities reduce sedimentation runoff from their road systems over a twenty-year period following attainment of stormwater permits between 2018 to 2021 (Vermont Agency of Natural Resources, 2017b). Towns are required to develop road stormwater management plans in the following steps:

1. Identify sections of roads connected to surface waters through ditches, culverts, or other drainage structures;
2. Inventory connected portions of the road network to determine if these sections meet the standards being developed by the Vermont Agency of Natural Resources;
3. Develop a long-term plan to bring all connected sections up to statewide design standards.

The Bennington County Regional Commission hired Fitzgerald Environmental Associates to complete both a stormwater master plan and to inventory hydrologically connected roads for erosion problems in Rupert. The stormwater master plan completed in 2015 identified 21 problem areas where work was needed to reduce erosion and protect stormwater infrastructure. Five of these were categorized as high priority with more detailed design work.

The Bennington County Regional Commission completed the road erosion survey in 2019 which identified the following categories of road condition:

Table 23. Road erosion survey results
Source: https://anrweb.vt.gov/DEC/IWIS/MRGPReportViewer.aspx?ViewParms=True&Report=Portal

Category	# Segments
Does Not Meet	**18**
Very High	3
High	4
Moderate	11
Partially Meets	**70**
Moderate	18
Low	52
Fully Meets	**312**
Grand Total	400

Roads that do not meet standards generally lacked drainage ditches, had eroded ditches, or had unstable conveyances. Those segments categorized as “Very High” priority will need to be brought up to standards by 2025 to meet the municipal general permit

[7] This is a regulatory term under the Clean Water Act identifying the maximum amount of a pollutant that a body of water can receive and still meet water quality standards.

requirements. All segments should be brought up to standard by 2036. Rupert needs to complete an inventory of the status of culverts in the town.

Rupert completed a culvert inventory in 2018. Of the 406 culverts in the town, 285 are good or excellent, 28 were fair, 77 poor, 10 critical, 6 urgent and 2 closed.

New driveways have to be approved by both the Highway Department and the Select Board.

F. State and Regional Plans and Programs

1. Vermont Hazard Mitigation Plan (2018)

The Vermont Hazard Mitigation Plan (2018) identified a series of hazards shown in Table 24 below along with those we considered in this plan. The planning team used the state plan as a starting point and local knowledge to create a more specific set of hazards that they addressed. Table 24 shows how the Rupert plan tracks the state plan.

Table 24. Comparison of hazards considered in the 2018 Vermont Hazard Mitigation Plan vs. the Rupert Hazard Mitigation Plan

2018 VT Hazard Mitigation Plan	Rupert Hazard Mitigation Plan
Hazards	**Natural Hazards**
Drought	Drought
Earthquake	Earthquake
Inundation Flooding and Fluvial Erosion	Flooding and Fluvial Erosion
Hail	Hail
Wind	High Winds
Hurricane/Tropical Storm	High Winds and Flooding and Fluvial Erosion
Infectious Disease	Infectious Disease Outbreak
Invasive Species	Invasive Species
Landslides	Landslide/Debris Flow
Severe Thunderstorm	See High Winds and See Flooding and Fluvial Erosion
Snowstorm and Ice Storm	Winter Storms
Extreme Heat	Temperature Extremes
Extreme Cold	Temperature Extremes
Wildfire	Wildfire

2. Bennington County Regional Plan Policies and Actions (adopted March 23, 2017)

The Bennington County Regional Plan (Bennington County Regional Commission 2017) lists the following policies and actions supporting hazard mitigation including 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). The regional plan also includes a flood resilience section (IX), which is required by Vermont statutes describing potential 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 Agency of Natural Resources

The Vermont Agency of Natural Resources (VT ANR) has worked with Rupert and other communities to adopt updated flood and river corridor regulations. VT ANR also has mapped river corridors and can regulate activities within those that are not subject to review by municipalities. VT ANR also reviews municipal permit applications for development within the special flood hazard area, permit applications for stream alterations, regulated activities within wetlands, and permits for transporting hazardous materials.

4. Act 250 Review

The Act 250 program provides a public, quasi-judicial process for reviewing and managing the environmental, social, and fiscal consequences of major subdivisions and developments in Vermont. During Act 250 proceedings, agencies and the public can offer comments on such proposed developments.

5. Other Organizations

The Rupert Fire Department provides first response to emergencies, along with the Highway Department which repairs damages that result from flooding and other disasters as well as pumping out basements and repairing driveways that lead to main roads. The Congregational Church provides a secondary shelter and is seeking funding for upgrading their kitchen and bathrooms for the shelter.

G. Town Capabilities

Table 25 below summarizes town capabilities for implementing mitigation measures.

Table 25. Capabilities of the Town of Rupert			
Plans, Policies, Ordinances	Description/Responsible Agent	Effectiveness	Improvements Needed
Town Plan	Planning Commission; Select Board (adoption of Town Plan)	Adopted in 2021	The town is in the process of adopting an updated plan.
LEMP	Emergency Manager Director; Select Board (adoption of plan)	Annual updates important	Update and improve Local Emergency Management Plan as part of the annual process.
Flood hazard bylaws	Planning Commission; Zoning Administrator (permitting); Development Review Board; Select Board (approval of bylaws)	Effective	Should be updated to include 2015 VT ANR river corridor maps and areas.
Mutual Aid for Emergency Services	Emergency Management Director; Select Board (approval of agreements); LEPC (coordination)	Needs some improvements and updates	Update mutual aid fire agreements with neighboring communities.
Mutual Aid for Public Works	Emergency Management Director; Road Foreman; Water Department; Select Board (approval of agreements); LEPC (coordination)	Needs some improvements and updates	Develop mutual aid agreements for road maintenance. The town currently gets assistance from and provides assistance to Pawlet and Sandgate.
Zoning/Subdivision Regulations	Planning Commission and Zoning Administrator (permitting); Development Review Board; Select Board (approval of bylaws)	The Town Zoning Administrator and the Development Review Board review development proposals	Changes are made as needed
Wetlands/Rivers and Streams/Waterbodies/Steep Slopes/Groundwater Protection Regulations	Planning Commission; Zoning Administrator (permitting); Development Review Board; Select Board (approval of bylaws)	Generally addressed by VT ANR, but considered during reviews by the Zoning Administrator and DRB	

Table 25. Capabilities of the Town of Rupert			
Plans, Policies, Ordinances	Description/Responsible Agent	Effectiveness	Improvements Needed
Building Codes	State of Vermont (commercial only); Zoning Administrator (certain building codes in flood hazard zones)	Commercial building codes overseen by State of Vermont (Department of Public Safety)	Town does not oversee building codes for residential structures.
Water	No public water supply		
Road Maintenance Programs and Standards	Road Foreman; Select Board	Effective; Town adopted most recent State of Vermont (AOT) road and bridge standards	None
Events Management	Select Board Vendor permit	Effective	None
School Emergency Response	School administrators; Emergency Management Director	There are no schools within Rupert, so this is addressed by schools attended by Rupert school children	Rupert does elect school directors for the Mettawee School Board.
Vulnerable Populations	Emergency Management Director and Health Officer	Needs some improvements and updates	Vulnerable populations need to know who to call for help: Health Officer or EMD
Mobile Homes	Emergency Management Director and; Health Officer	State of Vermont regulates mobile homes and mobile home parks	No mobile home parks in town

H. Current Programs

I. Mitigation Projects

Table 27 below lists mitigation actions for each of those hazards. Some will be implemented by the Town of Rupert and others by agencies such as the Vermont Agency of Transportation. Mitigation actions are listed by the type of hazard. Table 26 shows how these actions were prioritized.

Table 26. Criteria for prioritizing mitigation actions.
Source: Vermont Hazard Mitigation Plan 2018

	Impact	Feasibility
High	• Significantly benefit the environment, OR • Significantly benefit people/vulnerable populations, OR • Significantly reduce risk in our built environment, OR • Significantly benefit the economy, OR • Create the opportunity to do one of the above (e.g., filling a data gap), AND Significantly reduce vulnerability to a high priority hazard (erosion, inundation, ice, snow)	Have political and community support, AND Are consistent with current state laws/policies, AND Have funding/other required resources available or identified, AND Are technically/logistically feasible

Table 26. Criteria for prioritizing mitigation actions.
Source: Vermont Hazard Mitigation Plan 2018

	Impact	Feasibility
Medium	• Moderately benefit the environment, OR • Moderately benefit people/vulnerable populations, OR • Moderately reduce risk in our built environment, OR • Moderately benefit the economy, OR • Create the opportunity to do one of the above (e.g., filling a data gap), AND • Moderately reduce vulnerability to a profiled Hazard	• Have political and community support, OR • Are consistent with current state laws/policies, OR • Have funding/other required resources available or identified, AND • Are technically/logistically feasible
Low	• Minorly benefit the environment, OR • Minorly benefit people/vulnerable populations, OR • Minorly reduce risk in our built environment, OR • Minorly benefit the economy, OR • Create the opportunity to do one of the above (e.g., filling a data gap), AND • Minorly reduce vulnerability to a profiled hazard	• Have political and community support, OR • Are consistent with current state laws/policies, OR • Have funding/other required resources available or identified, OR • Are technically/logistically feasible

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 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
All Hazards	Education and Outreach	Provide information on the Town website with links to information for residents on preparing for hazards.	***Town Select Board*** Town Emergency Management Director	2021 to 2023	Town general fund	Medium	High
All Hazards	Education and Awareness	Encourage residents to sign up with the Citizens Assistance Registry for Emergencies to provide first responders with contacts of populations vulnerable to potential hazards, particularly drought, extreme temperatures, and infectious diseases, but also those in need of assistance for	***Town Emergency Management Director***	2021 to 2023	Town general fund	Medium	High

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

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
		evacuation and/or sheltering					
All hazards	Education and Outreach	Upgrade shelter at Congregational church	Town Select Board; ***Congregational Church***		State funding	High	Medium
All Hazards	Local Planning and Regulations	During the review of proposed developments, encourage proper construction techniques and use of appropriate materials to address hazards, particularly flooding, winter storms, wind events, earthquakes, landslides, and wildfire	***Town Development Review Board*** ***Zoning Administrator***	2021 to 2023	Town general fund	High	High
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*** Town Emergency Management Director Fire Department	2021 to 2023	Town general fund	High	High

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
All hazards	Structure and Infrastructure Projects	Investigate upgrading the Town Shelter to Red Cross standards	***Town Select Board*** Town Emergency Management Director Red Cross		Red Cross Town of Rupert	High	High
All Hazards	Education and Outreach	Provide educational materials for landowners on NFIP, proper construction techniques, and utility maintenance to reduce damage from storms	***Town Select Board*** Town Emergency Management Director	Ongoing as needed for landowners	Town funds	High	High
All Hazards	Education and Outreach s	Make materials available from VEM and other sources to residents on preparing for emergencies.	***Town Select Board*** Town Emergency Management Director	Ongoing as needed by residents	Town of Rupert	High	High
All Hazards	Local Planning and Regulations	Update Local Emergency Management Plan annually	***Town Select Board*** Town Emergency Management Director	Annually as required by VEM	Town of Rupert	High	High

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
Flood/Flash Flood/Wind Event	Education and Outreach	Educate landowners of the necessity of securing propane tanks, boats, outbuildings, mobile homes and other similar items and structures from wind and flood	***Town of Rupert Zoning Administrator***	Ongoing as needed by landowners	Town funds	High	High
Flood/Flash Flood	Education and Outreach	Work with the Poultney - Mettawee Natural Resource Conservation District on studies of the Indian River.	***Town of Select Board*** Poultney-Mettawee NRCD	2021 to 2024	State funding	Medium	Medium
Flood/Flash Flood	Structure and Infrastructure Project	Regularly update n assessments of culverts and bridges and their condition	***Town of Rupert Highway Department*** BCRC	2021 to 2024	State funding	High	High

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
Flood/Flash Flood	Structure and Infrastructure Project	Based on the above assessment, replace culverts, especially those in poor or lower condition. This would include the Perkins Road culvert, to better accommodate hydraulic conditions	***Town of Rupert Highway Department***	2021 to 2024	FEMA State funding	High	High
Flood/Flash Flood	Structure and Infrastructure Projects	Flood proof structures within flood hazard areas	***Town of Rupert Private owners***	Ongoing as needed depending on site conditions	FEMA Private	High	Medium
Floods/Flash Flood	Structures and Infrastructure Projects	Complete stormwater projects listed in Fitzgerald Environmental Associates 2015 report	***Town of Rupert Highway Department***	2021 to 2025	Town general fund State funding	High	Medium
Floods/Flash Flood	Structures and Infrastructure Projects	Bring all road segments categorized as “very high” in the town road erosion inventory to AOT standards by 2025	***Town of Rupert Highway Department***	2021 to 2025	Town general fund State funding	High	High

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
Floods/Flash Flood	Structures and Infrastructure Projects	Replace critical road infrastructure on Route 315	***Town of Rupert Highway Department***	2021 to 2025	Town general fund; State funding		
	Structures and	Investigate West Rupert Drainage system	***Town of Rupert Highway Department***	2023-2025		High	High
Floods and Flash Floods	Local Planning and Regulations	Encourage appropriate stormwater and erosion control measures in new developments	***Town Planning Commission***	Ongoing as development projects are reviewed	Town general fund	Medium	High
Floods and Flash Floods	Local Planning and Regulations	Adopt and enforce updated flood hazard and fluvial erosion hazard zone bylaws to incorporate VT ANR model bylaw provisions and VT ANR river corridor mapping	***Town Planning Commission; Town Development Review Board Zoning Administrator***	2021 to 2023	Town general fund	High	High
Winter storms	Education and Outreach	Provide educational materials on sheltering in place and preparation for winter storms, including long-term power outages	***Town Emergency Management Director***	2021 to 2023	Town general fund	Low	Low

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
Winter storms	Education and Awareness	Provide materials for residents on methods to protect property from wind events	***Town Emergency Management Director; Zoning Administrator***	2021 to 2023	Town general fund FEMA HMGP, BRIC, FMA	Low	Low
Winter storms	Local Planning and Regulations	Develop agreements with adjacent towns for sharing of highway equipment during disasters	***Town Select Board;*** Town Road Foreman	2021 to 2023	Town general fund	Low	Low
High wind events	Structure and Infrastructure Project	Work with utility companies to prioritize and treat vegetation clearing on vulnerable lines	Green Mountain Power ***Town of Rupert Highway Department***	Ongoing as utility companies undertake work	Utility companies	Medium	Medium
High wind events	Education and Outreach	Provide educational materials on sheltering in place and preparation for winter storms, including long-term power outages	***Town Emergency Management Director***	2021 to 2023	Town general fund	Medium	Medium
High wind events	Local Planning and Regulation	Require boats, propane tanks and other items stored outdoors to be secured	***Town Planning Commission; Zoning Administrator***	2021 to 2023	Town general fund	Medium	Medium

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
High wind events	Local Planning and Regulation	Encourage protection and planting of wind breaks in new developments	***Town Emergency Management Director; Zoning Administrator***	2021 to 2023	Town general fund	Medium	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***	Ongoing as funding becomes available or vulnerability of structures changes	FEMA HMGP, PDM	Medium	Medium
Drought	Local Planning and Regulation	Monitor drought conditions and post on town website when droughts are occurring	***Town Emergency Management Director***	Ongoing as drought conditions change over time	Town general fund	High	High
Drought	Education and Awareness	Provide educational materials on dealing with drought	***Town Emergency Management Director***	2021 to 2023	Town general fund FEMA HMGP, BRIC	High	High
Hail	Structure and Infrastructure Projects	Retrofit existing buildings to minimize hail damage	***Town Select Board; Private Owners***	2022 to 2024	FEMA HMGP, PDM	Low	Low

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
Temperature extremes	Education and Awareness	Encourage residents to sign up with the Citizens Assistance Registry for Emergencies to provide first responders with contacts of 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***	2021 to 2023	Town general fund FEMA HMGP, PDM	Medium	High
Drought	Natural System Protection	Develop improved assessment of groundwater sources and amend bylaws to assure their protection	Vermont Geological Survey ***Town Planning Commission***	2021 to 2024	FEMA HMGP, PDM State of VT	High	Low
Drought	Local Planning and Regulation	Incorporate planning for droughts in the emergency management plan	***Town Emergency Management Director***	2021 to 2023	Town general fund	High	High

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
Wildfire	Local Planning and Regulations	Develop community wildfire plan in coordination with adjacent municipalities	***Town of Rupert, Emergency Management Director*** BCRC US Forest Service	2023-2025	U.S. Forest Service	Low	Medium
Wildfire	Education and Awareness	Educate property owners to reduce hazardous fuel loads near structures and to establish maintained defensible space zones where necessary	***Property Owners Town of Rupert Emergency Management Director*** US Forest Service	Ongoing as fuel and weather conditions change	FEMA Property Owners US Forest Service Town of Rupert	Medium	Medium
Earthquake	Education and Awareness	Educate property owners on proper construction techniques to reduce potential damage from earthquakes	***Town of Rupert Zoning Administrator*** and Emergency Management Director	Ongoing as earthquake vulnerability changes	Town of Rupert	Low	Medium
Earthquake	Local Planning and Regulation	Identify any older buildings that may be subject to damage from earthquakes	***Town Select Board***	Ongoing as conditions warrant	Town funds	Low	Medium

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
Landslide and debris flow	Structure and Infrastructure Projects	Implement visual monitoring in potential landslide areas. There are at least four clay banks on private property needing attention; Town is awaiting VT ANR approval.	***Town Emergency Management Director***	2021 to 2023	Town general fund	Medium	Medium
Landslide and debris flow	Structure and Infrastructure Projects	Stabilize and replant stream corridor areas subject to landslides and/or mass failure	***Town Emergency Management Director*** BCRC	Ongoing as conditions warrant	State of VT Watershed grants	Medium	Medium
Hazardous materials spill	Structure and Infrastructure Projects	Work with VT AOT to identify and mitigate high accident intersections	***VT AOT***	2021 to 2024	State AOT funds	Medium	Medium
Infectious disease outbreak	Local Planning and Regulations	Monitor disease occurrences and potential outbreaks, partnering with the VT Dept. of Health	*Town Health Officer*	Ongoing as outbreaks occur	State of VT Dept. of Health	Medium	Medium

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
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***	2021 to 2024	Town general fund /State of Vermont Health Department	Medium	Medium
Invasive species	Local Planning and Regulations	Monitor extent of invasive species, particularly forest invasive species such as Emerald Ash Borer	***Town Select Board***	Ongoing	Town general fund	Low	Low
Invasive species	Local Planning and Regulations	Complete surveys for ash trees vulnerable to Emerald Ash Borer in town highway ROW. Encourage partnership with utility companies for tree removal	BCRC; ***Bennington County Conservation District***	2021 to 2023	FEMA HMGP, BRIC VT Department of Forests, Parks and Recreation	Medium	Medium
Invasive species	Local Planning and Regulations	Survey for invasive species (e.g., Japanese knotweed) along streams to identify potential erosion areas	***Bennington County Conservation District***	2021 to 2023	State of Vermont Department of Parks, Forestry and Recreation	Low	Low

Table 27. Mitigation actions. Primary agents responsible are in ***bold italics*** with others as supporting agents, except where more than one agent has jurisdiction.

Hazard	Type[8]	Action	Responsible Party	Time Frame	Funding Source(s)	Impact	Feasibility
Invasive species	Local Planning and Regulations	Encourage use of native species in plantings for commercial and residential development	***Town Planning Commission***	Ongoing as development projects are reviewed	Town general fund	Medium	Medium
Invasive species	Education and Awareness	Provide outreach materials for landowners on using native plants and controlling invasive species	***Bennington County Conservation District***	2021 to 2023	Town general fund /State of Vermont Department of Parks, Forestry and Recreation	Medium	Medium

E. Monitoring

1. Annual Review

This plan will be integrated into existing planning efforts when appropriate. During the annual budget process, the status of proposed projects as well as any newly identified projects will be reviewed by the Select Board. If necessary, the plan will be amended to include these new projects. During Town Meeting Day, 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.

Toward the end of the five-year period covered by this plan, the Select Board will initiate a review of the plan, by:

1. Updating the analyses of events using new information since completion of the 2012 draft
2. Identification of any new structures
3. Evaluation of potential probability and extent of hazards based on any new information since completion of the 2012 plan.
4. Review of completed hazard mitigation projects
5. Identification of new projects given the revised hazard evaluation

The Town of Rupert Select Board will hold open meetings to solicit opinions and to identify issues and concerns from members of the public and stakeholders. The Town of Rupert 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, Rupert 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.

2. Local Emergency Management Plan

Local Emergency Management Plans or LEMPS provide contact information and list the steps to setting up an incident command structure, assessing risks and vulnerabilities, and providing for resources and support. These plans also allow for documenting the steps used to address an incident. These plans should be updated regularly.

3. Integration of With Other Town Planning Efforts

Rupert will integrate this hazard mitigation plan with the town plan when that comes up for update in 2029, though by then this plan will have been updated as well. The Town will continue to use this plan to assess hazards, develop mitigation measures and implement measures to reduce hazards. The Town will be implementing stormwater management practices over the next several years that have been identified in separate stormwater plans but also incorporated here.

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B. Maps

The Vermont Open Geodata Portal (http://geodata.vermont.gov/)provides data on transportation systems, the location of structures (E911), critical facilities, jurisdictional boundaries, and other information. The base map was from ArcGIS Online (ESRI). Data from other sources specific maps is noted below.

Map 1. Town of Rupert: New York GIS Clearinghouse, https://gis.ny.gov/

Map 2. Town of Rupert Land Cover: New York GIS Clearinghouse, https://gis.ny.gov/

Map 3. Town of Rupert Critical Facilities: Rupert Local Emergency Management Plan (LEMP) (2020); Vermont Agency of Transportation provided to BCRC for Batten Kill Resilience Study, and the Planning Committee.

Map 4. Town of Rupert Flood Zones, Fluvial Erosion Hazard Zones and River Corridors: Vermont Agency of Natural Resources Natural Resources Atlas, http://anrmaps.vermont.gov/websites/anra/
FEMA Flood Map Service Center: https://msc.fema.gov/portal/

Map 5. Town of Rupert Damages: VTRANS Batten Kill Resilience Study; meetings with Skip and Tom Wilson.

Map 6. Town of Rupert Water Resources

Map 7. Town of Rupert Wildfire Potential: LANDFIRE Program, www.landfire.gov
Vermont Forest Resources Plan, http://anrmaps.vermont.gov/websites/sars_data/; BCRC data.

Map 8. Rupert Landslide Potential: Dale, J. 2015. Landslide potential in Bennington County, Vermont. Report prepared for Majorie Gale, Vermont Geological Survey from Green Mountain College, Poultney, VT.

C. Personal Communication Sources

Veronica Fialkowski, MPH., Infectious Disease Epidemiologist, Vermont Department of Health, Veronica.Fialkowski@vermont.gov

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

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

Appendix I. Mitigation actions from the 2014 Rupert Hazard Mitigation Plan

Hazard	Preparedness or Mitigation	Action	Responsible Party	Time Frame	Status (complete; carried to 2021 plan; deleted)	Priority
All hazards	Preparedness	Upgrade shelter at Congregational church	Rupert	1 year	Carried to 2021 plan	Medium
All hazards	Mitigation	Put power lines underground from main lines to the Town Hall and Fire Department if necessary	Town of Rupert	2-5 years	Carried to 2021 plan under High Wind Events	Medium
All hazards	Preparedness	Upgrade the Town Shelter to Red Cross standards	Town of Rupert Red Cross	1 year	Carried to 2021 plan	High
All hazards	Preparedness	Maintain current shelter at Rupert fire house	Rupert	Ongoing	Deleted as shelter exists	High

Appendix I. Mitigation actions from the 2014 Rupert Hazard Mitigation Plan

Hazard	Preparedness or Mitigation	Action	Responsible Party	Time Frame	Status (complete; carried to 2021 plan; deleted)	Priority
All Hazards	Mitigation	Provide educational materials for landowners on NFIP, proper construction techniques, and utility maintenance to reduce damage from storms	Town of Rupert	1 year	Carried to 2021 plan	High
All Hazards	Preparedness	Distribute materials from VEM and other sources to residents on preparing for emergencies.	Town of Rupert	1 year	Carried to 2021 plan	High
All Hazards	Preparedness	Update Local Emergency Operations Plan annually	Town of Rupert	Annually	Completed and Carried to 2021 plan	High

Appendix I. Mitigation actions from the 2014 Rupert Hazard Mitigation Plan

Hazard	Preparedness or Mitigation	Action	Responsible Party	Time Frame	Status (complete; carried to 2021 plan; deleted)	Priority
Flood/Flash Flood/Wind Event	Mitigation	Educate landowners of the necessity of securing propane tanks, boats, outbuildings, mobile homes and other similar items and structures from wind and flood	Town of Rupert	1 year	Carried to 2021 plan	High
Flood/Flash Flood	Mitigation	Work with the Poultney - Mettawee Natural Resource Conservation District on studies of the Indian River.	Town of Rupert Poultney-Mettawee NRCD	2-5 years	Carried to 2021 plan	Medium
Flood/Flash Flood	Mitigation	Complete an assessment of culverts and their condition	Town of Rupert BCRC	2-3 years	Completed 2018	Medium

Appendix I. Mitigation actions from the 2014 Rupert Hazard Mitigation Plan

Hazard	Preparedness or Mitigation	Action	Responsible Party	Time Frame	Status (complete; carried to 2021 plan; deleted)	Priority
Flood/Flash Flood	Mitigation	Based on the above assessment, replace culverts, such as the Perkins Road culvert, to better accommodate hydraulic conditions	Town of Rupert	2-5 years	Completed and Carried to 2021 plan	High
Flood/Flash Flood	Mitigation	Flood proof structures within flood hazard areas	Town of Rupert Private owners	2-5 years	Carried to 2021 plan	Medium
Winter storm (snow and ice)	Preparedness	Construct shelter for salt and sand	Town of Rupert	1 year	Completed	High
Wind Event	Mitigation	Work with utility companies to prioritize and treat vegetation clearing on vulnerable lines	CVPS	1 year	Ongoing	Medium

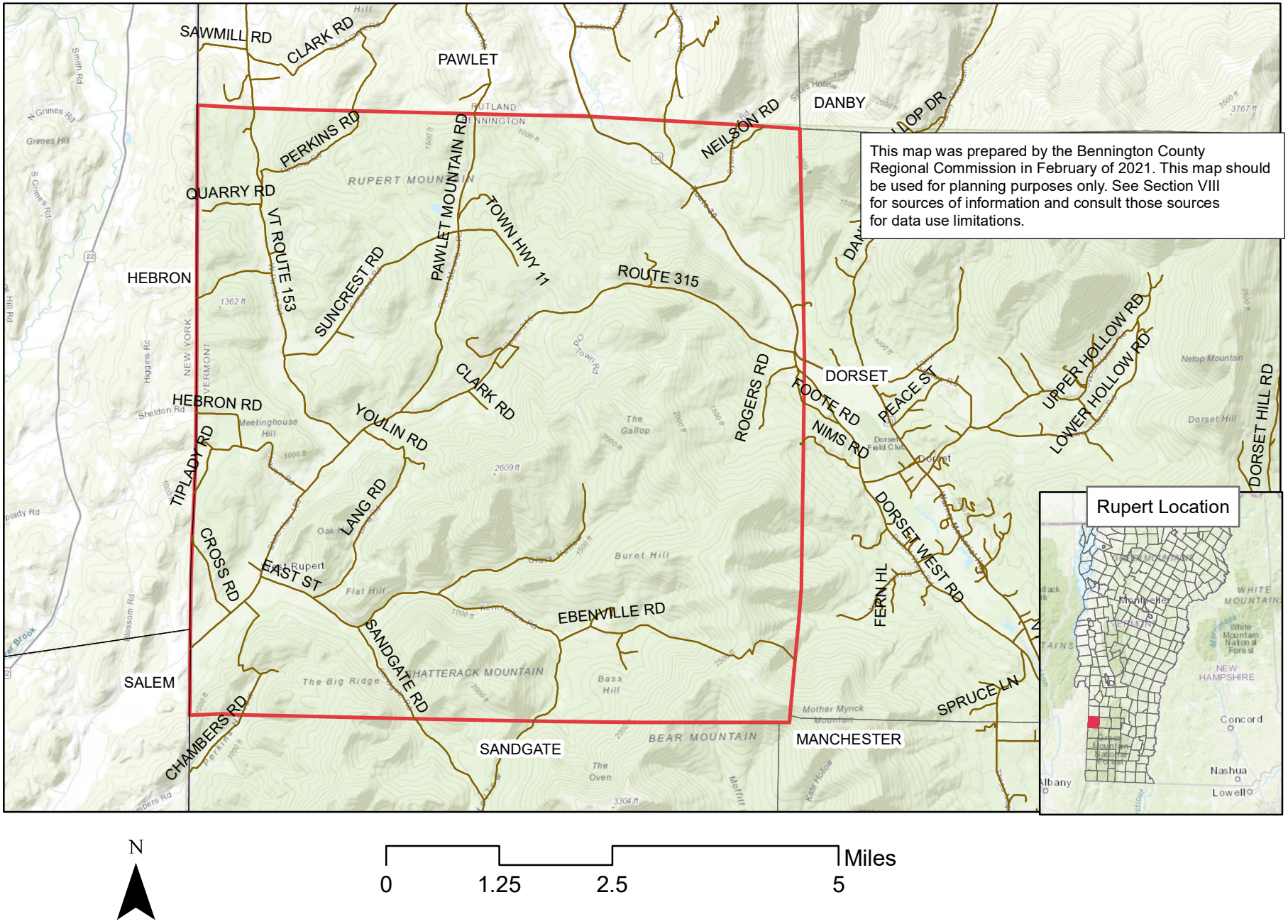
Appendix I. Mitigation actions from the 2014 Rupert Hazard Mitigation Plan

Hazard	Preparedness or Mitigation	Action	Responsible Party	Time Frame	Status (complete; carried to 2021 plan; deleted)	Priority
Drought	Mitigation	Identify areas with shallow wells susceptible to drought	Town of Rupert	1 Year	Deleted and replaced with drought monitoring	Medium
Earthquake	Mitigation	Identify any older buildings that may be subject to damage from earthquakes	Town of Rupert	2-5 years	Carried to 2021 plan	Low
Landslide/Debris Flow	Preparedness	Complete a study of areas potentially subject to landslide	Town of Rupert BCRC Vermont Geological Survey	2-5 years	Replaced with ongoing visual inspection of areas	Low
Wildfire/Drought	Mitigation	Develop community wildfire plan in coordination with adjacent municipalities	Town of Rupert, BCRC	2-5 years	Carried to 2021 plan	Low to Medium

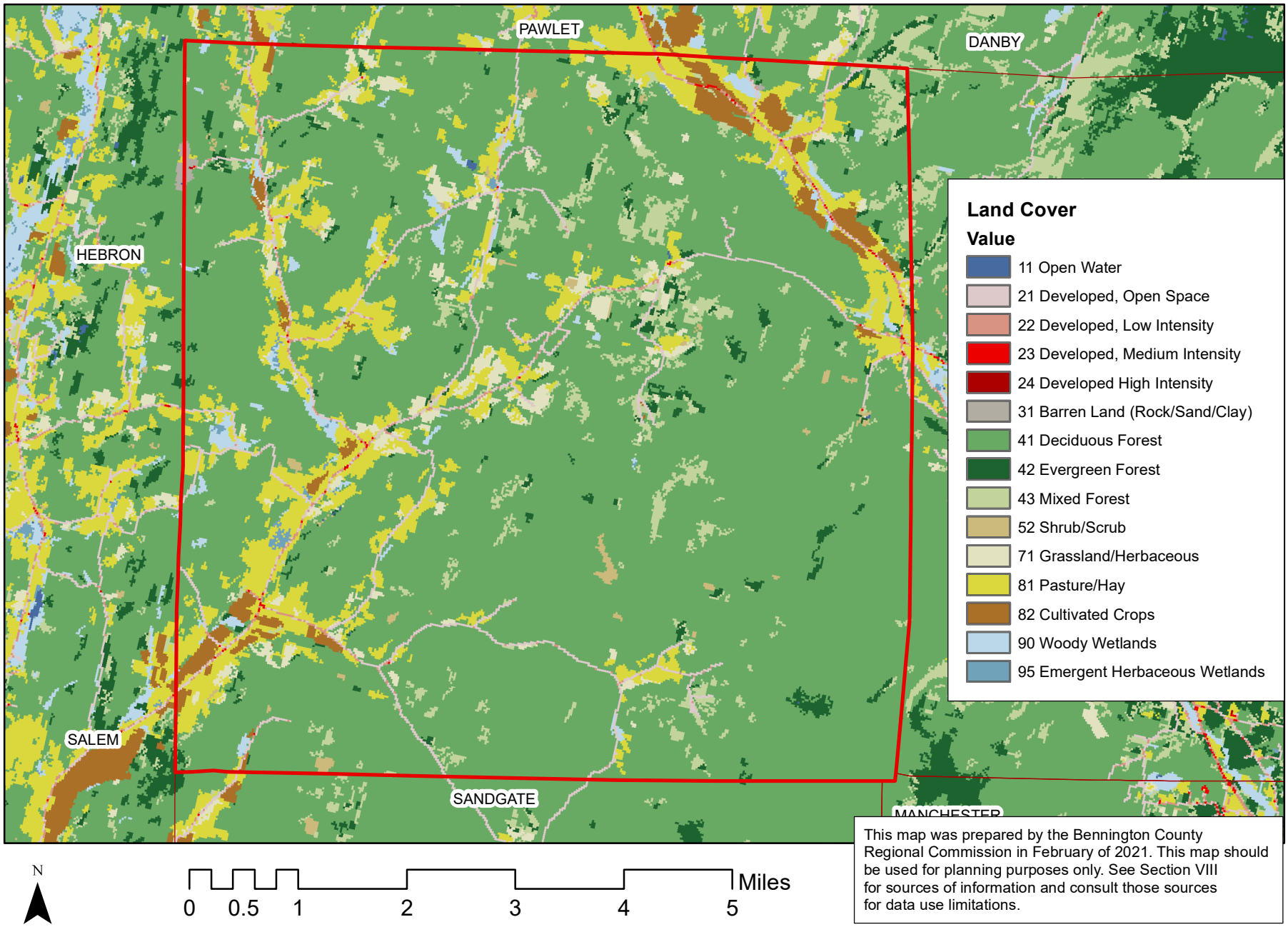
Appendix I. Mitigation actions from the 2014 Rupert Hazard Mitigation Plan

Hazard	Preparedness or Mitigation	Action	Responsible Party	Time Frame	Status (complete; carried to 2021 plan; deleted)	Priority
Wildfire/Drought	Mitigation	Educate property owners to reduce hazardous fuel loads near structures and to establish maintained defensible space zones where necessary	Property Owners Town of Rupert US Forest Service	1-3 years	Carried to 2021 plan	Low
Earthquake	Mitigation	Educate property owners on proper construction techniques to reduce potential damage from earthquakes	Town of Rupert	2-4 years	Deleted as hazard of low priority	Low

Map 1. Town of Rupert

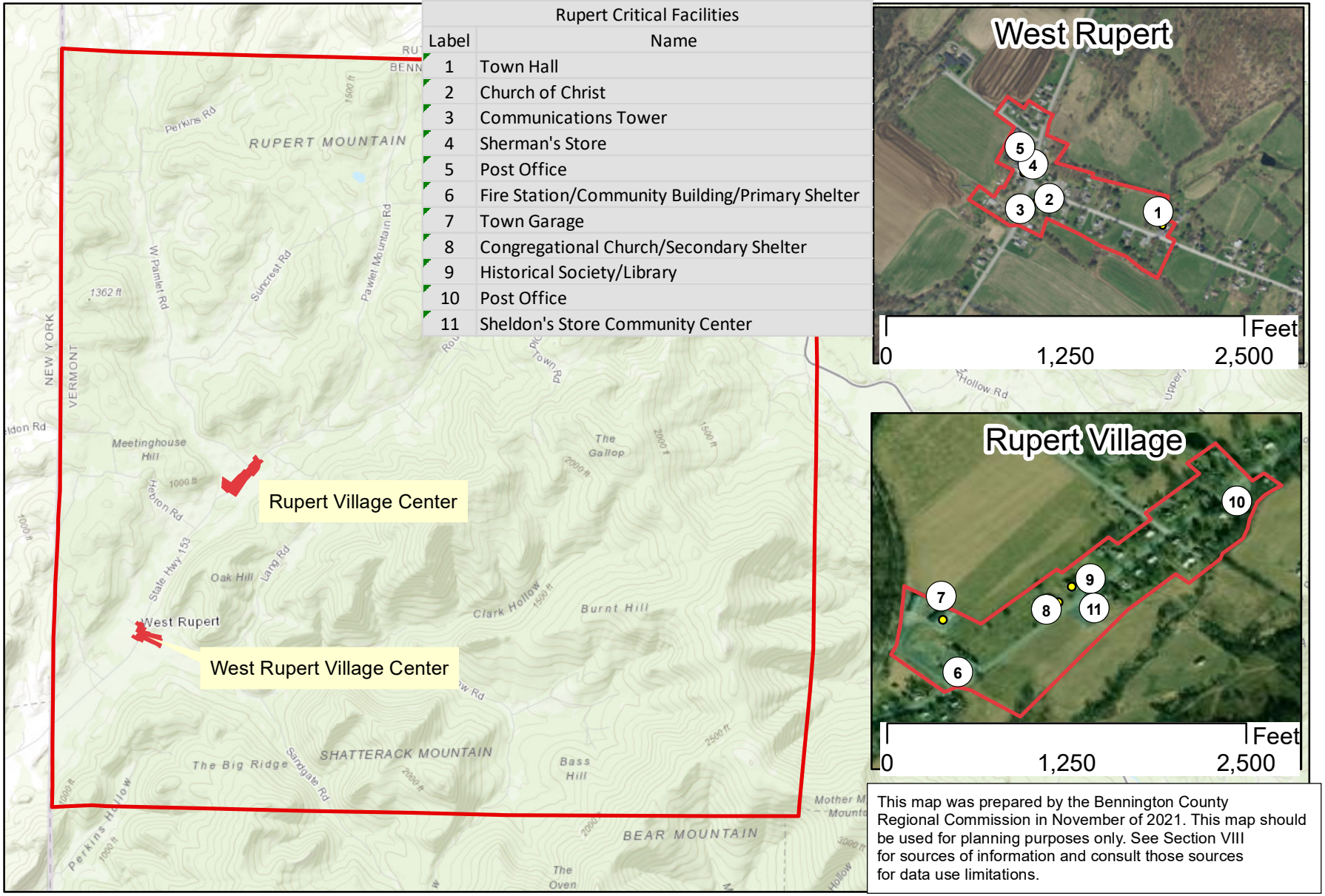


Map 2. Town of Rupert Land Cover



Map 3. Town of Rupert Critical Facilities

Rupert Critical Facilities	
Label	Name
1	Town Hall
2	Church of Christ
3	Communications Tower
4	Sherman's Store
5	Post Office
6	Fire Station/Community Building/Primary Shelter
7	Town Garage
8	Congregational Church/Secondary Shelter
9	Historical Society/Library
10	Post Office
11	Sheldon's Store Community Center

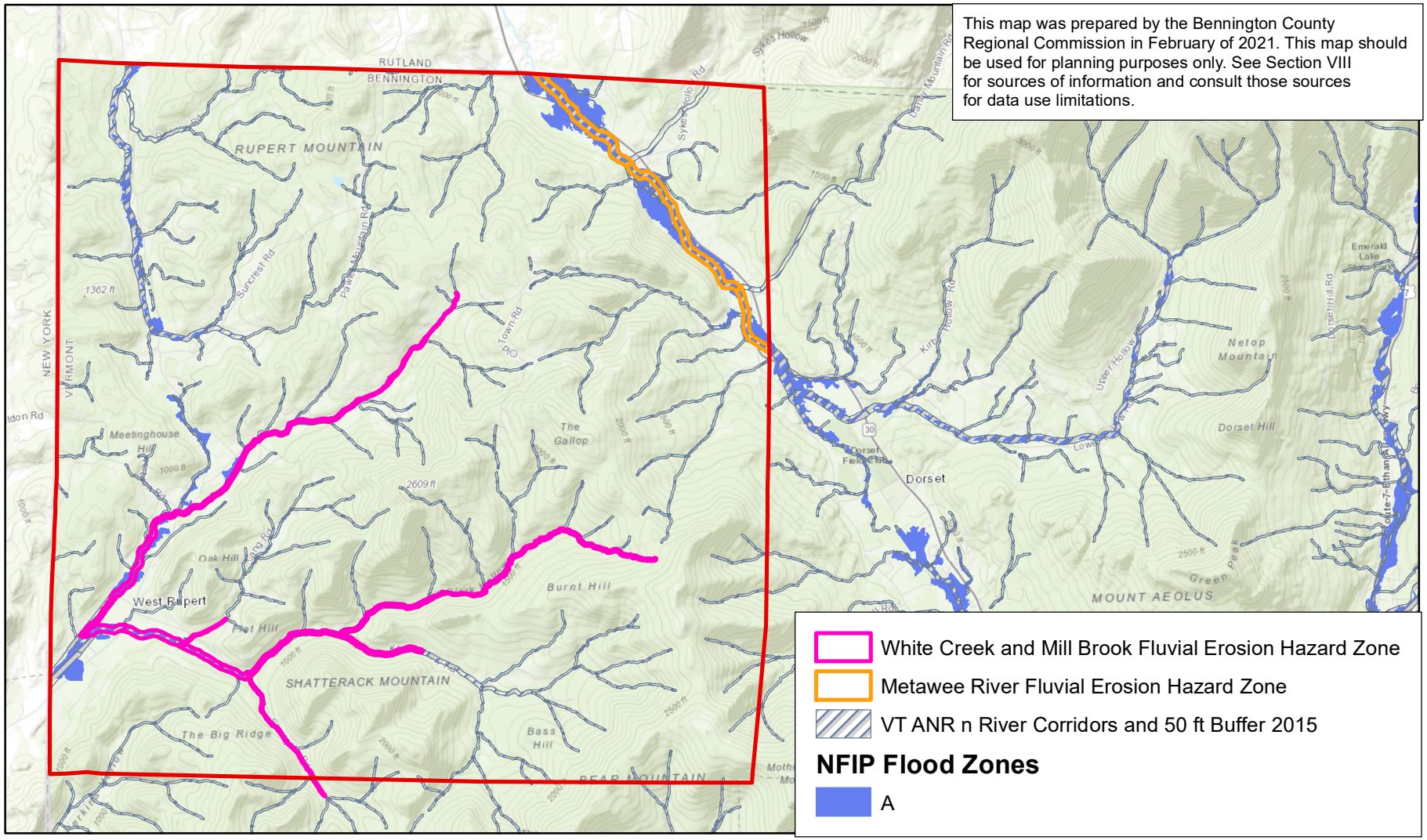


This map was prepared by the Bennington County Regional Commission in November of 2021. This map should be used for planning purposes only. See Section VIII for sources of information and consult those sources for data use limitations.

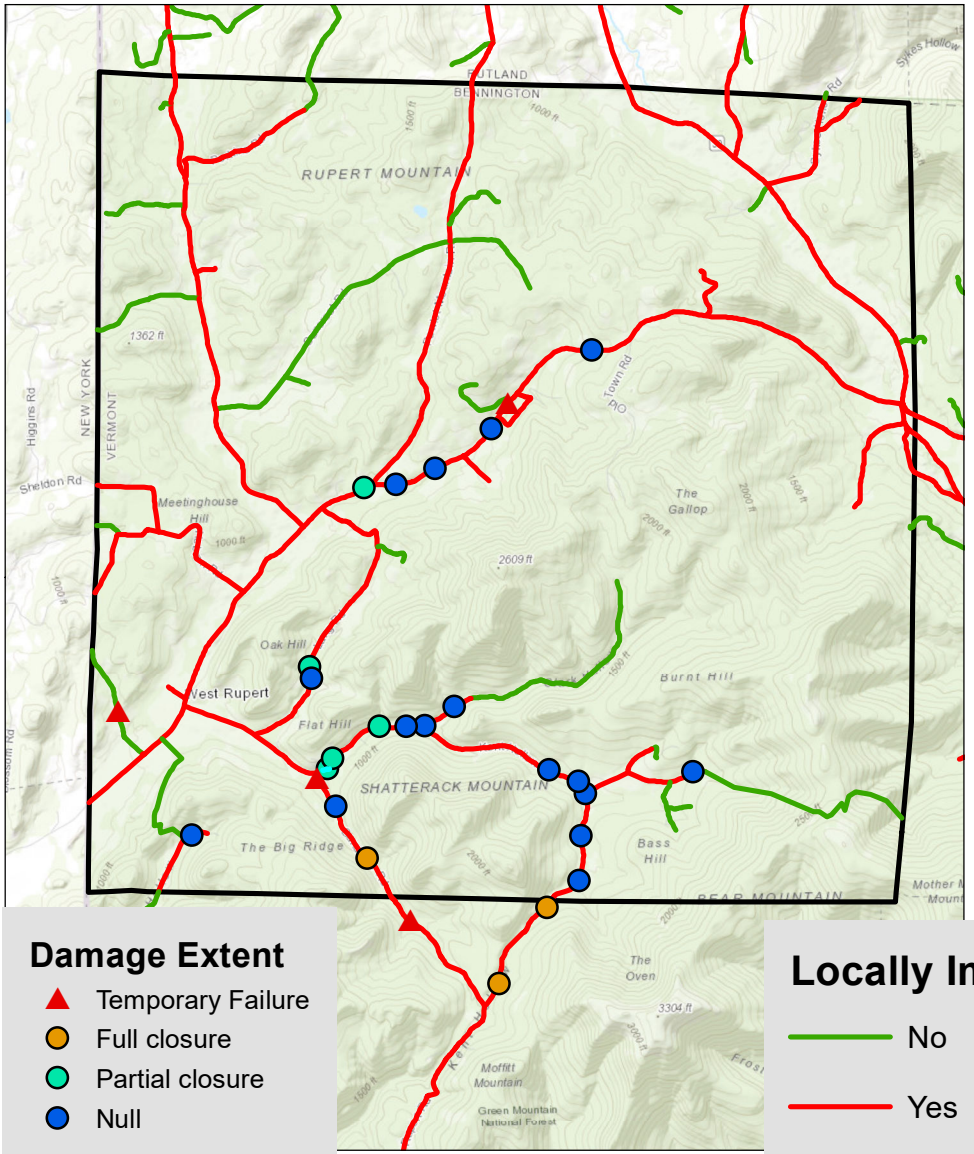
N

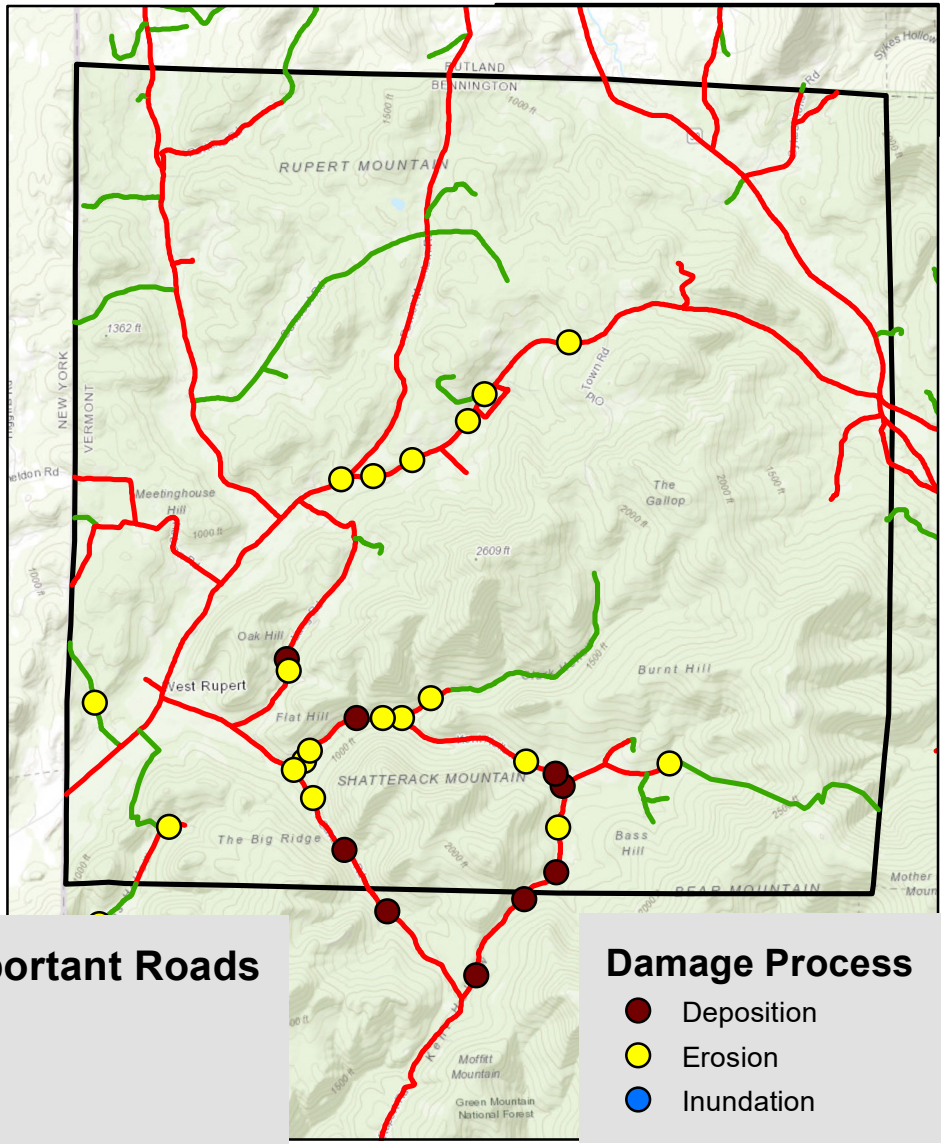
0 0.5 1 2 3 4 5 Miles

Map 4. Rupert Flood Zones, Fluvial Hazard Zones, and River Corridors



Map 5. Town of Rupert Damages





Damage Extent

- Temporary Failure
- Full closure
- Partial closure
- Null

Locally Important Roads

- No
- Yes

Damage Process

- Deposition
- Erosion
- Inundation

N

0 0.5 1 2 3 4 5 Miles

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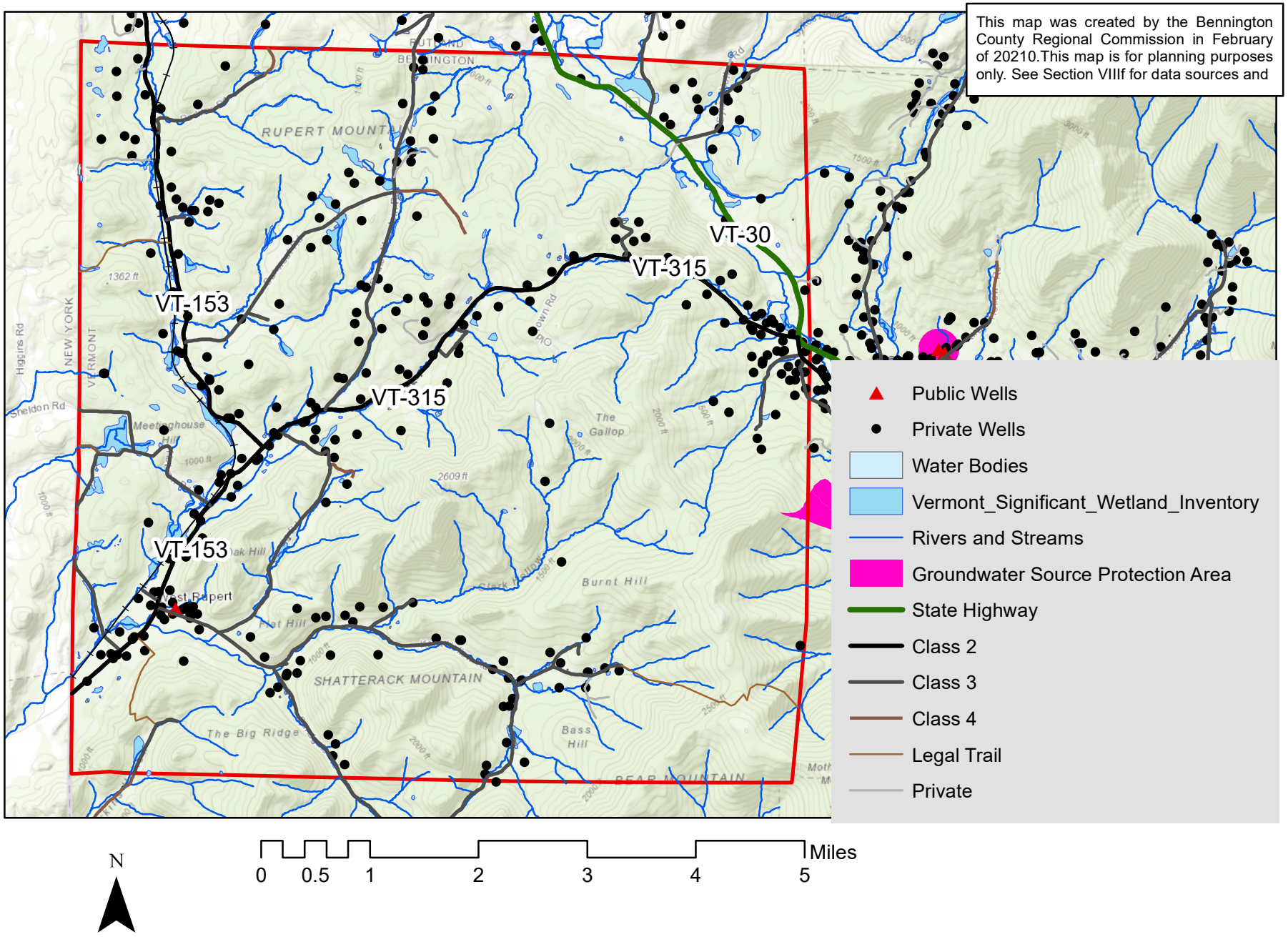
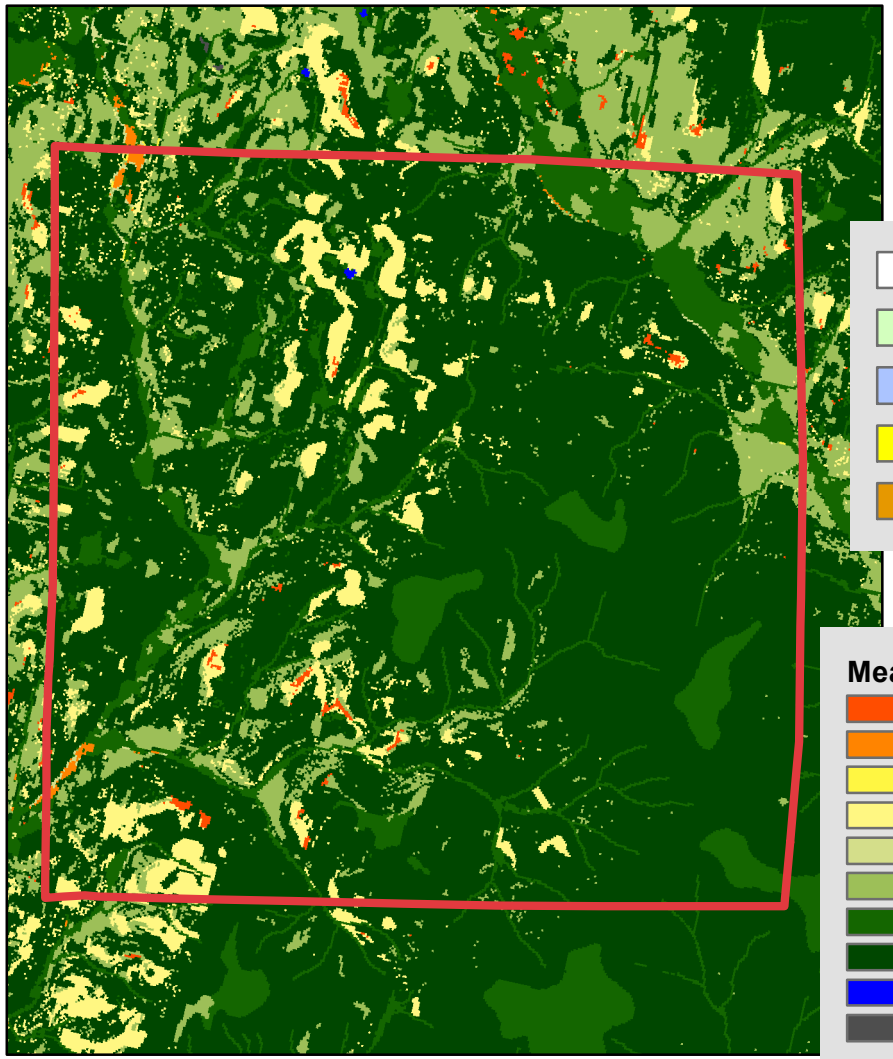
Map 6. Rupert Water Resources

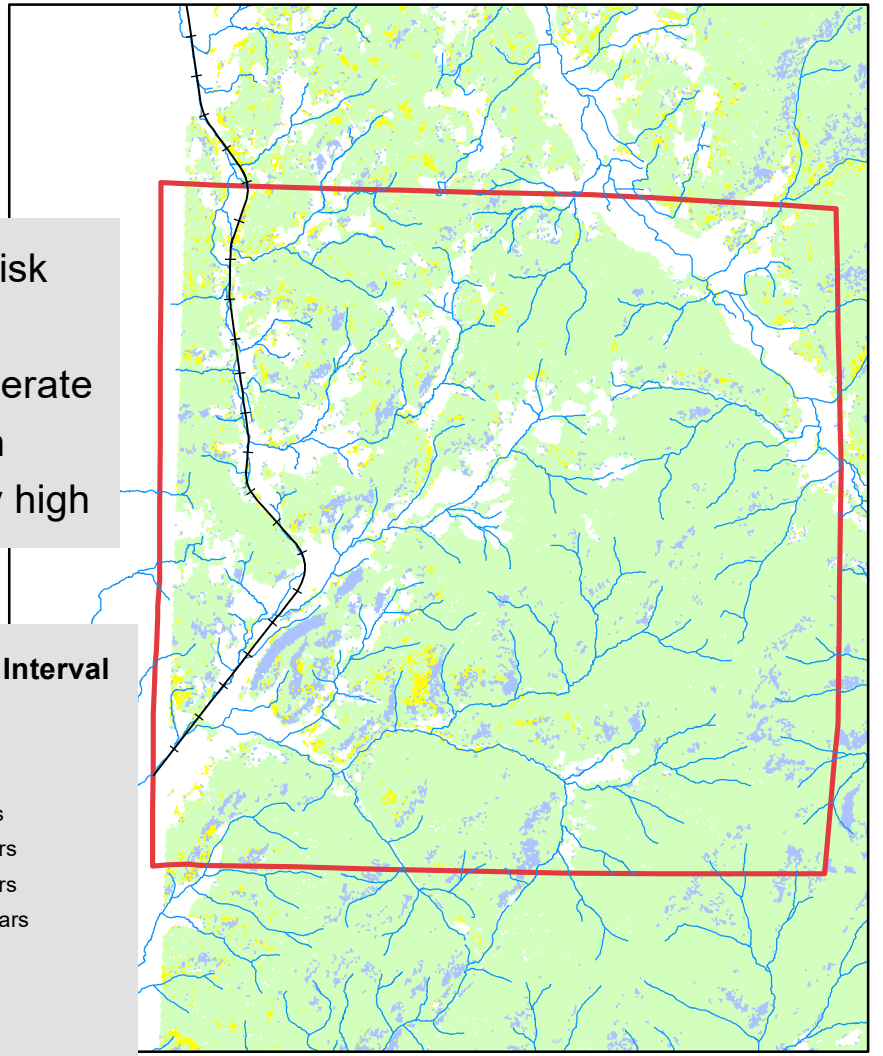


Map 7. Town of Rupert Wildfire Potential

Mean Fire Return Interval



Wildfire Risk



Mean Return Interval

- 46-50 Years
- 51-60 Years
- 81-90 Years
- 91-100 Years
- 126-150 Years
- 151-200 Years
- 501-1000 Years
- >1000 Years
- Water
- Barren

N

0 0.5 1 2 3 4 5 Miles

This map was prepared by the Bennington County Regional Commission in February of 2021. This map should be used for planning purposes only. See Section VIII for sources of information and consult those sources for data use

Map 8. Town of Rupert Landslide Potential