Town of Sandgate
Hazard Mitigation Plan

Adopted ***April 21, 2025***
Town of Sandgate
3266 Sandgate Road
Sandgate, VT 05250

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I. Introduction

This single jurisdiction Hazard Mitigation Plan is an UPDATE to a plan approved by the Federal Emergency Management Agency (FEMA) effective May 16, 2016 and expired May 17, 2021. This Hazard Mitigation Plan is funded by a FEMA Building Resilient Infrastructure and Communities (BRIC) grant.

Purpose

This plan is intended to identify, describe, and prioritize potential natural hazards that could affect the Town of Sandgate and develop measures to reduce or avoid those impacts.

Hazard mitigation is defined as “any sustained action taken to reduce or eliminate long-term risk to life and property from hazards.” (FEMA, 2023) Hazard mitigation plans are created through a community-driven process that identifies the hazards that could impact the town and the actions and projects that a jurisdiction can undertake to reduce risks and damages from natural hazards. The Federal Emergency Management Agency, within the U.S. Department of Homeland Security and the Department of Vermont Emergency Management both advocate the implementation of hazard mitigation measures to save lives and property and reduce the financial and human costs of disasters.

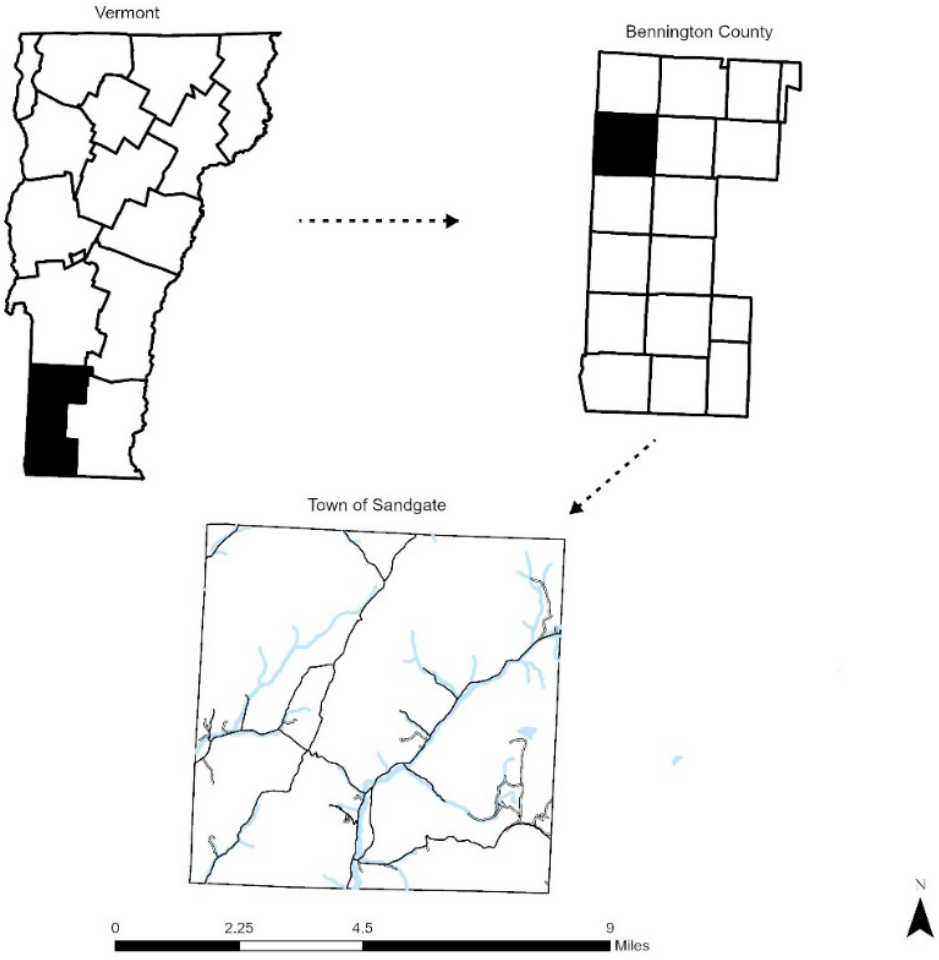
Sandgate was previously part of a multijurisdictional plan completed in 2005. In 2016, Sandgate created a single jurisdiction hazard mitigation plan to focus solely on the Town of Sandgate. This plan is an update of the 2016 plan to include updated demographics, recent events, changes in the planning and risk assessment process, mitigation actions that have already been completed, and changes in the town’s priorities for mitigation strategies.

This plan is created to align with the 2023 State of Vermont Hazard Mitigation Plan.

II. Town Profile

Location and Geography

The Town of Sandgate is located in Bennington County in the southwest portion of the state of Vermont. The Town is bordered by Rupert on the north, Arlington on the south, Manchester on the east and Salem, NY on the West (Map 1). Sandgate is approximately 42.32 square miles of extremely rugged, forested land in the middle of the Taconic Mountain Range. The east side of the town, which includes the valley of the Green River, is separated from the Camden Valley and West Sandgate by a high mountain ridge that is crossed only by West Sandgate Road which winds through "The Notch" in that ridge. Elevation ranges from 670 feet above sea level along the Green River near the Arlington border to 3,300 feet on Bear Mountain located in the northeastern part of the town. Other prominent peaks in town include Moffit Mountain, Egg Mountain, Swearing Hill, and Minister Hill. (Sandgate Town Plan, 2022)



Map 1. Location of Town of Sandgate. Source: BCRC, April 2024.

The Green River, a major tributary of the Batten Kill, flows from north to south into the Town of Arlington. Most of Sandgate is forested, consisting primarily of northern hardwood forests but also of conifer forests, generally at higher elevations.

While Sandgate does not have any large lakes, there are numerous smaller lakes. Lake Madeline is found in the eastern portion of the town on the western flank of Mount Equinox. At 20 acres this lake is the largest in Sandgate and, along with Barbos Lake and Hopper Pond, is not accessible to the public. These are all located on private lands owned by the Carthusian Monastery. Multiple small privately owned ponds dot the landscape across Sandgate.

Demographics

As of the 2020 Census, Sandgate's total year-round population was 387 (Sandgate Town Plan, 2022). For the 30 years prior to 2020, the rate of growth in Sandgate has been consistently higher than the regional growth rate. That changed as of the 2020 Census which showed a 4% decrease in population over the previous decade. According to ESRI Data from the 2020 Census, residents that are 65 years of age and older make up approximately a quarter of the population of Sandgate (Chart 1). The next largest age group is 50 – 59-year-olds. This indicates many elderly citizens and retirees who may currently and, in the future, need additional assistance during a disaster.

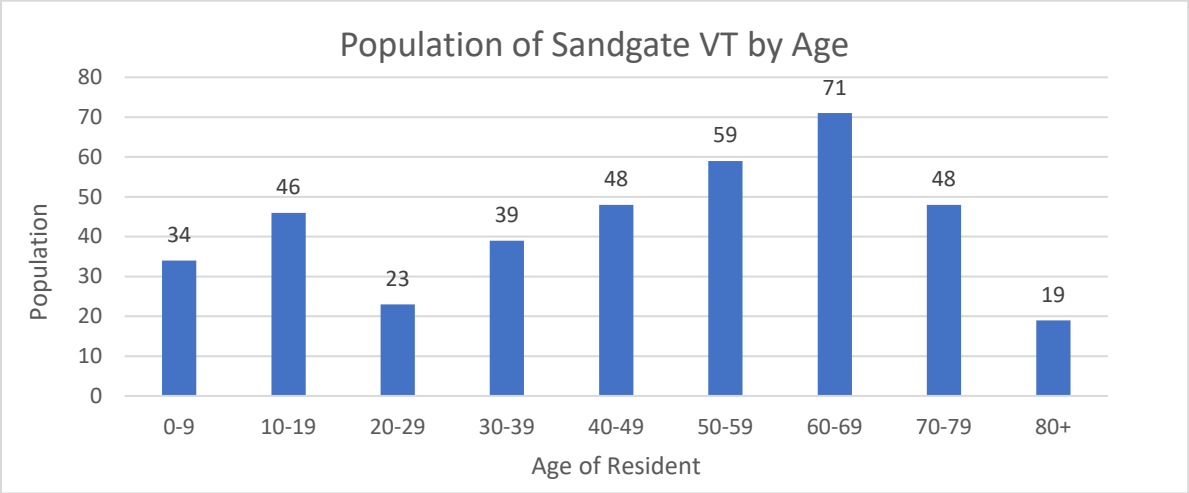


Chart 1. Population of Sandgate, VT by age. Source: ESRI Data from 2020 Census.

Housing

According to the 2020 Census, there are a total of 257 housing units with 171 being occupied housing units in Sandgate. This is an increase of 9 units since 2010 (Sandgate Town Plan, 2022). Most of these are single-family dwellings and camps. There are 68 vacant housing units of which 53 (21% of total housing units) are for

seasonal, recreational, or occasional use. The town does not regulate short-term rentals (STRs) so may be unaware of the location or the vacancy status of these units.

It is important to note that since 2020, many of the seasonal camps have become full-time, year-round residences.

Land Use and Development

Due to Sandgate's physiography, there are few areas that are suited for development. Most of the land in Sandgate is forested and the topography is mostly steeply sloping mountains and ridges separated by stream valleys and hollows. Well over half of its acres contain slopes greater than 20% leaving most of the land largely undevelopable. The valleys of the Green River, Terry Brook, and Baldwin Brook contain the only moderately level ground in the town and most development can be found along the two main roads, Sandgate Road and West Sandgate Road which follow these waterways. A summary of the structure types in Sandgate can be seen in Table 1.

Table 1. Number of buildings by type. Source: VCGIS 2021 E911 data

Type of Building	Number of Buildings
Single-family residential	363
Mobile home	8
Multi-family	2
Commercial/Commercial Farm/Other Commercial	5
Lodging	2
Seasonal Dwelling	76
Town Office	1
Education	1
House of Worship	6
Other*	41
Total	505

There are 3 primary zoning districts in Sandgate: Rural Residential, Forest #1, and Forest #2. The Rural Residential district encompasses much of the existing development and is served by the major roadways. Forest #1 includes areas where "physical conditions and access do not present severe obstacles to development". Any development in this district can be accessed by public roads and utilities while still protecting any natural resources. The Forest #2 district protects natural resources, recreational opportunities, and forest-related industries. (Sandgate Town Plan, 2022)

Critical Facilities and Infrastructure

The town of Sandgate only owns three buildings: the Town Office, School House #2 (a historic schoolhouse), and the town garage. The Town Office recently installed a generator and is listed as the Emergency Operations Center in the Local Emergency Management Plan (LEMP). It does not have potable water which makes it unavailable

as the emergency shelter for the town. However, through work via the Municipal Technical Assistance Grant Program, a project to remedy this situation is being investigated. The two emergency shelters currently listed on the LEMP are Arlington Memorial High School and the East Arlington Fire House, both located in the neighboring town of Arlington. The Sandgate town garage sits on 17 acres just up the road from the town offices.

Transportation infrastructure in this town is limited (Table 2). Sandgate Road runs from the southern portion of town following the Green River valley and continues northeast into Beartown where it turns into a Class 4 road in Manchester. West Sandgate Road branches off from Sandgate Road and travels west through a steep switchback passage called “The Notch” into West Sandgate and then to Salem, NY. Rupert Road runs just west of The Notch on West Sandgate Road north into Rupert providing a connection from Sandgate to Route 153. 12 smaller roads provide access to other homes and camps in the town.

Table 2. Sandgate, VT – Town Highway Mileage
Source: VTrans Sandgate Town Highway Map 2021.

Highway Type	Miles
Class 1	0
Class 2	7.58
Class 3	18.67
Class 4	7.37
Total	26.25

The electric infrastructure is provided throughout the town by Green Mountain Power. Telephone services are provided by Consolidated Communications. Internet service was brought in by the Southern Vermont Communication Union District and almost all of Sandgate is now served by Fidium. Cell phone coverage in Sandgate is still spotty at best, however. This lack of ability to communicate during a disaster is a concern to the town.

The town does not have a public water supply or wastewater disposal facility. Instead, property owners are served by on-site wells and septic systems. Currently, the well at the town hall does not provide potable water.

Emergency services are primarily provided by the Arlington Volunteer Fire Department and the Arlington Rescue Squad. However, other surrounding towns with fire departments may also respond to calls depending on the severity of the call. A fire department located near the intersection of Berwal Road and Route 313 in Arlington serves West Arlington and Sandgate and there are several dry hydrants located throughout the town (Map 7). Law enforcement services are provided by Vermont State Police (VSP) and the Bennington County Sheriff’s Department (BCSD). The VSP and BCSD stations are both a distance away in Shaftsbury and Bennington, respectively.

The response time to any event can be extensive due to the vast area that both departments must cover and a lack of staffing within the law enforcement agencies.

The town has a Local Emergency Management Plan (LEMP) that is updated annually. The current Emergency Management Director (EMD) is also the Select Board Chair. Sandgate has also appointed an Emergency Management Coordinator. The EMD coordinates with the town to update the LEMP and work with surrounding municipalities and service agencies in larger regional planning efforts.

Community Development and Development Trends

Development within Sandgate has remained in the valleys of the Green River and Terry Brook which flow along Sandgate Road and West Sandgate Road, respectively. There are four smaller, slightly more dense neighborhoods within Sandgate: Beartown, West Sandgate just past the Notch, Baldwin Corners, and near the town offices at the corner of Woodcock Road and Sandgate Road. As of the 2020 census, the population declined by 4% over the previous decade. Looking forward, Sandgate will remain a rural town with little development.

Sandgate has not had any substantial development changes since 2016, however it is interesting to note that many camps have been converted recently to year-round homes and many year-round homes were purchased by second home buyers in the years since the Covid-19 pandemic and are only used seasonally or as short-term rentals.

Historic, Natural/Environmental, and Cultural Resources

The Town of Sandgate was chartered in 1761 and prior to that was part of Indigenous People's hunting and fishing grounds. There are many historical resources within the town including old stone walls and foundations of the Daniel Shays Village, the United Methodist Church built in 1877, Sandgate's School House #2, the remnants of several mill sites near Beartown, the stone arched bridge on Woodcock Road, and four cemeteries. There may also be prehistoric archaeological sites scattered throughout the town.

The forests that have regrown since early settlers cleared large swaths of land for agriculture and settlement contain largely maple, beech, and yellow birch. The maple trees support an industrial maple business, the largest business in town. Much of the forest is of relatively poor quality due to extensive logging practices. New practices should encourage the growth of a variety of tree species which will lead to improved habitats for a variety of wildlife species. These forests not only provide maple sap and trees for logging, but they also provide areas for recreational pursuits such as bear and deer hunting.

Significant events since the last plan update (major disasters, major developments, conditions affecting risk in the community)

Since 2016, Bennington County has experienced five FEMA designated disasters as indicated in Table 3. Four of the five events were flooding events, and the fifth event was the Covid-19 pandemic that had impacts not only on Sandgate but also worldwide. Further discussion of these events can be found within the appropriate hazard section.

Table 3. FEMA Designated Disasters since 2016 and their descriptions. Source: FEMA and NCEI, 2024

Date	FEMA Declaration Number	Title	Description
June 29,2017-July 1, 2017	DR-4330-VT	Severe Storms and Flooding	Torrential rainfall throughout portions of Southern Vermont with 3.47 inches in four hours recorded. This caused flooding in the Walloomsac River at Paper Mill Village in Bennington. A microburst in Bennington County also caused estimated wind speeds of 100 mph.
April 15, 2019	DR-4445-VT	Severe Storms and Flooding	Some reports of flooding were made including some washed out dirt roads and a major disaster was declared in Bennington County to assist in repairing the damaged roads.
January 20, 2020 – May 11, 2023	DR-4532-VT	VT Covid-19 Pandemic	Worldwide pandemic of the SARS-CoV-2 virus that infected over 22 million Americans and required those infected to quarantine.
July 29, 2021 – July 30, 2021	DR-4621-VT	Severe Storms and Flooding	Major impacts were felt from flash flooding right in Sandgate. Portions of roads were washed away, and many other roads suffered significant to severe disasters. There were stream banks failures. Some residents were isolated for 24-48 hours, and residential damage was reported.
July 7, 2023-July 21, 2023	DR-4720-VT	Severe Storms, Flooding, Landslides, and Mudslides	From July 9th – July 11th, rain fell on already saturated soil and resulted in flash flooding throughout the county. The Town of Londonderry was the hardest hit, but the Green River in Sandgate did hit flood stage, however no major damages were reported.

Due to the multiple flood events in the last several years, the Town of Sandgate has done multiple improvement projects including upsizing culverts, elevating roads, digging new or larger ditches, and multiple riparian plantings along the Green River and Hopper Brook. These efforts are probably what made the impacts of the 2023 flood event far less destructive than the 2021 flood event.

III. Planning Process

Overview and Background

The hazard mitigation planning process began in November 2023 when the Town of Sandgate and the Bennington County Regional Commission signed a contract to begin work on the update to the 2016 plan. A FEMA Building Resilient Infrastructure and Communities (BRIC) grant was utilized to support this planning process.

Building Support: Community Involvement, Roles and Responsibilities

The planning team was made up of Select Board members, the EMD, the Road Foreman, the Zoning Administrator, and residents of the town. Many of these individuals wear multiple hats and are on the select board as well as other roles within the community, many of which interact with vulnerable populations within their roles in the town such as the older populations and those faced with poverty. Stakeholders were also encouraged to participate, and the survey was sent out to all emergency service providers that serve or can serve the Town of Sandgate. An effort was made to reach out to the utilities that serve the town, including Green Mountain Power and Consolidated Communications. Conversations and information were gathered from the General Manager (GM) of the dams located on Lake Madeline and the director of the Sandgate operations for Crown Maple. These groups and all stakeholders were also invited to participate in the public meeting held on February 26th and were available to answer questions throughout the planning process.

Documenting the Plan Update Process

A kick-off planning meeting was held in November 2023 during their publicly warned Select Board meeting. During this meeting, the planning team was created. A public meeting was held on February 26th to discuss the plan, the future updates, and to solicit in-person feedback regarding the hazards that the town should address in the town. This public meeting was advertised in the local store, on Facebook, via the town website and notices were hung at the four kiosks around town. Several meetings where the progress of the plan update was discussed, and public input requested, were publicly warned according to the Vermont Open Meetings Law. Dates are listed in Table 4.

Table 4. Dates of Hazard Mitigation Planning Meetings

Meeting	Date	Notes
Kick-off meeting	November 20, 2023	Held in conjunction with a regularly scheduled selectboard meeting, the planning team was created. Town residents were present but gave no comment. Stakeholders identified.

Table 4. Dates of Hazard Mitigation Planning Meetings		
Meeting	**Date**	**Notes**
Planning Committee Meeting	December 13, 2023	Established timeline for update and created an engagement plan for stakeholders.
Community Survey Disseminated	January 12th – March 24th	Community survey shared online and via paper copies at the town office. Fliers posted around at 4 kiosks.
Public Meeting	February 26, 2024	Held a public meeting to gain feedback on hazards to address and review the planning process. 2 members of the public attended (aside from members of the planning committee). See Appendix III for the results of that meeting.
Planning Committee Meeting	March 25, 2024	Working meeting to review survey results and perform risk and vulnerability assessments.
Planning Committee Meeting	April 29, 2024	Working meeting to review mitigation actions from prior plan.
Planning Committee Meeting	May 28, 2024	Working meeting to continue to review the mitigation actions and perform the evaluation of each action.
Public Meeting	July 15, 2024	Participated in a Select Board Meeting to review the final mitigation actions and share the status of the plan with the Select Board and the community. No comments from the community members that were present.
First Draft of the Plan Published	August 1, 2024	First draft made available for public and municipal review by the planning team on Sandgate's website and via email to surround town leaders and stakeholders.
Submission to Vermont Emergency Management for Review	September 1, 2024	First draft submitted to VEM for review and feedback.
Submission to Vermont Emergency Management for Second Review	February 28, 2025	Revised Draft submitted to VEM for review and feedback.
Select Board adoption pending approval of the Hazard Mitigation Plan	April 21, 2025	Plan was presented to the Select Board for adoption pending approval from FEMA.

The plan was posted on The Town of Sandgate website, where town information is posted, and on the Bennington County Regional Commission website. The plan was sent to the Select Board Chairs of the surrounding towns of Arlington, Sunderland, Manchester, Dorset, and Rupert in Vermont, and Salem, NY for comments. Each was asked to share the plan with appropriate staff and officials. Comments were requested by email to Dara Zink at the Bennington County Regional Commission at dzink@bcrcvt.org by August 25, 2024. Once the comment period ended and no comments were received, the plan was sent to Vermont Emergency Management for review. Following the review by Vermont Emergency Management, the Select Board adopted the plan, dated April 21, 2025, at their Selectboard meeting.

Understanding the Community's Risks

To understand the community's risks, the previous hazard mitigation plan was reviewed, as well as multiple other studies, reports and technical information. Table 5 lists all the plans that were reviewed and how they were used within this plan update.

Table 5. Existing Plans, Studies, Reports & Technical Information

Title	Use
2023 FEMA Local Mitigation Planning Handbook.	Referenced to ensure that this plan meets FEMA mitigation planning requirements.
Bennington Regional Plan Policies and Actions (adopted March 19, 2015)	Referenced in Section V for the Capability Assessment.
Community Wildfire Protection Plan for the Towns of Arlington, Glastenbury, Sandgate, Shaftsbury and Sunderland	Referenced in Section V for the Capability Assessment.
Conversation with General Manager of the Lake Madeline dam	Used to update the information regarding the two dams referenced in the Section IV. Risk Assessment and hazard history.
FEMA National Risk Index Map	This information was used to update the risk assessments in Section IV.
FEMA Disaster Declarations for Vermont	Referenced in Section II to build the town profile and referenced in Section IV for each hazard's history.
FEMA 2015 Flood Insurance Rate Maps (FIRM) for Sandgate	Referenced in Section II. Flooding and Fluvial Erosion and Section V. National Flood Insurance Program.
FEMA Flood Insurance Study Bennington County, Vermont (All Jurisdictions) Study Number 50003CV000A	Referenced in Section V. National Flood Insurance Program.
Knowledge from residents and stakeholders of the town	This information was used to develop the risk assessment in Section IV.
Local Emergency Management Plan, 2024	Referenced in Section V for the Capability Assessment.
National Flood Insurance Program	This information was used in Section IV to develop the risk assessment and referenced in Section V in the Capability Assessment.
Sandgate Land Use & Development Bylaw Adopted May 6, 2024	Referenced in Section V for the Capability Assessment.
Sandgate Town Plan Adopted December 19, 2022	Used to help build the community profile and referenced in Section V for the Capability Assessment.
Sandgate, Vermont Annual Report 2023 Fiscal Year	Budget information referenced in Community Capability Section in Section V. Fire warden report and Conservation Commission report referenced in Section IV to create hazard history.
Stormwater Master Plan, Town of Sandgate, Vermont (Adopted December 29, 2017)	Referenced in Section V for the Capability Assessment.
The National Centers for Environmental Information (NCEI) Storm Events Database	Used to update the hazard history and risk assessment in Section IV.
The National Weather Service	Data used to build the risk assessment and hazard history in Section IV.
The State of Vermont Hazard Mitigation Plan 2023	Referenced to develop the risk profiles in Section IV.

Table 5. Existing Plans, Studies, Reports & Technical Information	
Title	**Use**
The Vermont Department of Forest, Parks, and Recreation Data on Wildfire	Referenced to develop the risk profiles in Section IV.
Town of Sandgate Hazard Mitigation Plan 2016	This is the previous hazard mitigation plan for the Town of Sandgate.
Town of Sandgate's FEMA Flood Insurance Rate Map, effective 12/2/2015	Used to create Map 2 and referenced in Section V for the Capability Assessment.
Town Road and Bridge Standards	Referenced in Section V for the Capability Assessment.
VTDigger	Newspaper in Vermont. This was referenced to help build the risk assessment in Section IV.
VTrans Public Crash Data Query Tool	Used to build hazard history and risk assessment in Section IV.

With respect to NCEI data, there have been numerous changes to that database in just the last few years. While NCEI data goes back to 1950, there was a dramatic change in 1996 in the way data were collected. The number of events recorded in the years prior to 1996 is far less than from 1996 onward. Therefore, for the most reliable data, we used only data from 1996 onwards.

IV. Risk Assessment

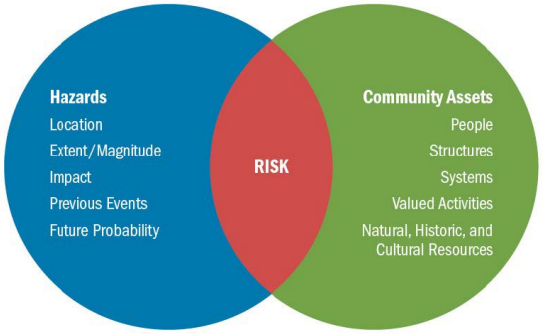


Figure 1. Risk is the overlap of community assets and the effects of hazards. Source: FEMA Local Mitigation Planning Handbook 2023

Risk Assessment Process

Risk is defined by FEMA in the Local Mitigation Planning Handbook 2023 as "the potential for damage or loss when natural hazards interact with people or assets." Where hazards and community assets overlap, you will find risk. The greater the overlap, the greater the risk to people, natural environment, built environment, and other community assets.

The planning committee came together to conduct a risk assessment (Table 6) for each hazard and then choose which hazards would be profiled in this hazard mitigation plan. Since the 2016 plan, there have been significant changes in how hazards are evaluated. Following the methodology of the 2023 Vermont State Hazard Mitigation

Plan, the probability of each hazard was ranked on a scale of 1 to 4 by its frequency of occurrence. Each hazard was then evaluated for its potential impact also on a scale of 1 to 4. A description of the ranking for frequency of occurrence and potential impact can be found in Table 7. The potential impact was then averaged, and the final score obtained by multiplying the probability score by the average of the potential impact. The results are then factored into the plan. The planning committee chose not to profile or mitigate any hazards with an overall score of 2.5 or less due to a low probability of occurrence and/or low impact. The State Hazard Mitigation Plan can be reviewed for more information on hail, severe heat, and earthquakes.

Table 6. 2025 Town of Sandgate Hazard Mitigation Plan - Risk Assessment

Hazard	**Probability**	**Potential Impact**					**Score*:**
		Built Environn	People	Economy	Natural Environment	**Average:**	
Flooding and Fluvial Erosion	**4**	4	4	4	4	**4**	**16**
Winter Storm	**4**	2.5	2.5	2	3	**2.5**	**10**
High Wind	**4**	3	2.5	2	3	**2.625**	**10.5**
Hail**	**2**	1.5	1	1	1	**1.125**	**2.25**
Severe Heat**	**1**	1	2	1	1	**1.25**	**1.25**
Extreme Cold	**4**	2.5	2	1	1	**1.625**	**6.5**
Drought	**3**	3	3	1.5	3	**2.625**	**7.875**
Landslides	**3**	2	1	1	2.5	**1.625**	**4.875**
Wildfire	**3**	1	1	1	2	**1.25**	**3.75**
Earthquake**	**1**	1	1	1	1	**1**	**1**
Hazardous Materials Spill	**2**	1	1	1	2.5	**1.375**	**2.75**
Invasive Species	**4**	1	3	2	3	**2.25**	**9**
Infectious Disease Outbreak	**2.5**	1	3	1.5	1	**1.625**	**4.0625**

*Score = Probability x Average Potential Impact
**Hazards not profiled or mitigated for in this plan.

Table 7. Hazard Assessment Ranking Criteria		
	Frequency of Occurrence: Probability of a plausibly significant event impacting the community or regional scale based on previous occurrences and climate change projections.	**Potential Impact:** Severity and extent of damage and disruption to population, property, environment, and the economy
1	**Unlikely:** <1% probability of occurrence per year	**Negligible:** isolated occurrences of minor built or natural environmental damage, potential for minor injuries, health, or well-being impacts, or minimal economic disruption.
2	**Occasionally:** 1–10% probability of occurrence per year, or at least one chance in next 100 years	**Minor:** isolated occurrences of moderate to severe built or natural environmental damage, potential for injuries or health or well-being impacts, minor economic disruption.
3	**Likely:** >10% but <75% probability per year, at least 1 chance in next 10 years	**Moderate:** severe built or natural environmental damage on a community scale, injuries, fatalities or impacts to individual and community well-being, short-term economic impact.
4	**Highly Likely:** >75% probability in a year	**Major:** severe built or natural environmental damage on a community or regional scale, multiple injuries or fatalities or severe long-term impacts to individual and community well-being, significant long-term economic impact.

Hazards

The planning committee decided to focus on the same hazards as the 2016 plan in the community survey and in the initial planning conversation. No additional hazards were included at that time (Table 8.) The 2023 State Hazard Mitigation plan addresses the hazards as listed in the second column. The table crosswalks the hazards in the 2016 plan to the state's hazards and the last column indicates which hazards will be addressed in this plan and how the plan refers to them. In this plan, flooding and fluvial erosion will include flash floods. Temperature extremes will be addressed separately as Severe Heat and Extreme Cold; however, as indicated above, severe heat will not be addressed in this plan.

Table 8. Crosswalk of hazards from 2016 Hazard Mitigation Plan to the 2023 Vermont State Hazard Mitigation Plan and then to the 2025 Town of Sandgate Hazard Mitigation Plan.

2016 Town of Sandgate Hazard Mitigation Plan Hazard List	**2023 Vermont State Hazard Mitigation Plan Hazard List**	**2025 Town of Sandgate Hazard Mitigation Plan Hazard List**
Floods and Flash Floods	Fluvial Erosion	Flooding and Fluvial Erosion
	Inundation Flooding	
Winter Storm	Snow	Winter Storm
	Ice	
High Wind Event	Wind	High Wind Event
Hail	Hail	Hail*
Temperature Extremes	Heat	Severe Heat*
	Cold	Extreme Cold
Drought	Drought	Drought
Landslides and Debris Flow	Landslides	Landslides

Table 8. Crosswalk of hazards from 2016 Hazard Mitigation Plan to the 2023 Vermont State Hazard Mitigation Plan and then to the 2025 Town of Sandgate Hazard Mitigation Plan.		
2016 Town of Sandgate Hazard Mitigation Plan Hazard List	**2023 Vermont State Hazard Mitigation Plan Hazard List**	**2025 Town of Sandgate Hazard Mitigation Plan Hazard List**
Wildfire	Wildfire	Wildfire
Earthquake	Earthquake	Earthquake*
Hazardous Materials Spill	Not addressed	Hazardous Materials Spill
Invasive Species	Invasive Species	Invasive Species
Infectious Disease Outbreak	Infectious Disease Outbreak	Infectious Disease Outbreak
*These hazards were addressed in the previous plan but will not be addressed in this plan.		

Each hazard chosen to be addressed in this plan will be profiled using the following information based on FEMA requirements:

- Location – the geographic area within the planning area that is affected by the hazard
- Extent – the expected range of intensity for each hazard
- Previous occurrences – the history of any historical events caused by that hazard
- Probability – how likely the hazard is to occur in the future

Flooding and Fluvial Erosion

Hazard	**Probability**	**Potential Impact**					**Score*:**
		Built Environment	People	Economy	Natural Environment	**Average:**	
Flooding and Fluvial Erosion	**4**	4	4	4	4	**4**	**16**

Description

According to the 2023 Vermont State Hazard Mitigation Plan, flooding and fluvial erosion were the top two significant hazards in the state. It was also the top ranked hazard in the risk assessment conducted by the Sandgate planning committee.

There are two types of flooding that impact Vermont and the Sandgate region: inundation flooding and flash floods. The National Weather Service defines a flood as “any high flow, overflow, or inundation 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 level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.” (*NOAA’s National Weather Service - Glossary*) Flash floods can also occur after a dam failure or after a sudden release of water by an ice jam. Inundation flooding is a longer-term event than flash flooding and may last days or

weeks and spread out over large areas. A floodplain is the land area covered by floodwaters.

Runoff from snowmelt in the spring, summer thunderstorms, and tropical storms and hurricanes can all result in flooding in Sandgate. Ice jam flooding can occur in Vermont rivers when substantial ice forms followed by several days of warmth, snowmelt and any rainfall leading to the breakup of ice. As the ice breaks up on the rivers, chunks of ice form jams which can cause localized flooding on main stem and tributary rivers. Ice jams are most prevalent during the January thaw in late January and in March and April as spring approaches.

According to the USGS (2020), fluvial erosion "includes bed erosion, meaning lowering of the bed of a stream, as well as bank erosion, which refers to the retreat of stream banks that occurs as a stream widens or migrates laterally. This type of erosion is prevalent in rivers that have been straightened, rivers whose riverbed has been removed, or whose banks lack riparian buffers (woody vegetation). Erosion can cause dam failure, channel failure which can destroy productive farmland and roads, and the sediment that is moved can contribute to reservoir sedimentation on dammed streams".

Location

Flooding and fluvial erosion occurs along the many streams and rivers that flow through Sandgate. Many of the primary roads in and out of Sandgate are along these streams, such as Sandgate Road which follows the length of the Green River, Chunks Brook Rd which is along its namesake Chunks Brook, and the western portion of West Sandgate Road which follows Terry Brook and a portion of Baldwin Brook.

Sandgate also has 16 dams within the town and numerous beaver ponds. Four of these dams are mapped by ANR, the remaining 12 are small dams created by man-made ponds throughout the town. Two of the dams, Lake Madeleine and the Lake Madeleine Dike, are rated as significant damage potential from failure. These two dams are privately owned by The Carthusian Foundation and were created to generate hydroelectric power for the Carthusian Monastery located on the western flank of Mount Equinox.

Extent

The primary damage from past events has been from inundation flooding and fluvial erosion with secondary damage from wind.

The National Weather Service, uses the following impact categories:

- **Minor Flooding:** Minimal or no property damage, but possibly some public threat (e.g., inundation of roads).
- **Moderate Flooding:** Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations.

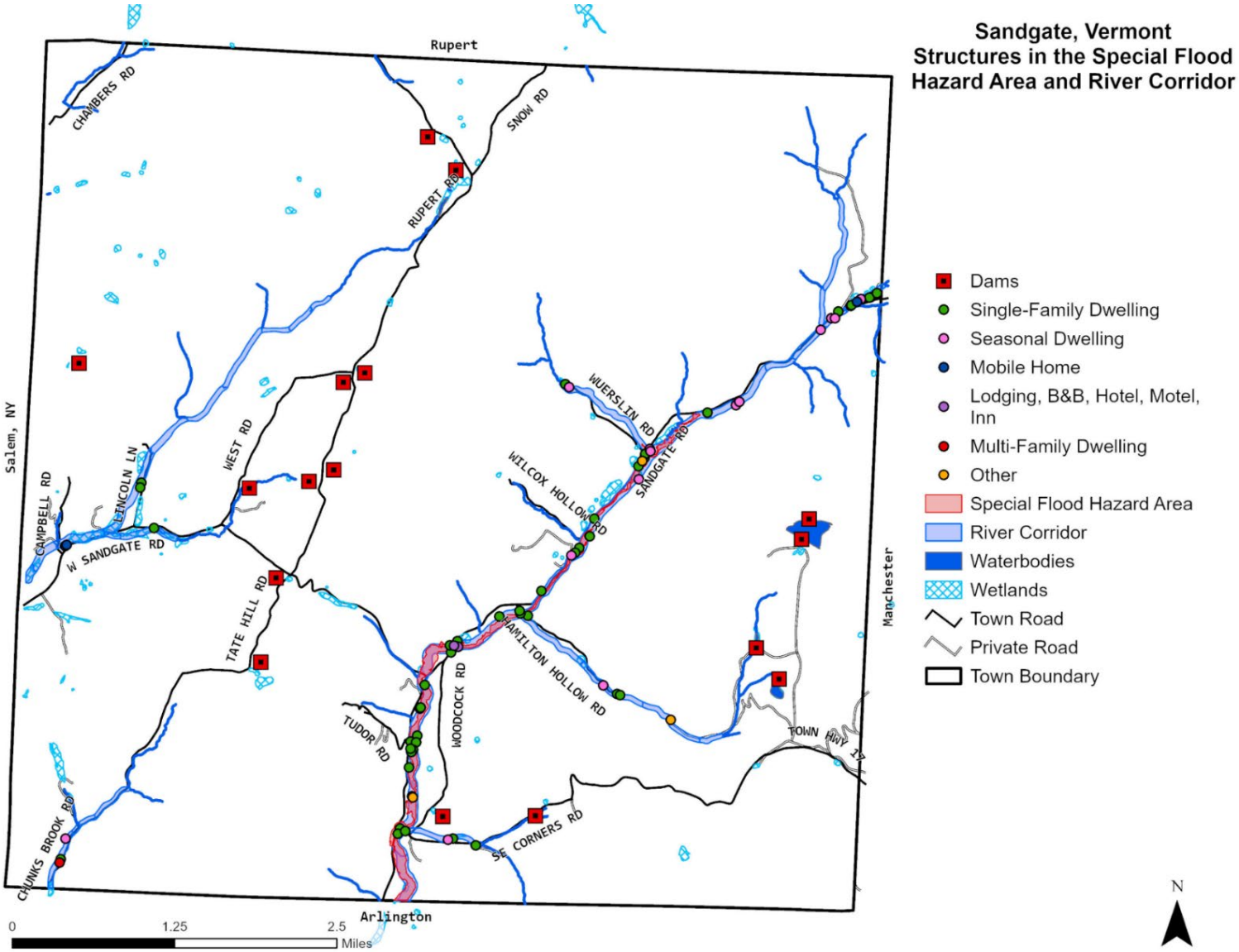
- **Major Flooding:** Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.
- **Record Flooding:** Flooding which equals or exceeds the highest stage or discharge observed at a given site during the period of record. The highest stage on record is not necessarily above the other three flood categories – it may be within any of them or even less than the lowest, particularly if the period of record is short (e.g., a few years).

Table 9 shows the NOWData from the National Weather Service that indicates the maximum and minimum precipitation for each month at the Bennington Morse State Airport and in Peru, Vermont.

Table 9. NOWData from the National Weather Service showing maximum and minimum precipitation for each month at the Bennington Morse State Airport and in Peru, Vermont. Years in bold italics correspond with weather events in Table 10.

Month	**Bennington Morse State Airport, Bennington, VT Max (year) / Min (year)**	**Peru, VT Max (year) / Min (year)**
January	4.17” (1999) / 0.63” (2004)	9.36” (1999) / 2.34” (2003)
February	4.81” (2008) / 0.77” (2012)	7.99” (2008) / 1.21” (2024)
March	5.12” (2008) / 1.14” (2015)	7.91” (2001) / 1.61” (2015)
April	5.01” (2022) / 1.14” (2015)	8.76” (1996) / 0.65” (2001)
May	7.16” (2013) / 0.97” (2015)	8.96” (1990) / 1.25” (2015)
June	7.29” (2013) / 1.37” (2022)	11.95” (2013) / 1.29” (1999)
July	9.48” ***(2021)*** / 2” (2015)	12.32” ***(2021)*** / 1.11” (2002)
August	9.03” ***(2011)*** /1.73” (2015)	10.5” ***(2003)*** / 2.12” (2007)
September	7.42” (2015) / 1.02” (2014)	7.99” (2003) / 1.73” (2016)
October	7.45” (2005) / 1.12” (2000)	12.66” (2010) / 0.77” (1994)
November	5.73” (2018) / 0.68” (2000)	9.34” (2018) / 1.62” (2015)
December	5.64” (2023) / 0.63” (1999)	7.2” (1996) / 1.72” (1999)
Annual	47.52” (2008) / 28.97” (2015)	68.42” (2023) / 50.16 (1994)

There are no stream gauges in Sandgate nor has there been any information developed to identify the extent of flooding events for the 5-, 10-, 25- or 50-year storm. Extent is therefore based on areas shown in Map 1 which delineates the following areas potentially affected by flooding.



Map 2. Structures in the Special Flood Hazard Area and River Corridor. BCRC 2024

Special Flood Hazard Areas (SFHA): these are areas mapped by FEMA and using the LIDAR derived zones currently under review. Sandgate only has Zone A mapped in its flood hazard area. Zone A indicates the area inundated by the base flood with no Base Flood Elevation determined. Figure 2 shows the parts of a typical floodplain.

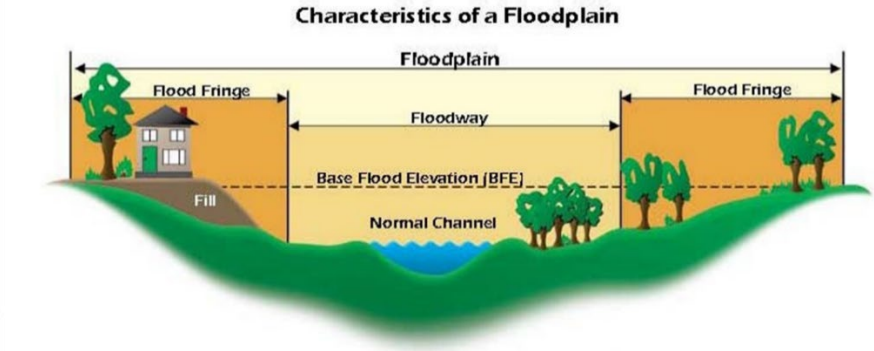


Figure 2. Typical Floodplain

River Corridors: River corridors (Figure 3) have been mapped by the Vermont Agency of Natural Resources using geospatial data and 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 (Vermont River Management Program 2010).

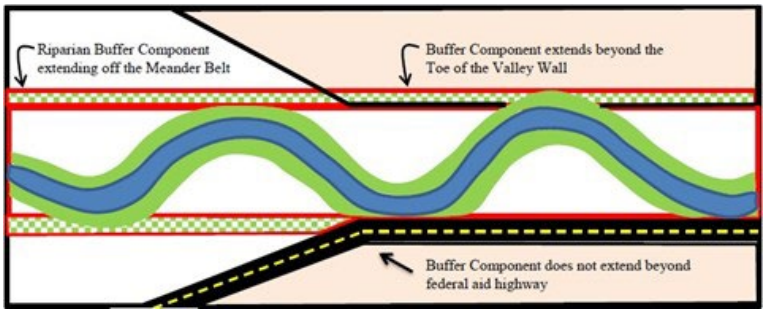


Figure 3. River Corridors

Since joining the National Flood Insurance Program (NFIP) in 2013, there have been no NFIP-designated repetitive losses within the jurisdiction.

The extent of fluvial erosion is difficult to track. No local records have been maintained that include this information. However, it can be witnessed by viewing the damage that has occurred along riverbanks and to essential roads within the town after an event (Figure 4).

Figure 4. Bend in Chunks Brook with fluvial erosion damage evident along the far bank. Source: Dara Zink, 2024

Previous Occurrence, Disasters

There have been 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 recorded 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.

In addition to these events, the Bennington Evening Banner, the local newspaper at the time, recorded three more flood events. The 1869 flood occurred after nearly 36 hours of violent rainfall and flooded downtown Bennington. A storm in 1948 caused downtown Bennington to flood and rendered the North Street and River Street bridges impassable.

Lastly, the newspaper mentioned a storm in 1973 that claimed lives, caused property damage and flooded several communities in Vermont.

Hurricanes and tropical storms that form in tropical waters have historically affected New England but are relatively infrequent. Besides the 1938 hurricane previously mentioned, Tropical Storm Belle brought significant rains to Vermont in 1976 and Hurricane Gloria brought rain and wind damage in 1985. Sandgate has been subjected to two major tropical storms in the past twenty years. Hurricane Floyd was a Category 4 storm before hitting North Carolina on September 16, 1999, and then was reduced to a tropical storm when it reached southern New England.

In August of 2011, Tropical Storm Irene hit New England (DR-4022-VT). One of the largest events in recent history, this storm 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. Rainfall amounts averaged 4 to 8 inches and fell within a twelve-hour period. A Cooperative Weather Observer recorded 4.70 inches of rain in Pownal and Bennington Morse State Airport reported 4.23 inches of rain from August 27 to 28. 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. In Bennington County, approximately 5,000 customers were affected by power outages. Record flooding occurred on the Walloomsac River. The Walloomsac gage exceeded its seven-foot flood stage at 8:48 am EST on August 28th, its nine-foot moderate flood stage at 9:50 am, its eleven-foot major flood stage at 11:46 am, crested at a record 12.82 feet at 2:30 pm, and fell below flood stage at 5:32 am on August 29th. In Sandgate, there were 8 culverts damaged, 10 bank erosion incidents that damaged roads, one debris jam and three landslides.

Even more recently, on July 29th and 30th, 2021, a fast-moving storm hit southern Vermont bringing 5 inches of rain to some areas. Sandgate felt the impacts of flash flooding that knocked down trees, washed out roads and left some residents isolated for up to 24 hours as the road crew worked quickly to repair the severely damaged roads. Culverts were washed out along Sandgate Road, West Sandgate Road, and along Baldwin Brook. A six-foot culvert overflowed on West Sandgate Road partially destroying the road and leaving deep gullies along other portions. Portions of Hamilton Hollow were washed out and impassable. Lincoln Lane, Tate Hill Road and Chunks Brook Road all suffered significant to severe damage. Woodcock Road and Wilcox Road suffered gully erosion and Wilcox Road also saw stream bank failures and culvert failures. Vermont Route 313, one of the primary access routes to Sandgate, was also closed due to flooding at the Route 313 and Sandgate Road intersection. Bennington

and Windham County were both declared eligible for Public Assistance (PA) under the federal disaster declaration DR-4621. Together, these counties were awarded $7,248,345.00.

The most recent flood event occurred at the end of July 2023 (Figure 5). After a wet early July left water tables high, widespread amounts of showers and thunderstorms hit the region from July 9th through 11th causing flooding across the county. While most of the immediate area was spared the worst of the damage, the Green River still breached its banks. Two fatalities were recorded in connection with the flooding in the state. Rainfall totals of 2.5 to 5 inches fell across the southern Green Mountains and Bennington County was once again part of a federal disaster declaration (DR-4720-VT).

Figure 5. The Green River just downstream from Southeast Corners Road during the 2023 floods. Source: Jim Henderson, 2024.

Chart 2 shows a total of 49 flood events in Bennington County from 1996 to 2023, using National Center for Environmental Information data. These have been primarily minor and affected either specific streams, such as the Walloomsac and Batten Kill, or a specific town or towns.

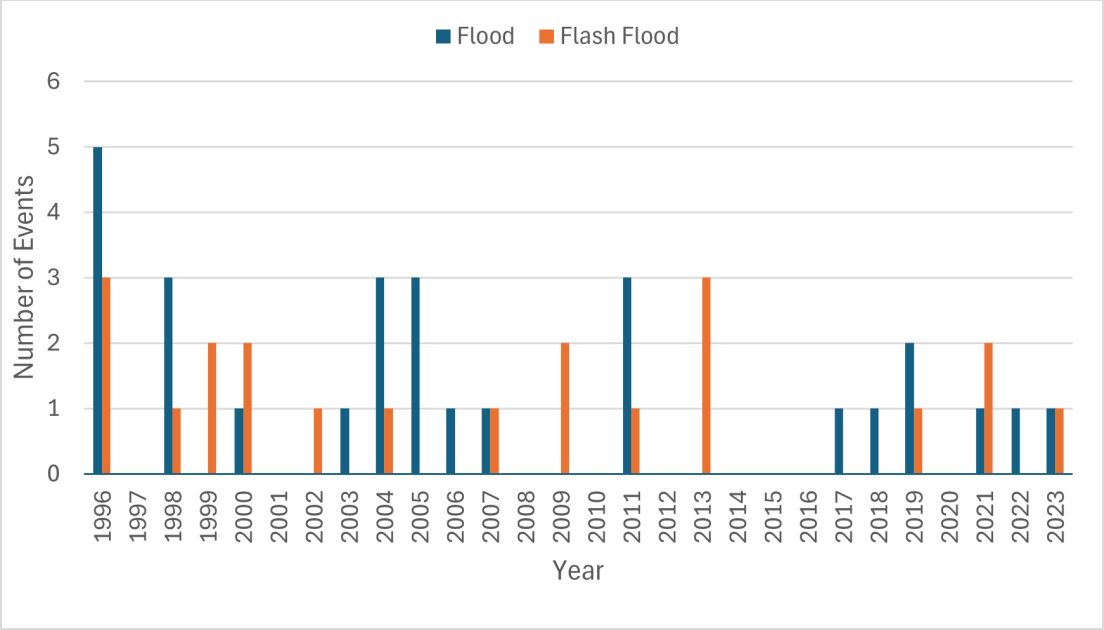


Chart 2. Number of flood events by type and year for Bennington County. Source NCEI, 2024

Table 10 describes significant flood events that have occurred since 1996 which impacted Bennington County and likely affected Sandgate. These events were described in the National Center for Environmental Information records (2024). It should be noted that only the January 1996 event occurred in the winter, with all other events in the spring, summer or fall. Ice jam flooding does occur in the winter, however no major instances have included this type.

Table 10. Significant flood events affecting Bennington County. Source: National Center for Environmental Information records (NCEI, 2024)

Dates	Type	Description	FEMA
19-20 Jan 1996	Flood	An intense area of low pressure produced unseasonably warm temperatures, high dew points and strong winds resulting in rapid melting of one to three feet of snow. 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. A Cooperative Weather Observer recorded 0.94" of rain in Sunderland. One death was reported in Vermont.	DR-1101 1/19 to 2/2 1996
16-17 Sept 1999	Flood	The remnants of Hurricane Floyd brought high winds and heavy rainfall (3-6 inches) to southern Vermont. Many smaller tributaries reached or exceeded bank full. 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.	DR-1307 9/16-21 1999
14-17 Jul 2000	Flash Flood	Thunderstorms caused torrential rainfall with flash flooding washing out sections of roadways in northeast Bennington County and southern Bennington County. Routes 7 and 67 were closed. A Cooperative Weather Observer recorded 3.39" of rain in Sunderland.	DR- 1336 7/14-18 2000

Table 10. Significant flood events affecting Bennington County. Source: National Center for Environmental Information records (NCEI, 2024)

Dates	Type	Description	FEMA
17 Dec 2000	Flood	Unseasonably warm and moist air brought a record-breaking rainstorm to southern Vermont. Rainfall averaged 2-3 inches. The heavy rain, combined with snowmelt and frozen ground, lead to a significant runoff and flooding. A Cooperative Weather Observer recorded 3.38" of precipitation in Sunderland.	DR-1358 12/16-18 2000 (Severe Winter Storm)
21 July to 18 Aug 2003		Severe storms and flooding affected Vermont including Bennington County. A Cooperative Weather Observer recorded sporadic and sometimes large amounts of precipitation during that period in Sunderland. (Note: this event does not appear in the NCEI data.)	DR-1488 7/21-8/18 2003
16-17 Apr 2007	Flood	An intense coastal storm spread heavy precipitation across southern Vermont. Starting as a mixture of snow, sleet, and rain which changed to all rain. Precipitation totals ranged from 3" -6" inches leading to minor flooding across portions of southern Vermont. A Cooperative Weather Observer recorded 3.54" of rain in Sunderland.	DR- 1698 4/15-21 2000
28-29 Aug 2011	Flood/ Flash Flood	Tropical Storm Irene produced widespread flooding, and damaging winds across the region. Rainfall amounts averaged four to eight inches and fell within 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.	DR-4022 8/27-2 2011
29 June-1 July, 2017	Flood	Thunderstorms across the region resulted in torrential rainfall in portions of Southern Vermont. The airport at Bennington recorded 3.47 inches of rain in four hours during the evening. This rainfall resulted in river flooding along the Walloomsac. A storm also produced a microburst in Bennington County with maximum wind speeds of 100 mph estimated.	DR-4330
15 April, 2019	Flood	Heavy rain fell throughout the region during the morning hours of Monday, April 15th, 2019. This resulted in a few reports of flooding with some dirt roads washed out. A major disaster was declared by the President of the United States in Bennington County to assist in repairing the damaged roads.	DR-4445
29-30 July, 2021	Flood	Between 2" – 5" inches of rain fell across most areas which resulted in several reports of flash flooding. This rainfall ended a very wet month of July in which most areas picked up between 12" – 18" inches of rain.	DR-4621
7-21 July, 2023	Flood	Rain fell on already saturated soils and resulted in areas of flash flooding throughout the county.	DR-4720

Vulnerability

A moderate or major flood event, with the occurrence of fluvial erosion, in or near Sandgate any given year is highly likely with a > 75% probability in a year.

Table 11 tallies the number of structures by type within the special flood hazard area and river corridor. This count includes any structure whose footprint falls within either the Special Flood Hazard Area (SFHA) or within the river corridor. As shown, there are 10 structures within the special hazard area and 70 within the river corridor. The locations of these structures are shown in Map 2. Out of a total of 316 structures, 25% are at risk of flooding with 1-10% risk of injury. Most services recover in less than seven days, though help for specific property owners may take longer due to the remote distances from services.

Table 11. Structures by type in flood hazard zones in Sandgate, VT. Source: Vermont Open Geodata Portal

Type of Structure	Number in SFHA	River Corridor
Single-family residential	8	46
Mobile home	0	3
Multi-family	0	1
Commercial/Industrial	0	0
Lodging	2	2
Seasonal Dwelling	0	14
Town Office	0	0
Education	0	0
House of Worship	0	0
Other	0	4
Total	10	70

Infrastructure, specifically roads, are the most likely to be impacted in Sandgate due to flooding and fluvial erosion. The road system is vital to many areas of Sandgate since there are many locations that can only be accessed via one road. If the road is damaged or destroyed, residents may be isolated for days at a time and not have access to emergency services while the road is rebuilt. The major business in Sandgate, Crown Maple, relies on the roads to move their product in and out of the region. The Department of Public Works is continuously working to improve roads by upgrading culverts, deepening and stone lining ditches, and elevating the road itself. Dry hydrants located throughout the town are also negatively affected by fluvial erosion. Sediments and debris that are washed downriver during a flood can fill the intake pipe, block the suction screen, and make it unusable during an emergency. More information regarding dry hydrants, their location, and use can be found in the Wildfire Section.

The Lake Madeleine Dike and the Lake Madeleine Dam pose significant damage potential to the Carthusian Monks that live just below these two dams. The Carthusian

Foundation had a Corrective Measure Plan and schedule created by Schabel Engineering in 2021 and has been actively engaged with following up on the measures indicated within that plan.

According to FEMA's National Risk Index for the Sandgate region, Sandgate's expected annual loss due to riverine flooding is relatively moderate compared to the rest of the nation. However, with the increase in flooding events due to climate change, this is likely to increase even while the population and development of Sandgate is expected to remain the same.

High Wind Event

Hazard	**Probability**	**Potential Impact**					**Score*:**
		Built Environment	People	Economy	Natural Environment	**Average:**	
High Wind	**4**	3	2.5	2	3	**2.625**	**10.5**

Description

High wind events in Sandgate can be the result of windstorms, hurricanes/tropical storms, thunderstorms, and tornados. Sandgate is largely forested so the risk of downed trees and powerlines is great. These types of events are frequent occurrences in this area with NCEI listing a total of 163 wind events since 1996, an average of almost 6 events per year. Thunderstorm winds are the most common occurring largely in the spring and summer months. Wind events can occur at any time throughout the year and often occur in tandem with other hazards such as flooding and fluvial erosion or winter storms which bring strong winds, heavy snow, and ice.

This is the second highest ranked hazard event by the planning team. Of primary concern to the planning team are damage to the built environment and natural environment as the area is largely forested and many structures are found within forested areas. Access to roads can be restricted or cut off due to falling trees or downed powerlines. However, risk to human life is also considered as falling trees and downed powerlines can cause injury or death and cut off power to those who may need it to run lifesaving medical equipment.

Location

High wind events can strike anywhere. Where storms are funneled up valleys, damage can be significant. Roads that run through densely wooded areas are susceptible to downed trees and fallen power lines. Homes that are surrounded by trees may also be at risk of damage due to falling trees.

Power outages can occur due to downed power lines. This could impact small areas of Sandgate or the entire area depending on the scale of the event. Telephone service may be affected as well. Cell service is minimal throughout Sandgate and without landlines, communication is greatly limited or nonexistent. With a combination of downed trees blocking roads and the inability to communicate due to loss of power, emergency services may not be able to reach areas of the town during an emergency.

Extent

The National Weather Service (NWS) and the National Oceanic and Atmospheric Administration (NOAA) classifies the wind events addressed in this plan as follows:

- *Windstorm* – Straight-line winds that are sustained at speeds of 31 to 39 mph for at least an hour or gusts of 46 to 57 mph occur. High wind advisories are issued by the NWS for sustained winds of 40 to 73 mph or for gusts of 58 mph our higher.
- *Thunderstorm* – The NWS issues thunderstorm warnings when winds are 58 mph or higher and/or hail of 1 inch or longer is expected. Thunderstorms cause microbursts or macrobursts that can reach speeds up to 80 mph.
- *Tropical Storm* – The NWS classifies a tropical storm as a tropical cyclone that has maximum sustained wind speeds of 39 to 73 mph. These storms may bring heavy rains causing flooding and fluvial erosion.
- *Hurricane* – A hurricane is a tropical cyclone with maximum wind speeds of 74 mph and greater. Hurricanes may bring heavy rains causing flooding and fluvial erosion.
- *Tornado* – NOAA defines a tornado as “a narrow, violently rotating column of air that extends from a thunderstorm to the ground.” These occur typically between March and August.

Previous Occurrence, Disasters

NOAA lists several types of wind events in their database: high wind, strong wind, thunderstorm wind, tornado, and tropical storm. A summary is listed below in Table 12.

Table 12. Summary of wind events in Bennington County since 1996. *Source: National Centers for Environmental Information, 2024*

Year	High Wind	Strong Wind	Thunderstorm Wind	Tropical Storm	Tornado	Funnel Cloud	Totals
1996	5						5
1997	2	2	4				8
1998	1		4		1		6
1999	2		3				5
2000	1		1				2
2001			2				2

Table 12. Summary of wind events in Bennington County since 1996. *Source: National Centers for Environmental Information, 2024*

Year	High Wind	Strong Wind	Thunderstorm Wind	Tropical Storm	Tornado	Funnel Cloud	Totals
2002	1		3		1		5
2003	1				1		2
2004							0
2005	1		3				4
2006	5		4				9
2007	3		4				7
2008		3	3				6
2009	1		1				2
2010	5		3			1	9
2011	1		5	1			7
2012	2		3				5
2013			4				4
2014			2				2
2015			2				2
2016		1	4				5
2017	4	3	4				11
2018	2	5	2				9
2019	1	9	3				13
2020	0	4	2				6
2021	1	3	8				12
2022	2	6	4				12
2023		2	1				3
Totals	41	38	79	1	3	1	163

The following events have resulted in federal disaster declarations:

- DR – 1101: January 19, 1996- High Wind Strong southerly winds resulted in reports of downed trees, limbs, and power lines throughout the region. These winds were part of a larger storm event that resulted in road washouts and the flooding of several homes within Bennington County.
- DR – 1307: September 16, 1999- Tropical Storm Floyd This storm brought high winds and heavy rainfall to Southern Vermont. Winds gusted over 60 mph and a combination of the wind and saturated grounds caused trees and power lines to fall. Up to 2,000 people lost power in southern Vermont.
- DR – 1488: July 21, 2003- Tornado A tornado originating in Pownal cut a swath longer than 25 miles and 150 yards wide. It then moved northeast into Bennington and then moved into the Green Mountain State Forest in western Windham County. It caused some damages to structures within Bennington and Pownal but most damage was to trees. 2,000 customers lost power in extreme southern Vermont.

- DR – 1698: April 16, 2007- High Wind Funneling of winds in portions of southern Vermont caused approximately 175 large trees (8-12 inches in diameter) to fall in Dorset.
- DR – 4022: August 28, 2011- Tropical Storm Irene The wind from this large event knocked down trees and powerlines throughout Bennington County. Roads closed due to the downed trees and power outages occurred throughout the area.
- DR – 4330: July 1, 2017- Thunderstorm Winds Peak winds within a microburst over Sandgate were estimated at 100 miles per hour. Trees snapped and were uprooted within the path of the microburst.
- DR – 4720: July 13, 2023- Thunderstorm Winds Part of the larger flooding event, thunderstorm winds caused downed trees and power lines in Bennington County.

Vulnerability

Sandgate is vulnerable to wind events due to its remote location, large forested areas, and reliance on the timber industry. Structures may be at risk of damage due not only to falling trees but also to winds that can rip shingles from roofs or tornados that can cause severe structural damage. The remote location of Sandgate and some of its population creates vulnerability in that road closures may leave some areas without access to first responders should an emergency occur. The road crew is quick to respond to remove trees but when first responders have an extended response time, the risk to human life or injury increases. Many residents of Sandgate rely on the power grid and access to the internet to work remotely. These individuals may be cut off from service for an extended time and be unable to work. For those who do not work remotely, there may be a delay or even the inability to commute to work due to road closures. Lastly, the timber industry may be negatively impacted due to the loss of trees caused by strong wind events.

FEMA's National Risk Index places Sandgate at relatively low risk for strong wind events, hurricanes, and tornadoes. Sandgate's expected annual loss (EAL) is also relatively low for these types of events. However, with storms increasing in frequency and intensity due to climate change, Sandgate may see an increase in the negative impacts of these wind events even as population numbers and development remains the same. Future probability of wind events happening in Sandgate is almost guaranteed with a greater than 75% chance of occurrence.

Winter Storm

Hazard	Probability	Potential Impact					Score*:
		Built Environment	People	Economy	Natural Environment	**Average:**	
Winter Storm	**4**	2.5	2.5	2	3	**2.5**	**10**

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 damage can include power outages, traffic accidents, and isolation of some areas. 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 damage and restricting visibility while traveling. 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, and trees and power lines. Ice storms make walking and driving extremely hazardous. The average annual snowfall in Bennington County is 73.9 inches, with December, January, February, and March as the primary months for snowfall (Snowfall Climatology Toolbox). Between 1991 and 2020, this region has an average of 42.1 days per year that experience snow fall. Chart 3 shows the annual amounts of snowfall for the Sunderland 2, VT weather station. No data was available for 1999 however the variability of snowfall amounts can be seen over this 20-year span.

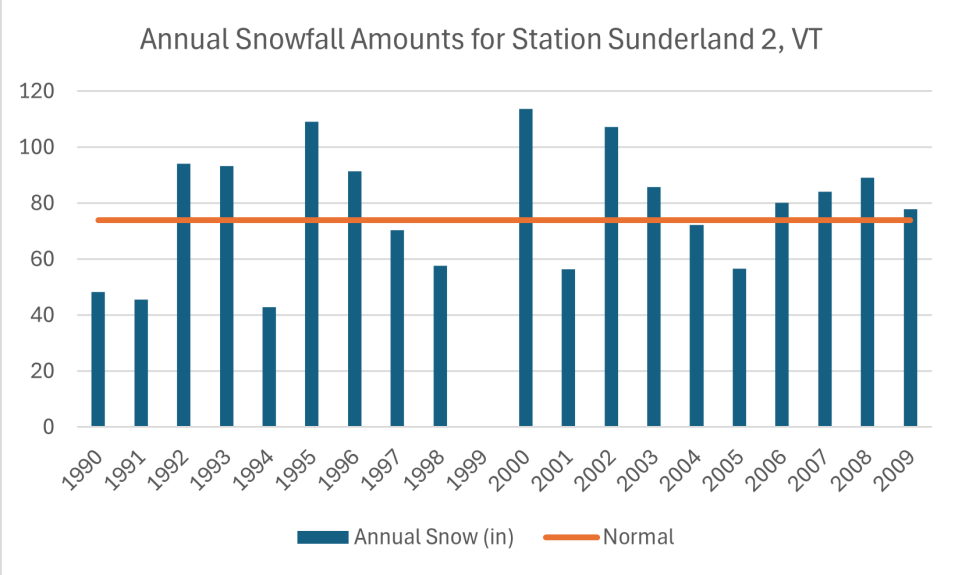
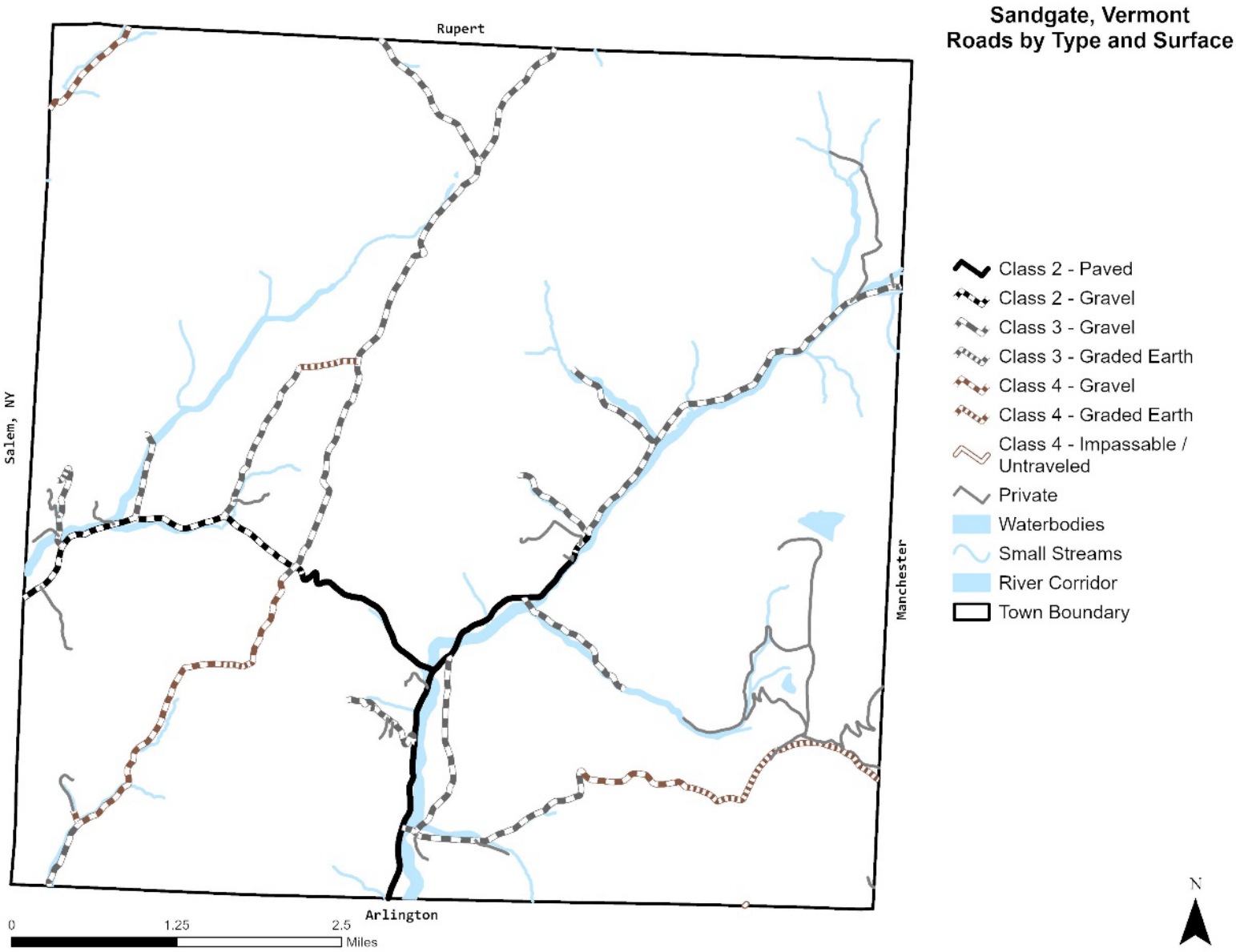


Chart 3. Annual Snowfall Amounts for Station Sunderland 2, VT. Source: Snowfall Climatology Toolbox.



Map 3. Roads by Surface and Type in Sandgate, VT. Source: BCRC, 2024

Location

Significant snowstorms and ice storms would affect the entire town of Sandgate and likely most or all of Bennington County and surrounding counties and states. Within Sandgate, unpaved roads are more difficult to maintain during winter storms, and residents along those roads would be most likely to be delayed by such storms. Most roads in Sandgate are unpaved, and these are shown in Map 3.

Extent

Winter storms can be measured in many ways and storms that have similar amounts of snowfall may be very different from each other. The National Weather Service Weather Prediction Center uses the Winter Storm Severity Index (WSSI) as a forecasting tool to relay potential impacts of a potential storm and where those impacts will be located (Figure 6).

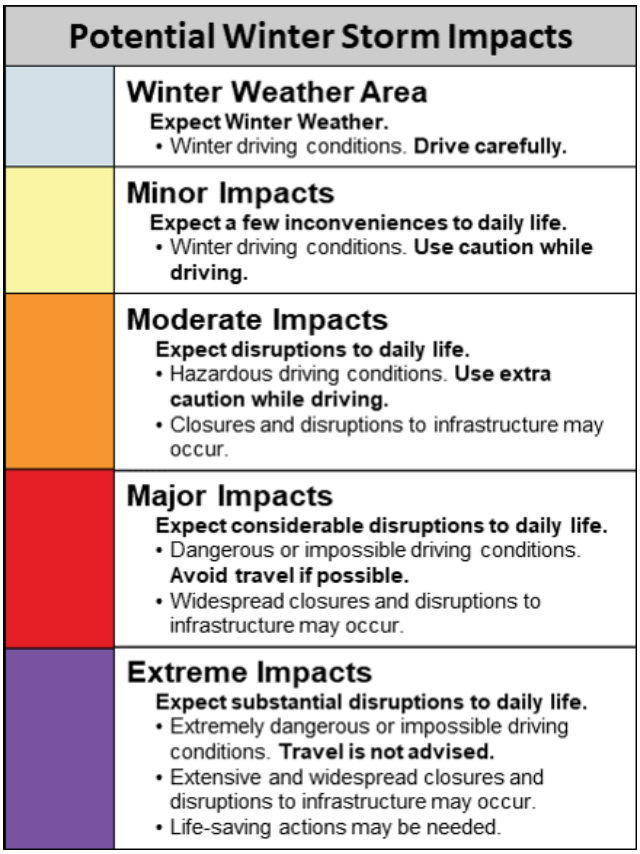


Figure 6. Winter Storm Severity Index. Source: NWS

WSSI bases its ranking on 6 components:

- **Snow amount index** – depicts which areas (i.e., transportation) could be affected by either the total amount of snowfall or the rate of snowfall. Also taken into consideration is climatology. Snowfall in one area of the country has more or less of an impact depending on their preparedness.

- **Snow load index** – takes into consideration how the weight of the snow can impact trees and powerlines.
- **Blowing snow index** – reflects where transportation problems may be an issue due to blowing or drifting snow.
- **Ground blizzard index** – depicts the severity of ground blizzards to transportation.
- **Flash freeze index** – the severity of events caused by temperatures rapidly falling below freezing.
- **Ice accumulation index** – accounts for the combined effects of ice accumulation and wind that can produce tree damage, utility interruptions, and transportation shutdowns.

Previous Occurrence, Disasters

The October 4, 1987 storm stranded travelers in the area and knocked out power for several days. The "Blizzard of ’93," one of the worst storms this century, virtually shut down Vermont on the weekend of March 13-14, forcing the closure of roads and airports. This was one of the most powerful snowstorms on record. Snowfall amounts ranged from 10 to 28 inches across the state. However, neither of these events merited federal disaster declarations.

An emergency declaration was issued for Bennington County and multiple other counties throughout the state, for a snowstorm that occurred from March 5 – March 7, 2001. The biggest nor’easter of the season hit southern Vermont starting early Monday morning and buried the area in approximately two feet of snow, making this the biggest general snowfall since the Blizzard of ’93.

In 2008, the State of Vermont was issued a federal disaster declaration (DR-1816) in Bennington and Windham counties for a severe winter ice storm that occurred between December 11th and December 18th. Snow and sleet amounts of 4 to 8 inches fell across the higher elevations of Bennington County. Ice accretions of up to three quarters of an inch formed which led to numerous downed trees, limbs, and power lines. Woodford reported 7 inches of mixed precipitation. An estimated 15,000 customers lost power due to this event causing schools to shut down for multiple days. Some roads became impassable from fallen debris. Frigid cold followed this storm which compounded the effects of the power outages, and many warming shelters were setup to assist those without power and heat.

Chart 4 summarizes the 130 winter storm events that have occurred in Bennington County since 1996. As can be seen, a high number of events occurred in 1997 and 2007 with ice storms as well as heavy snow and blizzards becoming less frequent in more recent years.

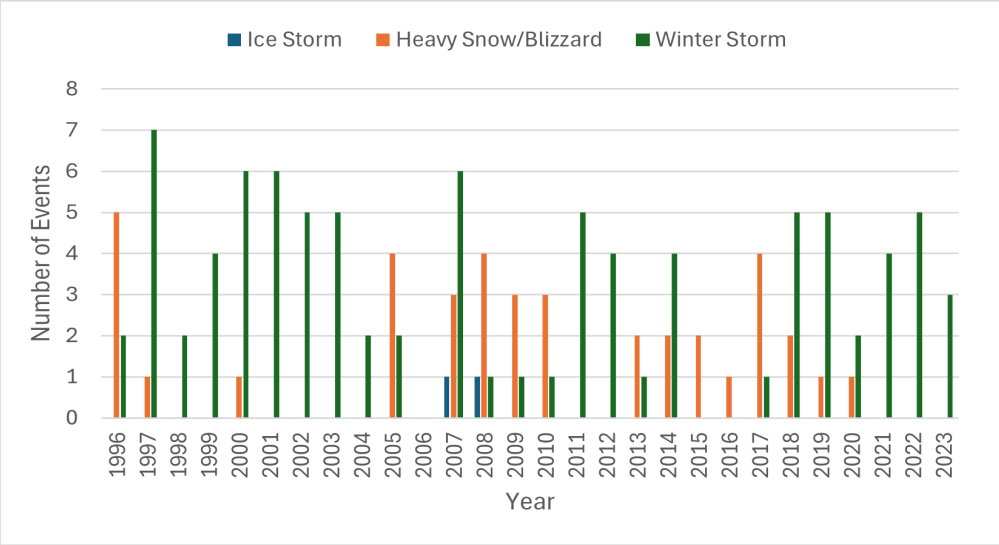


Chart 4. Number of winter storm events by type and year for Bennington County. Source: NCEI, 2024.

Vulnerability

There is a 100% probability of a moderate or greater snowstorm affecting Bennington County, including Sandgate, in any given year. These are large-scale events, though local impacts may vary greatly. Roads and power lines are most vulnerable, with traffic accidents the most likely to create injuries. Power outages could be short term or last seven or more days. Some roads may remain impassable for long periods as well. Vulnerable populations that do not have access to generators may struggle during power outages and remote areas may be cut off from supplies due to blocked roads. Heavy snow may damage buildings due to collapsed roofs. Snow laden trees and limbs may fall and damage buildings, utility lines, and cause blockages along roads. The skill of road crews in Vermont means that only the heaviest snowstorms (>12 inches) or ice storms affect the population. However, the population of Sandgate is aging per the census data indicated in the Town Profile section. This population has greater vulnerability to heart attacks, strokes, or other injury while clearing snow or while walking on ice after a winter storm.

In the natural environment, there is a risk that winter storms can knock down multiple trees that are in forested areas. Even though these fallen trees may not negatively impact the built environment or people, they can negatively impact the economy. Timber is a natural resource within Sandgate and when many trees fall, it can limit logging for that area. Winter storms and extreme cold can also negatively impact sap production as well. See more in the Extreme Cold section.

The National Risk Index gives Sandgate a relatively low risk index rating for both ice storms and winter weather events indicating that there is a low expected loss value for both hazards ($4,266 and $1,413, respectively).

According to the Vermont Climate Assessment 2021, the average winter temperatures have risen since the early 1900s by roughly 3.3 degrees Fahrenheit (Chart 5) due to climate change. Snowfall amounts have generally decreased as the temperatures have risen. However, annual snowfall remains highly variable year over year indicating that vulnerability will vary annually as well. Also, as snowfall amounts decrease the built environment may be increasingly susceptible to freeze-thaw cycles as indicated in the Extreme Cold section of this plan.

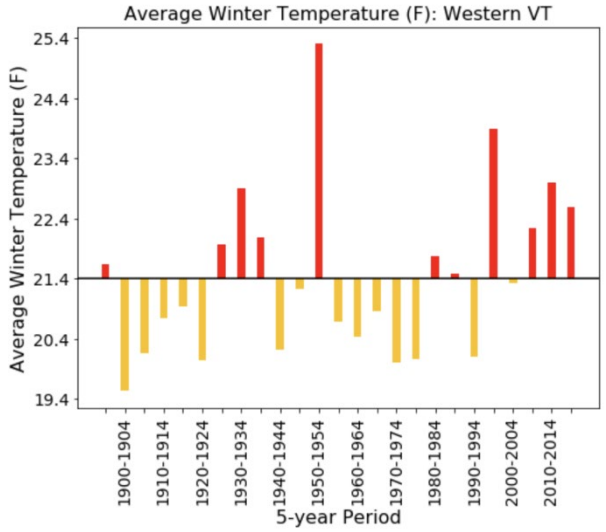


Chart 5. Average Winter Temperature: Western, VT. Source: Vermont Climate Assessment, 2021

Invasive Species

Hazard	Probability	Potential Impact					Score*:
		Built Environment	People	Economy	Natural Environment	**Average:**	
Invasive Species	**4**	1	3	2	3	**2.25**	**9**

Description

The planning team ranked this hazard as fourth highest. The public survey also reflected this level of importance to residents and other community stakeholders.

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. Invasive species are typically spread by human activity. Vermont experiences both aquatic and terrestrial invasives. Aquatic invasives are found in lakes, ponds, and rivers. Land invasives are further split into forest pests and terrestrial plants. Forest pests are those that cause negative

impacts on tree health in biodiversity. Terrestrial plants are non-native plants that cause negative effects to the environment.

The planning team reviewed the many different types of invasive species in Vermont and found that not all of the species in Vermont are found in Sandgate. Table 13 lists the species to be addressed specifically in this plan. The planning team chose to include aquatic invasives even though they have not been found specifically in Sandgate. Eurasian watermilfoil, water chestnut, and didymo have all been found throughout the state and transfer of these plants can easily happen from one waterbody to another. The team felt it was important to make note of them here.

Table 13. Invasive species found in Sandgate, Vermont Source: VT Invasives

Type of Invasive	Invasive Common Name	Scientific Name	Primary Habitat	Impacts
Aquatic Invasives	Eurasian watermilfoil	*Myriophyllum spicatum*	Grows in a large variety of lakes, ponds, low-energy areas of rivers and streams. Grow in depths of 1-10 meters.	Aggressively displaces and reduces the biodiversity of native aquatics plants.
	Water Chestnut	*Trapa natans*	Freshwater in depths up to 4.8 meters. Prefers nutrient rich, slow-moving waters.	Forms dense mats of plant matter. The seeds are painful if stepped on.
	Didymo**(Snot Rock)	*Didymosphenia geminata*	Freshwater bodies of water.	Alters stream ecology by forming dense algal blooms that can cover up to 100 percent of stream bottoms.
Terrestrial Plants	Wild (Poison) Parsnip	*Pastinaca sativa*	Commonly found alongside roads, pastures, and in abandoned fields.	Contains a phototoxic sap that can cause burns, blistering, and skin discoloration. Invades and modifies open and disturbed habitats to form dense growth.
	Japanese Knotweed	*Fallopia japonica*	Forest edges, meadows, fields, floodplains, disturbed areas	Does not hold soil well and can lead to increased erosion along streambanks. Can clog small waterways. Difficult to eradicate.

Table 13. Invasive species found in Sandgate, Vermont Source: VT Invasives				
Type of Invasive	**Invasive Common Name**	**Scientific Name**	**Primary Habitat**	**Impacts**
Terrestrial Plants	Bittersweet, Asiatic	*Celastrus orbiculatus*	Fields, forests, forest edges, disturbed sites, ornamental plantings, shade tolerant	Slowly kills trees by encircling and girdling them. Can kill other vegetation by carpeting over other growth.
	Multiflora Rosa	*Rosa multiflora*	Man-made or disturbed sites, meadows and fields, shores of rivers or lakes, shrublands or thickets	Multiflora rose (Rosa multiflora) can form impenetrable thickets that exclude native plant species.
	Shrub Honeysuckles	*Lonicera sp.*	Forest, forest edge, floodplains, meadows, fields, disturbed areas	Competes with native plants for sunlight, moisture and pollinators. When birds eat the fruit, it is poorer in fats and nutrients than fruits from native plants, so the birds do not get enough nutrients to help sustain long flights during migrations.
	Japanese Barberry	*Berberis thunbergii*	Forest, forest edge, floodplains, meadows, fields, disturbed areas	Promote Lyme disease due to harboring of mice populations, and is a host for deer ticks. Reduces wildlife habitat and forage.
	Common Barberry	*Berberis vulgaris*	Forests, forest edges, meadows, fields	Promote Lyme disease due to harboring of mice populations, and is a host for deer ticks. Reduces wildlife habitat and forage.

Table 13. Invasive species found in Sandgate, Vermont Source: VT Invasives

Type of Invasive	Invasive Common Name	Scientific Name	Primary Habitat	Impacts
	Garlic Mustard	*Alliaria petiolata*	Abandoned field, agricultural field, edge, open disturbed area, pasture, railroad right-of-way, roadside, utility right-of-way, vacant lot, yard or garden.	Invades high quality woodlands where it forms dense stands. Produces compounds that inhibit seed germination.
Forest Pests	Emerald Ash Borer	*Agrilus planipennis*	Feeds and lives in all species of ash tree.	The majority of ash trees infested with EAB will die. 5% of VT trees are ash. Eradication is not expected.
	Asian Long-horned Beetle* (ALB)	*Anoplophora glabripennis*	ALB larvae tunnel into the trunks and branches of hardwood species including ash, birch, elm, golden raintree, sycamore, maple, horse chestnut, katsura, mimosa, mountain ash, poplar, and willow trees.	Destructive wood-boring pest of maple and other hardwoods. Threatens resources like maple syrup due to the destruction of sugar maples.

*Invasives not currently found in Sandgate according to Vermont Aquatic Invasive Species Map, Vermont Invasives, 2024
**Didymo is no longer considered an invasive species but is classified as a “nuisance” plant.

Location

Invasive species can affect the town in multiple places depending on the environment the organism inhabits. Forested areas are subjected to the Emerald Ash Borer (Figure 7) and the Asian Long-horned Beetle (ALB). Terrestrial plants can impact open field, forested areas, and even the banks along water ways such as the Japanese knotweed which colonizes stream banks, and does not hold soil well, leading to increased streambank erosion. Aquatic invasives can affect the multiple waterways throughout the town as well as the multiple small lakes and ponds. It is important to note that there has not been any record of aquatic invasives in Sandgate yet. However, the Batten Kill that

runs through the neighboring town of Arlington has previously experienced didymo growth.

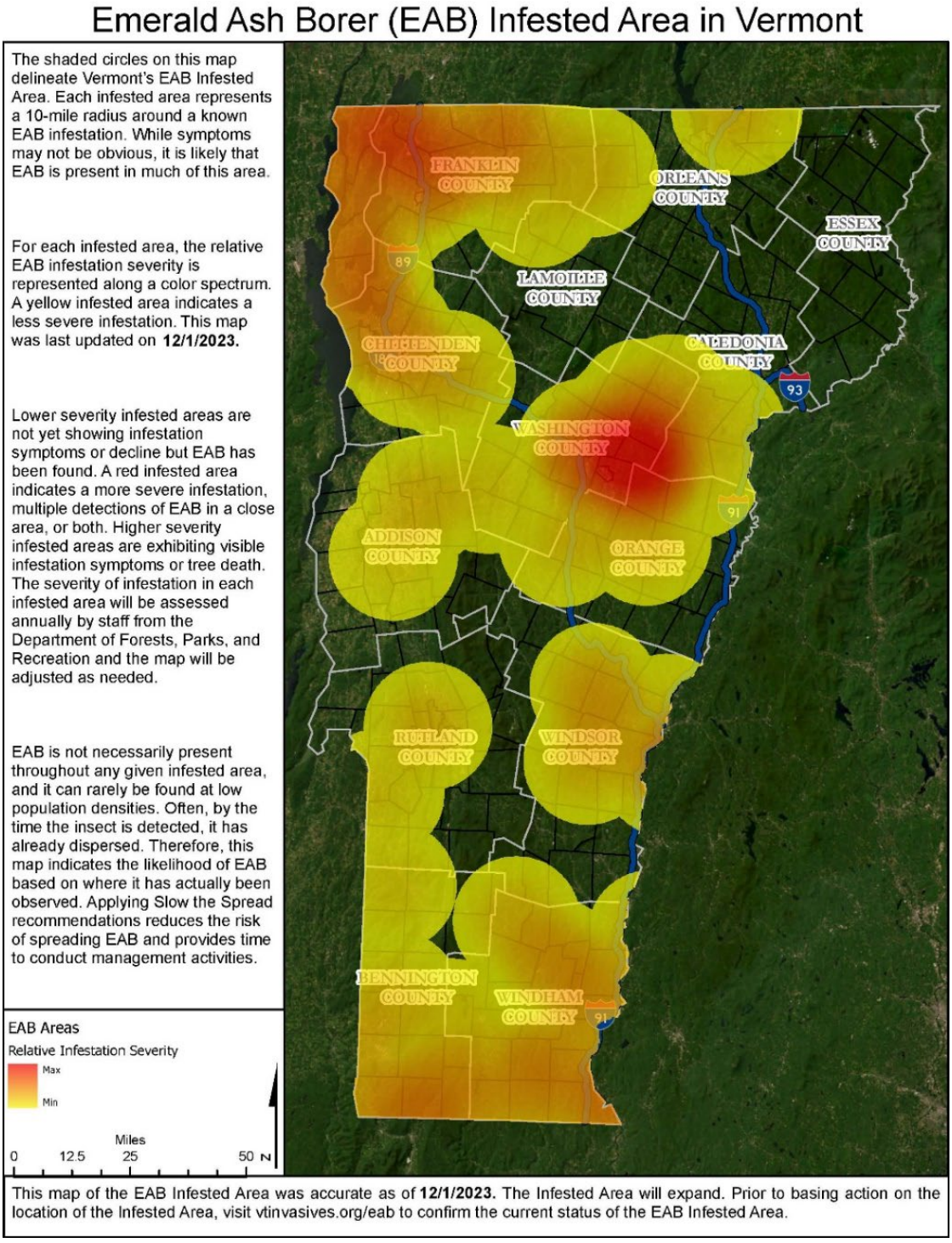


Figure 7. Emerald Ash Borer (EAB) infested area in VT. Source: VTInvasives.org

A map of the town was used to collect information about specific areas that stakeholders were concerned about and poison parsnip along the western (New York) end of West Sandgate Road was indicated as an area of concern for growth of this plant (Appendix III).

The Asian Long-horned beetle (ALB) has not been found in Sandgate, however there is an active infestation in Worcester County, Massachusetts.

Extent

The extent of invasive plants in Sandgate and in Bennington County has not been fully mapped. VT Invasives has done some mapping but it is not consistent.

Previous Occurrence, Disasters

Invasive species are present and are a continuous hazard that will vary with their abundance and their impacts on human life, the natural environment, and by extension, the economy.

Vulnerability

The likelihood of increased abundance of invasive species is 75-100% and potential impact 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 damages due to falling trees. Should the Asian long-horned beetle move north from Massachusetts, maple trees which are a primary economic driver in Sandgate, could be strongly negatively affected. Plants such as poison parsnip can cause injury to human life due to phototoxic sap that can cause burns, blistering, and skin discoloration. Growth of this plant can limit outdoor recreation as it grows along roadsides and in pastures and abandoned fields. The risk of transmission of aquatic invasives is high and therefore promoting prevention techniques such as draining, cleaning, and drying equipment will be especially important.

An increase in the invasive insect population brought on by climate change, particularly the emerald ash borer, can cause an increase in tree death and could result in an increase in road closures, power outages and property damage due to dead and falling trees. Even as the human population is expected to remain the same, invasive species may increase due to visitors or second homeowners potentially introducing these plants and animals to the Sandgate area. Future anticipated changes in land use and development are not expected to have an impact on invasive species.

Drought

Hazard	Probability	Potential Impact					Score*:
		Built Environment	People	Economy	Natural Environment	**Average:**	
Drought	**3**	3	3	1.5	3	**2.625**	**7.875**

Description

According to the National Integrated Drought Information System at drought.gov, drought is defined as "a deficiency of precipitation over an extended period of time (usually a season or more), resulting in a water shortage." Droughts can be difficult to measure because they are the absence of precipitation instead of the presence of an event. Droughts tend to develop slowly, cover an extensive area, and have a long-lasting impact after the event has ended leaving these types of events difficult to predict, monitor, and assess.

There are five types of drought: meteorological, ecological, agricultural, socioeconomic, and hydrological. The latter is based on stream flow and groundwater availability and, from a natural hazard perspective, is probably the most important. Reductions in rainfall over extended periods, especially during the growing season when plants need moisture to grow, can result in hydrologic drought.

Location

Drought can happen across large geographic areas and vary in impact. In relation to the rest of the state, Bennington County may be at slightly lower risk due to storm patterns.

Extent

The Standardized Precipitation Index (SPI) is a widely used index which measures water supply, specifically precipitation. Using this scale, red hues indicate drier conditions while yellow hues indicate wetter conditions. (Table 14.)

Table 14. Standardized Precipitation Index (SPI) Categories according to U.S. Drought Monitor and the potential impacts in Vermont. Source: "Bennington County Conditions | Drought.gov." Drought.gov, www.drought.gov/states/vermont/county/bennington.

				
D4 (Exceptional Drought)	D3 (Extreme Drought)	D2 (Severe Drought)	D1 (Moderate Drought)	D0 (Abnormally Dry)
• Vermont has had little or experience in D4 so no impacts have been recorded at that level.	• Crop loss is widespread; Christmas tree farms are stressed; dairy farmers are struggling financially • Well drillers and bulk water haulers	• Specialty crops are impacted in both yield and size • Producers begin feeding cattle; hay prices are high • Warnings are issued on	• Irrigation use increases; hay and grain yields are lower than normal • Honey production declines	• Crop growth in stunted; planting is delayed • Fire danger is elevated; spring fire season starts early • Lawns brown early; gardens begin to wilt

	see increased business • 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	outdoor burns; air quality is poor • Golf courses conserve water • Trees are brittle and susceptible to insects • Fish kills occur; wildlife move to farms for food • Water quality is poor; groundwater is declining; irrigation pods are dry; outdoor water restrictions are implemented	• Wildfires and ground fires increase • Trees and landscaping are stressed; fish are stressed • Voluntary water conservation is requested; reservoir and lake levels are below normal capacity	• Surface water levels decline

Previous Occurrence, Disasters

The National Climate Data Center calculates this index back to 1895 in Bennington County (Chart 6). 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 during the early 1910s and another occurrence in the early 1960s. Mild to moderate droughts have been more frequent.

Storm data from the National Center for Environmental Information (NCEI) indicates one drought event in April of 1999. That month, Sunderland only reported 0.88 inches of rain and Pownal only 1.15 inches. This drought had further negative impacts as Bennington County experienced brush fires due to the dry conditions.

More recently (and not recorded in NCEI data), in the summer of 2020 the southern part of Vermont experienced moderate drought conditions. As of an August 23, 2020 article in the VT Digger, the western part of southern Vermont including the Sandgate area, was categorized as D0 – abnormally dry levels yet the surrounding areas were at D1-moderate drought levels (Figure 8). In November of that year, the U.S. Depart of Agriculture's Farm Service Agency declared a drought-related natural disaster conditions for ten counties in Vermont, including Bennington County.

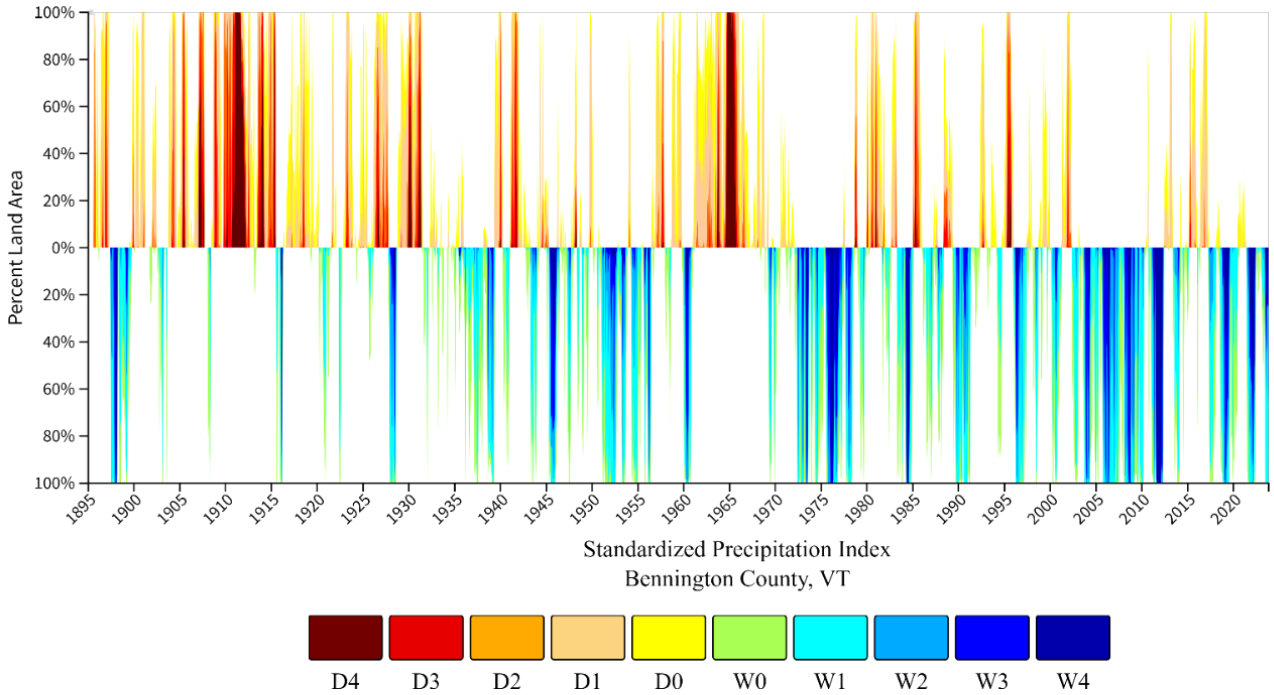


Chart 6. Historical Precipitation Conditions of Bennington County from 1895 to 2023. Source: Drought.gov

More recently (and not recorded in NCEI data), in the summer of 2020 the southern part of Vermont experienced moderate drought conditions. As of an August 23, 2020 article in the VT Digger, the western part of southern Vermont including the Sandgate area, was categorized as D0 – abnormally dry levels yet the surrounding areas were at D1-moderate drought levels (Figure 8). In November of that year, the U.S. Depart of Agriculture's Farm Service Agency declared a drought-related natural disaster conditions for ten counties in Vermont, including Bennington County.

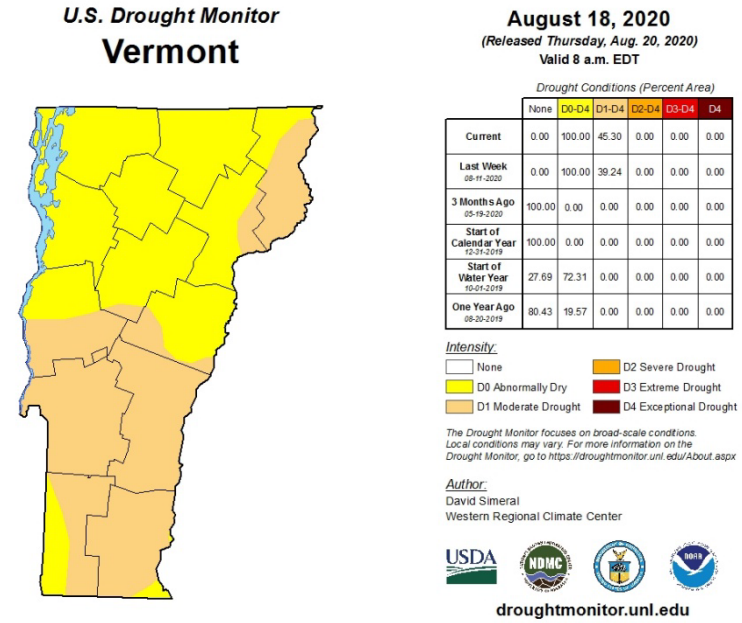
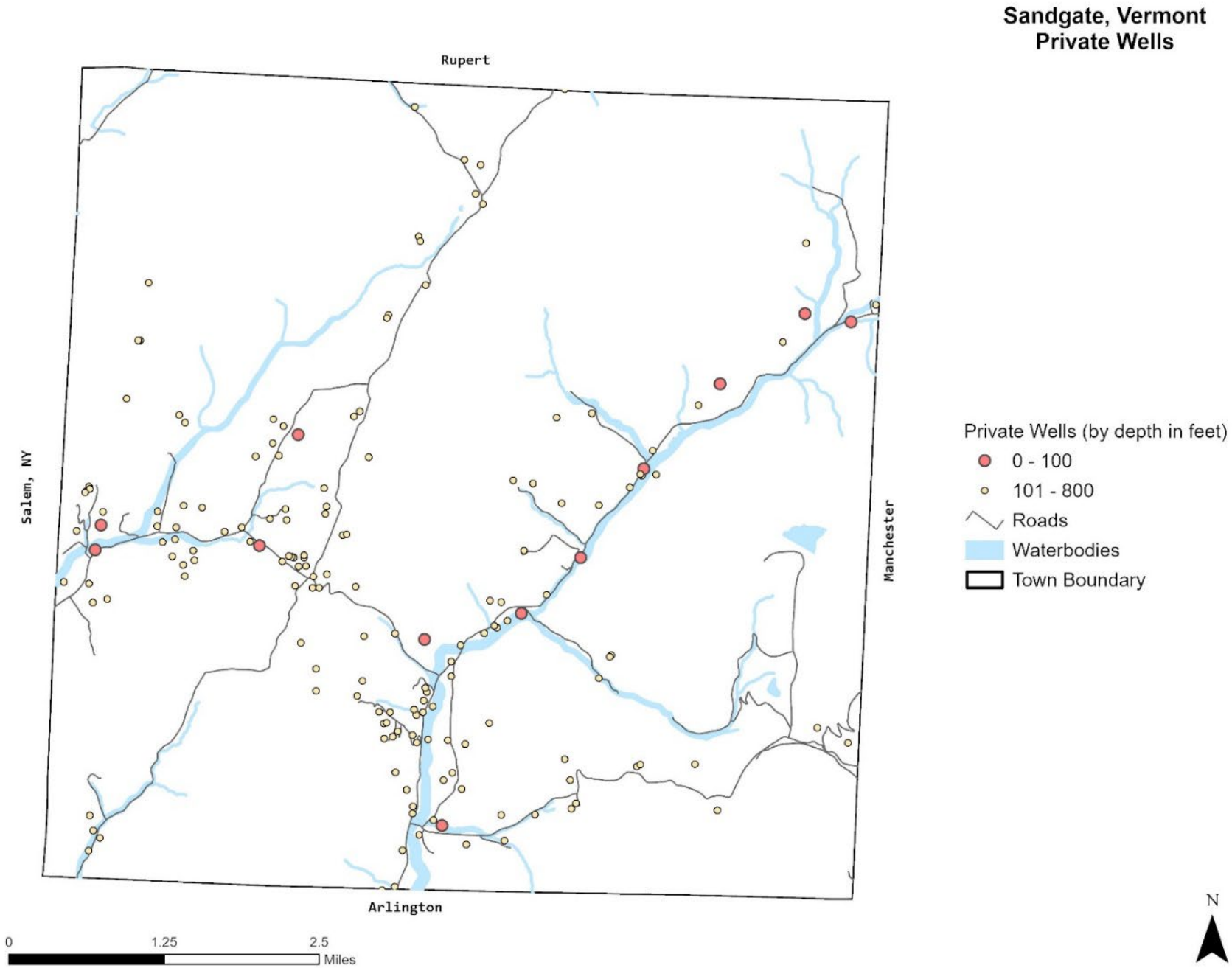


Figure 8. Image from VTDigger article showing drought conditions in Vermont on August 18, 2020. Source: VTDigger

Vulnerability

Bennington County has seen far wetter conditions than dry conditions but with rising minimum and maximum temperatures, drought may pose a risk in the future. Those residences (12) with shallow wells will be more likely to experience negative effects from severe and extreme droughts (Map 4). Risk to the built environment could be moderate if wells dry up and human life could be severely negatively affected without access to water. The natural environment which Sandgate relies so heavily upon could also be impacted by lack of water. The risk for wildfire increases as well as forest undergrowth dries out. Even though The National Risk Index lists drought as a 0-index score meaning that there are no annual losses expected in this area due to drought, the planning committee reviewed climate information and with the risk of rising temperatures, felt that the probability of a drought event would be likely to increase with a chance of happening at least once in the next ten years.



Map 4. Shallow private well locations. Source: BCRC, 2024

Extreme Cold

Hazard	Probability	Potential Impact					Score*:
		Built Environment	People	Economy	Natural Environment	**Average:**	
Extreme Cold	**4**	2.5	2	1	1	**1.625**	**6.5**

Description

Extreme cold is not well defined. In this plan, it will be considered as below freezing temperatures or 32 degrees Fahrenheit. For those involved in outdoor activities, extreme cold, accompanied by wind, is when exposed skin would be subject to frostbite. Frostbite occurs when the body is subjected to cold temperatures attempts to keep its vital organs functioning by cutting the circulation to extremities leaving them to freeze. Extreme cold can also cause hypothermia in individuals whose body temperature drops below 95 degrees Fahrenheit, and their body can't create heat as fast as it loses it. Power outages that might accompany winter storms temperatures that dip below freezing would not only affect personal health and the health of household animals, but could also impact the built environment and result in pipes freezing, and the loss of water supplies and perishables.

Bennington County has three cooperative weather observers but none in Sandgate. The closest one is in Sunderland. Records there have been kept long enough for the station to have monthly temperature normal collected but the NCEI (Table 15).

Table 15. Sunderland normal temperatures and precipitation for 1991-2020. Source: NCEI: https://www.ncei.noaa.gov

Month	High Temperature (°F)	Low Temperature (°F)	Average Temperature (°F)
January	32	11.2	21.6
February	35	12.2	23.6
March	42.8	20.1	31.5
April	56.7	31.2	44
May	68.7	41.7	55.2
June	77.2	50.6	63.9
July	80.9	55.2	68
August	79.3	53.5	66.4
September	73	45.7	59.4
October	59.8	35.9	47.8
November	48.4	27.6	38
December	37.4	18.8	28.1

Location

Cold weather would have a townwide impact on Sandgate wherever there is human life and the built environment due to potential damage due to freezing pipes and the subsequent water damage.

Extent

The National Weather Service (NWS) utilizes the Wind Chill Temperature (WCT) index to calculate wind chill and indicates how long it would take for frostbite to occur. (Chart 7).

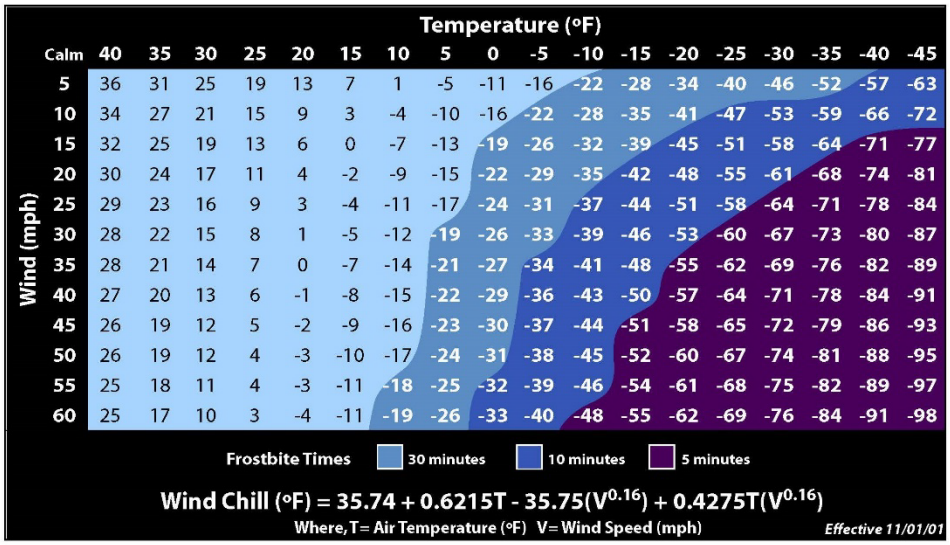


Chart 7. NOAA and NWS Wind Chill Chart. Source: Weather.gov

The NWS will also issue watches, warning and advisories when the weather gets cold. These are intended to inform the public about dangerous conditions to human life and also inform the agricultural industry to negative conditions for plant growth. These include:

- **Wind chill warning** – Issued when wind chill values are expected or occurring.
- **Wind chill watch** – Issued when dangerously cold wind chill values are possible.
- **Wind chill advisory** – Issued when seasonably cold wind chill values are expected but not extreme cold.
- **Hard freeze warning** – Issued when temperatures are expected to drop below 28 degrees for an extended period of time and may cause crop damage.
- **Freeze warning** – Issued when temperatures are expected to drop below 32 degrees for a prolonged period of time and may negatively impact crops and other plants.

- **Freeze watch** – Issued when there are significant and widespread freezing temperatures within the next 24 to 36 hours.
- **Frost advisory** – Areas of frost are expected and may pose a threat to vegetation.

Previous Occurrence, Disasters

The National Center for Environmental Information lists fourteen extreme cold events for Bennington County. These actions are included below in Table 16.

Table 16. Extreme Cold events in Bennington County. Source: NCEI, 2024

Date	Description
1/17/2000	A northwest wind of 15 to 30 mph blew across southern Vermont. Temperatures hit lows between 0° to -10° and the combination of cold temperatures and wind created wind chill values of -50° to -60°.
1/23 – 1/24/2011	Southern Vermont had low temperatures of -10° to -25° with brisk westerly winds. Wind chill reading of 25° to 35° were experienced.
1/7 – 1/8/2015	Overnight lows were between -9° and -19° with strong northwesterly winds leading to wind chill values as low as 15° to 35°. This caused many school districts in the region to have delayed starts.
2/15 – 2/16/2015	Low temperatures were as low as -20° and coupled with wind gusts up to 30 mph, wind chill values were -20° to -45°. Many towns and cities in the area opened warming shelters and reports of burst pipes and water mains occurred due to the cold temperatures penetrating deep into the ground.
2/13 – 2/14/2016	Dropping temperatures reached lows of -12° to -28° and winds gusted 20 to 40 mph. These conditions led to wind chill factors of -25° to -45°.
12/27 – 12/29/2017	Gusty winds and temperatures as low as -5° to -14° resulted in wind chill values of -37°.
12/31/2017	Temperatures in Bennington were as low as -18° in Bennington County. These cold temperatures resulted in dangerous wind chills ranging from -11° to -31°.
1/1/2018	A frigid airmass combined with northwesterly winds up to 15 mph resulted in dangerously cold wind chills. Wind chills fell as low as -15° to -35° in many locations across the region.
1/5 – 1/7/2018	This was an extended period of extremely cold conditions following a winter storm. The coldest wind chills occurred when winds gusting to 30 to 40 mph resulted in widespread wind chills as low as -20° to -40°. Many warming shelters were opened across the state as a result of the cold weather.
1/8 – 1/9/2021*	A 35-year-old man died from hypothermia within minutes after crashing his truck on Route 279 in Bennington and fleeing into the woods Temperatures were in the low 20s at the time of the accident, falling into the mid-teens overnight.
1/20 – 1/22/2019	After a winter storm, frigid temperatures with wind chills falling to -20° to -40°F occurred. The cold weather prompted the closing of schools and the opening of warming shelters across the region.
1/30 – 1/31/2019	Wind chills the morning of the 31st fell to -15° to -35°. The wind chills prompted many schools to close or delay opening.
1/28 – 1/29/2021	Dangerously cold wind chills across southern Vermont with low temperatures ranging from -11° up to 5°. Wind chill values ranged from -31° up to -3°.
1/14 – 1/15/2022	Wind chills fell to -15° to -35° over most areas.

Table 16. Extreme Cold events in Bennington County. Source: NCEI, 2024	
Date	**Description**
2/3 – 2/4/2023	Temperatures fell with readings of -15° to -30° followed by strong winds with peak wind gusts between 35 and 50 mph. A few power outages occurred as a result. The combination of very cold air and strong winds resulted in wind chill values much lower than the air temperature. The lowest wind chills ranged from -25° to -50°. Warming centers opened to aid those needing shelter from the cold. In addition, some area schools closed because of the cold weather.
*This event was classified as cold/wind chill but was included in this report due to its serious nature.	

Vulnerability

Extreme cold is a frequent occurrence in Vermont and the Sandgate area. Extreme cold typically has less of an impact on this population unless it is accompanied by high winds or a power outage. Many in the state are familiar with the cold and have homes with adequate heat and have the proper attire and gear to deal with extreme cold. However, there is a risk of hypothermia and frostbite for those that venture outside during extreme cold, and heart attacks when shoveling snow or other vigorous activities. Other vulnerable populations such as the elderly or the very young may be more susceptible to cold-related illnesses. Sandgate's aging population will create a greater vulnerability number of individuals vulnerable to extreme cold. According to the 2023 Vermont State Hazard Mitigation Plan, these groups also find it more difficult to maintain their body temperatures and may have a higher risk of hypothermia. Those experiencing homelessness are also at a greater risk of developing hypothermia and frostbite during extreme cold. The primary shelter at the Sandgate Town Office can be used as a warming shelter and Arlington Memorial High School can also be opened as a warming shelter. However, warming shelters are usually not opened unless there is a long-term power outage or other issue affecting the community during an extreme cold weather event.

The built environment can be impacted by extreme cold if buildings are not properly insulated. Water pipes can freeze and then burst causing water damage to homes. In seasonal homes, this may be a larger problem especially if they are not routinely maintained when the homeowners are not in residence. Other built environment impacts are frost heaves on roads and the creation of large potholes. Frost heaves can also cause damage to building foundations.

Climate change may be bringing a shift to warmer days, but it may also decrease the amount of snowfall on the ground leaving the built environment increasingly susceptible to freeze-thaw cycles. While development in the town may not be changing, there may be greater impacts to those structures that are already built. The natural environment can sustain damage due to freeze-thaw cycles that can harm trees and deep freezes can cause death to plants and animals alike.

This hazard type is considered as relatively low risk by the National Risk Index. The planning committee gave this hazard a high probability of occurring with a greater than 75% chance each year taking into consideration the future effects of climate change.

Landslides and Debris Flow

Hazard	Probability	Potential Impact					Score*:
		Built Environment	People	Economy	Natural Environment	**Average:**	
Landslides and Debris Flow	**3**	1	2	1	2.5	**1.625**	**4.875**

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.

Landslides are typically classified by the type of movement and material involved. According to The Landslide Handbook issued by the United States Geological Survey (USGS) in 2008, there are multiple categories. Table 17 lists the three most prominent types in this area. The type of movement may be a fall, topple, or slide. The type of debris is either rock or soil and the size of the particles of soil will determine whether it is earth (sand-sized or smaller particles) or debris (coarser fragments). More than one type of movement may occur simultaneously or at different times during a slope failure creating a complex failure.

In Vermont, landslides are typically caused by the human modification of slopes, saturated soils or fluvial erosion, with the latter being the most significant cause.

Table 17. Categories of landslides. Source: “The Landslide Handbook – A Guide to Understanding Landslides”. United States Geological Survey, 2008,

Category	Description	Triggers	Location
Falls	The detachment of soil or rock (or both) from a steep slope along a surface on which little or no shear displacement has occurred. Material descends by falling, bouncing or rolling.	Undercutting of the slope by streams and rivers or differential weathering (freeze/thaw cycle). Human activities such as excavating or maintenance.	Common along steep, rocky banks of rivers and streams.

Table 17. Categories of landslides. Source: “The Landslide Handbook – A Guide to Understanding Landslides”. United States Geological Survey, 2008,			
Category	**Description**	**Triggers**	**Location**
Topple	The forward rotation of a mass of soil or rock around an axis below the center of gravity of the displaced mass on a slope.	Gravity exerted by material located upslope from the displaced mass. Water or ice in the cracks within the mass. Also, vibration, undercutting, differential weathering, or stream erosion.	Common along steep, rocky banks of rivers and streams.
Slides	The downslope movement of soil or rock mass on the surface of rupture or on relatively thin zones of intense shear strain.	Intense or sustained rainfall or rapid snowmelt; rapid drops in river levels following floods, or erosion caused by the rise in rivers. May also be earthquake induced.	Commonly occur in fill materials.

Location

According to a presentation by Spingston, Kim, Dejong, Boyles, and Klepeis, most landslides in Vermont are located at the base of steep slopes and in close proximity to rivers. The large landslide called the Green River Landslide is located west of the town office, just north of the West Sandgate bridge, and along the Green River. It has been mapped by the Vermont Geological Survey, but no other information can be found from their Landslide Inventory.

Extent

The magnitude of landslides can be measured by the surface area (length, width, and gradient) of the slide. The material that has been moved can be measured in cubic yards. Another way the magnitude of a landslide can be measured is the distance the material of the slide has moved from the surface of rupture.

Previous Occurrence, Disasters

Three landslides occurred during Tropical Storm Irene in 2011. All were less than one acre in size and can be seen on Map 5.

In 2020, the Sandgate Conservation Commission released a report on the Green River Landslide and possible remediation strategies. It is believed to have been caused by the building of a roadway along the base of the hillslope in conjunction with field berming. Channelization of the Green River upstream and continued slope disturbance also contributed to this landslide. Pictures of the Green River landslide taken in 2016 and

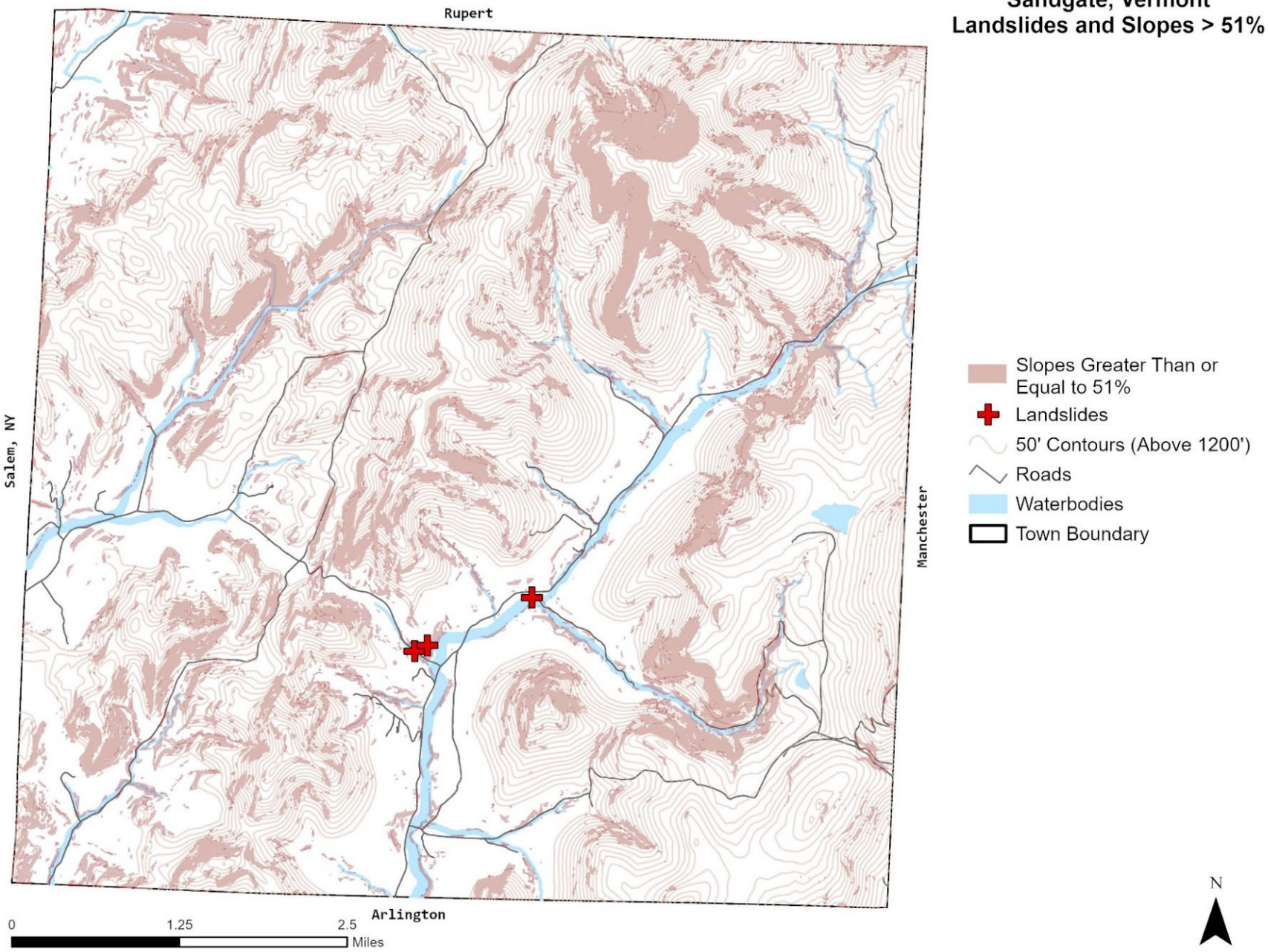
then in July of 2023 after the intense flooding event that occurred are below (Figure 9). This landslide has approximately doubled in size in the intervening years.

Figure 9. Green River Landslide in 2016 (left) and 2023 (right). Source: Jim Henderson

Vulnerability

Previous landslides occurred during major storm events and were located along the Green River. Landslides tend to occur in areas of steep slope and along waterways which Sandgate has many of those areas (Map 5). Impacts from landslides can include destabilization of roads and debris jams as material that has slid from slopes moves downstream. This could be seen if the Green River landslide continues to slide and deposit large quantities of sediment and vegetation into the river. This could potentially cause clogging at the West Sandgate bridge leading to damage to the bridge itself and flooding upstream as well.

The National Risk Index places the risk index at relatively moderate for the town. The probability of a landslide was ranked as likely by the planning team with a chance of an event at least once in the next ten years. With the climate in Sandgate gradually becoming wetter due to climate change, there is an increased chance of landslides in the future. Since the town is very rural and highly forested, landslides may not occur in areas that will impact the town but since many roads and residences are near streams, there may be negative impacts should a landslide occur in those areas. The planning team considered the impact on the built and natural environment greater than the impact on people and the economy but ranked them both as having only minor impacts.



Map 5. Landslides and Slopes greater than 51%. Source: BCRC, 2024

Infectious Disease Outbreak

Hazard	Probability	Potential Impact					Score*:
		Built Environment	People	Economy	Natural Environment	**Average:**	
Infectious Disease Outbreak	**2.5**	1	3	1.5	1	**1.625**	**4.0625**

Description

Infectious diseases are caused by bacterial infections, viruses, fungi, and other organisms that can spread through the human population. Two of the most well-known infectious diseases currently occurring are COVID and Lyme disease. Until COVID, Lyme disease had been the most prevalent infectious disease in Bennington County. Lyme Disease is very common in this region, as well as other tick-born illnesses.

Figure 10. Blacklegged tick. Source: Vermont Department of Health, 2024

Lyme disease, anaplasmosis, and babesiosis are all caused by blacklegged ticks (*Ixodes scapularis*) (Figure 10). These ticks are found throughout Vermont but live primarily in wooded areas and fields with tall grass and brush. They are most active in May and June and then again in October and November, however, they can be encountered at any time of the year when temperatures are above freezing.

Lyme disease has various symptoms due to the various body parts that can be impacted including skin, heart, nerves, and joints. Symptoms may begin as fatigue, chills, muscle pain, and a bull's eye rash called an erythema migrans. If not treated by antibiotics early, Lyme disease can spread throughout the body leading to numbness or

pain in the arms and legs and/or paralysis on one side of the face. Untreated, chronic nervous system issues may develop over months and years.

Location

Infectious diseases can be encountered in many places. Ticks that carry Lyme disease and other illnesses are found in wooded areas and fields. Lyme disease is reported more commonly in the southern and western halves of the state due to a slightly warmer climate which makes for a longer period of tick activity. Bacterial infections and viruses can be encountered almost anywhere in day-to-day life, primarily when people congregate.

Extent

The Vermont Department of Health (VDH) tracks and monitors cases of infectious disease. Currently, VDH issues a weekly report summarizing Covid-19 cases that includes statewide hospitalization cases and emergency visits that include Covid-like illness.

VDH also collects information on Vermont emergency room and urgent care visits for human-tick encounters. A tick encounter is any visit that involves a tick-related issue which many include anything from a bite or assistance in removing a tick.

Previous Occurrence, Disasters

COVID-19 pandemic began in early 2020 and it is currently still an active virus within the town and the world. In the beginning, when there was little known about COVID-19, people were required to wear face masks and physically distance themselves from others to reduce transmission. As a result, businesses were disrupted with some closing, schools were closed for prolonged periods with students learning remotely, and many workers switched to working remotely. The United States and Vermont went through several case surges where transmission in communities increased. Several vaccines have now been developed and distributed. Currently in the United States, anyone age 6 months and over can receive a COVID vaccine. COVID and the vaccination progress is ongoing.

Lyme disease is widespread in Vermont and New England and perhaps due to better tracking by physicians and other environmental factors, the number of cases is gradually increasing.

Chart 8 shows the diseases and conditions tracked by the Vermont Department of Health. These numbers indicate the total number of cases from 2006-2022. However, tracking numbers for certain diseases and conditions were low in 2021 this may be due to the increased tracking of COVID-19 casing a disruption in the tracking of other diseases. It is important to note that Lyme disease and Anaplasmosis are the two highest ranked reportable diseases in the State of Vermont.

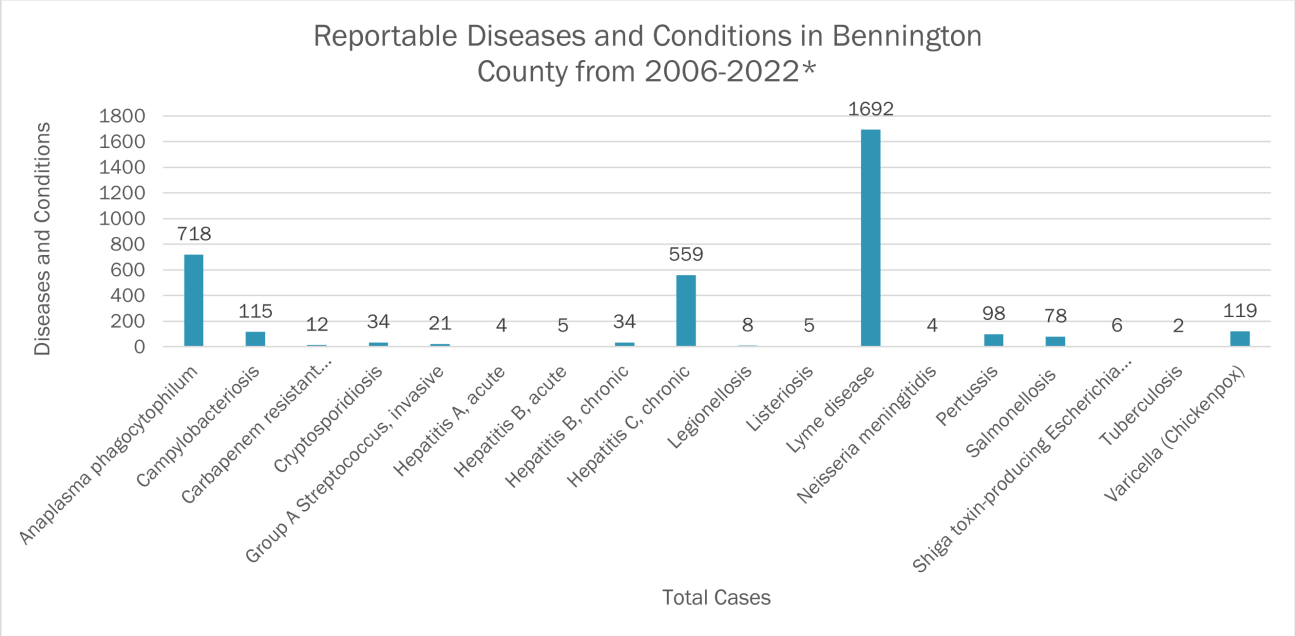


Chart 8. Reportable Diseases and Conditions in Bennington County from 2006 to 2022 (Source: VT Department of Health)*
**2022 data is preliminary and subject to change.*

Vulnerability

The probability levels for infectious diseases ranges. While tick-borne illnesses are not out of the ordinary for the area, large pandemics are rare and therefore, the planning team ranked it as an occasional occurrence, or at least one chance in the next 100 years.

Impacts on people are the primary concern for the planning team. Those individuals in the town's vulnerable populations such as the elderly, the young, and those who are immunocompromised are at risk from infectious diseases. In the case of another pandemic, there are disruptions to daily life which can lead to mental health crises. There is risk of loss of life as well. As indicated in Section II. Town Profile, the population in Sandgate is aging. This will cause a larger portion of the population to be more susceptible to infectious diseases in the future.

Regarding Lyme disease, Sandgate is a highly forested area as shown on Map 6. Many residents recreate or work outdoors throughout the year and while there aren't any tracking numbers specifically for tick-borne illnesses for residents of Sandgate, Chart 9 below shows emergency room and urgent care visits within Vermont. There is a clear spike in visits in spring and fall when residents, workers, and visitors to the area are active outdoors. The long-term impacts of Lyme disease on an individual may vary but include disruption to daily life and mental health issues. Work may become difficult, making it hard to provide for themselves or their family.

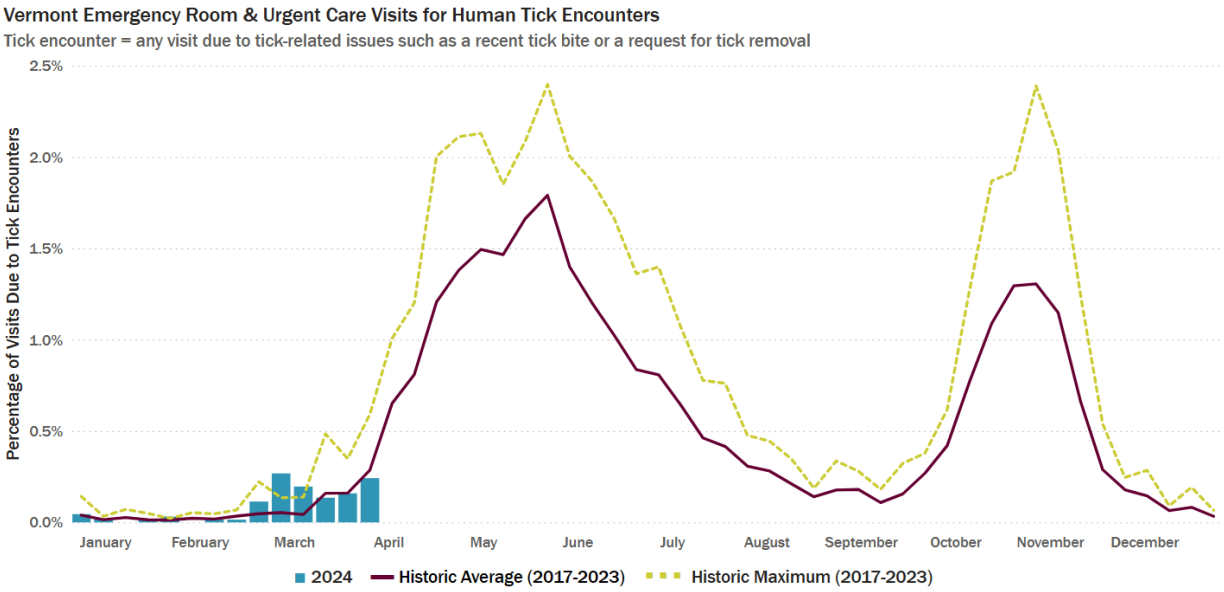
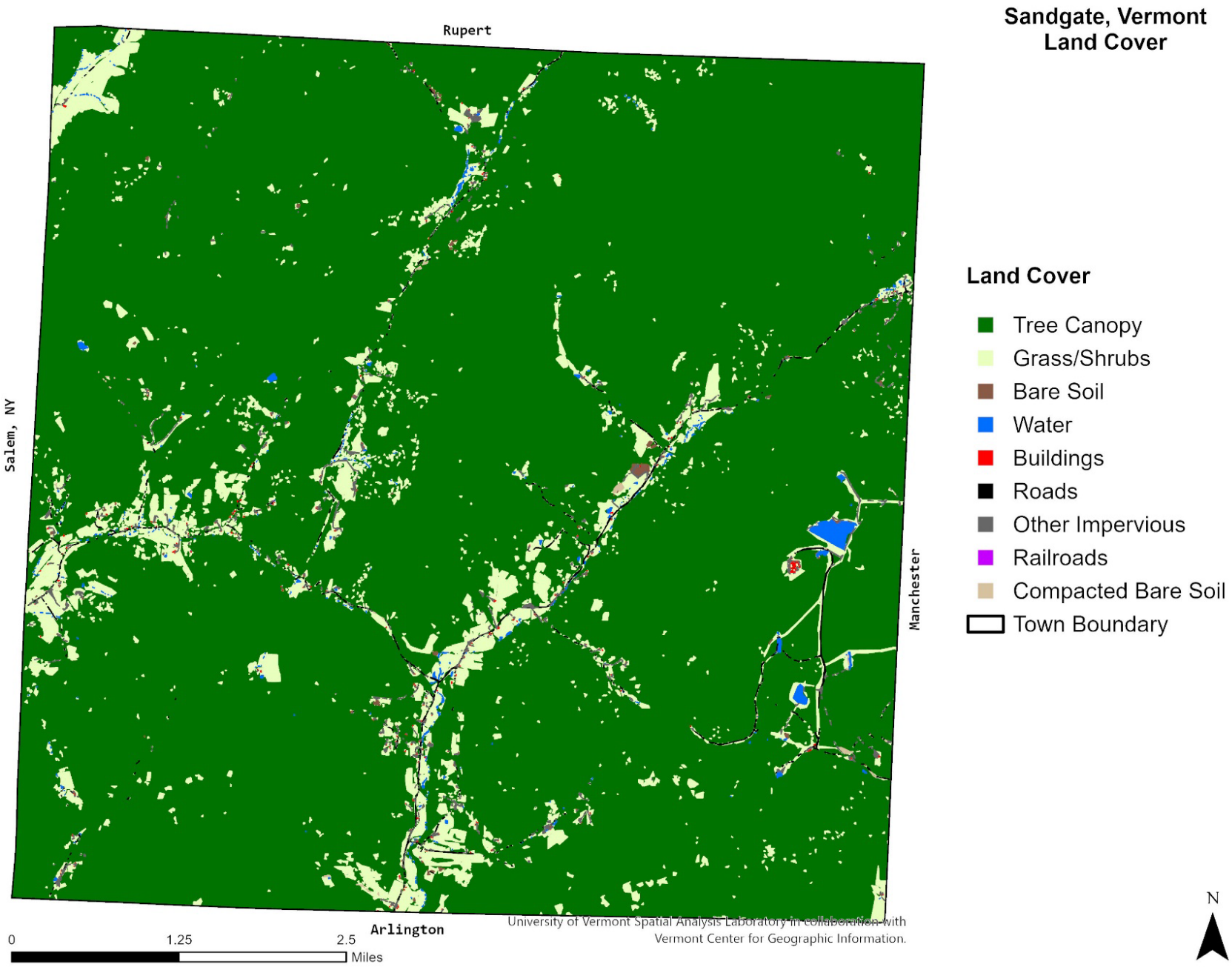


Chart 9. The weekly percentage of emergency department visits for tick-related issues. Source: Vermont Department of Health, April 15, 2024

According to the Vermont Climate and Health Profile Report issued by the VDH in 2016, the effects of climate change are uncertain. Climate change may bring a warmer climate and shorter winters, and this coupled with the reforestation that Vermont has been experiencing and the rise in the deer population (a common carrier of the black-legged tick), leads researchers to believe that the tick population will continue to grow and tick-borne illnesses even more common.

The planning team considered the impact on the built environment, the economy, and the natural environment as negligible. The town also does not foresee any future changes to land use or development which may increase or decrease the risk of infectious disease within the community.



Map 6. Land Cover in Sandgate, Vermont. Source: Bennington County Regional Commission, 2024

Wildfire

Hazard	Probability	Potential Impact					Score*:
		Built Environment	People	Economy	Natural Environment	**Average:**	
Wildfire	**3**	1	1	12	1	**1.25**	**3.75**

Description

The National Park Service defines wildland fire as "any non-structure fire that occurs in vegetation such as trees, grasses, and shrubs" whereas structure fires are those which burn man-made objects, buildings, or cars. There are two types of wildland fires: wildfire or prescribed fires. A wildfire is any *unplanned* fire affecting open lands including forests, grasslands, or other features. A prescribed fire is a fire that is created, managed, and carefully monitored by fire managers.

The potential for wildland fire is dependent on fuel types, which vary with vegetation, topography, and weather. The National Fire Danger Rating System (NFDRS) is a tool that is used to estimate the potential for fire danger for an area. There are five color-coded levels as described in Table 18.

Table 18. National Fire Danger Rating System levels and description. Source: U.S. Forest Service, 2024

Fire Danger Level	Description
Low	Fuels do not ignite readily from small embers, although a more intense heat source, such as lightning, may start many fires in duff or punky wood. Fires in open grassland may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering. Fire control is easy.
Moderate	Fires may start from accidental causes. On a windy day, if a fire does start in an open grassland, it will burn and spread quickly. Wood fires will spread slowly to moderately. Fire intensity will be moderate. Fires are not likely to become serious and are easy to control.
High	Fires can start easily and spread quickly with a rapid increase in intensity. Small fires can quickly become large fires. May become serious and hard to control unless handled while still small.
Very High	Fires will become very easy to start and spread rapidly. These fires are difficult to control and may become larger and create longer-lasting fires.
Extreme	Fires start quickly and burn intensely. They are potentially serious, difficult to fight, are very dangerous and may last several days.

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 Sandgate is covered by broadleaf litter fuels that exhibit fires of low intensity and slow rates of spread (U.S. Forest Service 2010).

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 snowmelt, 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).

In both forested and open settings, structures may be threatened by even small wildfires. These wildland-urban interface (WUI) areas are the most likely areas where resources will be needed to suppress wildland fire and to reduce potential hazards. According to the US Department of Agriculture, in 2020 Vermont had 70.6% of housing units located in the WUI. The WUI can be either interface or intermix areas. Interface areas are areas where housing is located near wildland vegetation. Intermix areas are where housing and vegetation intermingle. (Figure 11.) Map 7 shows areas in Sandgate where WUI intermix and interface occur.

Figure 11. Example of areas of intermix (left) and interface (right) in Sandgate. Source: Google Earth

Location

Low intensity fires with slow rates of spread could occur in the forested areas which comprise most of Sandgate's land cover. 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.

Extent

Fire intensity is measured by the amount of energy released in a fire which is exhibited by the length of flames. The rate of spread dictates the degree of wildland fire hazard and methods of control. Table 19 shows how wildfires can be categorized based on size.

Table 19. 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**

Previous Occurrence, Disasters

Since 2016, Bennington County has experienced 29 wildfires according to data supplied by Forest, Parks & Recreation. This information is summarized in Table 20. Most of these fires have been small, however the three largest happened in 2023 within the months of April and May when burning is strongly discouraged by the local Forest Fire Warden due to the risk of wildfire increasing during spring months.

The Sandgate Annual Town Report includes the Forest Fire Wardens' Report for that year. In 2023 there was one wildfire in Sandgate, according to the town report. This incident took place in April at the top of Minister Mountain and burned approximately 9.5 acres. This incident is the largest incident in Bennington County since 2016. In 2022, no wildfires were reported for Sandgate. In 2021, the fire warden's report indicated that there was one grass fire and two brush fires. In 2020, there were two grass fires and one brush fire. Further information was not given, and the 2021 and 2020 events were not reported by the Vermont Agency of Natural Resources Department of Forest, Parks & Recreation.

Table 20. Summary of wildfire data in Bennington County since 2016. *Source: The Department of Forest, Parks and Recreation, 2024.*

Date	Town	Cause	Acres of Grass	Acres of Brush	Acres of Forest	Final Acre Quantity
05/13/2023	Arlington	Debris Burning	0	6.75	0	6.75
04/15/2023	Sandgate	Campfire	0	0	9.42	9.42
04/11/2023	West Rupert	Powerline	0	0	5.9	5.9
04/08/2023	Shaftsbury	Debris Burning	0	1	0	1
11/04/2022	Bennington	Other causes	0	0	2	2
11/03/2022	Bennington	Smoking	0	0	2	2
10/08/2022	Woodford	Debris Burning	0	0.1	0	0.1
05/11/2022	Winhall	Debris Burning	0	2	1	3
05/09/2022	Shaftsbury	Debris Burning	0	0	1.5	1.5
04/25/2022	Shaftsbury	Debris Burning	0	0	0.25	0.25
04/08/2021	Pownal	Debris Burning (brush)	0.25	0	0	0.5
03/27/2021	Shaftsbury	Miscellaneous (grass)	0	0.00721	0	0.0072121
03/22/2021	Shaftsbury	Railroads	0	0	0.5	0.5
03/07/2021	Pownal	Debris Burning (brush)	1.5	0	0	1.5
06/17/2020	Winhall	Debris Burning (brush)	0	0	0.1	0.1

Table 20. Summary of wildfire data in Bennington County since 2016. *Source: The Department of Forest, Parks and Recreation, 2024.*

Date	Town	Cause	Acres of Grass	Acres of Brush	Acres of Forest	Final Acre Quantity
03/22/2020	East Dorset	Debris Burning (brush)	1	0	0	1
04/04/2019	Arlington	Misc (grass, wood ashes), unknown	0	0	0.1	0.1
04/03/2019	Arlington	Misc (grass, wood ashes), unknown	0	0	2.5	2.5
05/05/2018	Winhall	Misc (grass, wood ashes), unknown	0	0.25	0	0.25
04/09/2018	Dorset	Misc (grass, wood ashes), unknown	2	0	0	2
04/04/2018	Dorset	Debris (brush)	0.2	0	0	0.2
06/22/2016	Pownal	Children	0	0	0.5	0.5
04/20/2016	Pownal	Debris (brush)	0	0	0.1	0.1
04/18/2016	Pownal	Debris (brush)	0	0	0.125	0.125
04/16/2016	Manchester	Campfire (bonfire)	0	1.5	0	1
04/15/2016	Pownal	Debris (brush)	0	0.125	0	0.125
03/15/2016	Pownal	Debris (brush)	0	0.1	0	0.1
03/12/2016	Manchester	Children	0.25	0	0	0.25
02/23/2016	Manchester	Campfire (bonfire)	1	1	1	3

Vulnerability

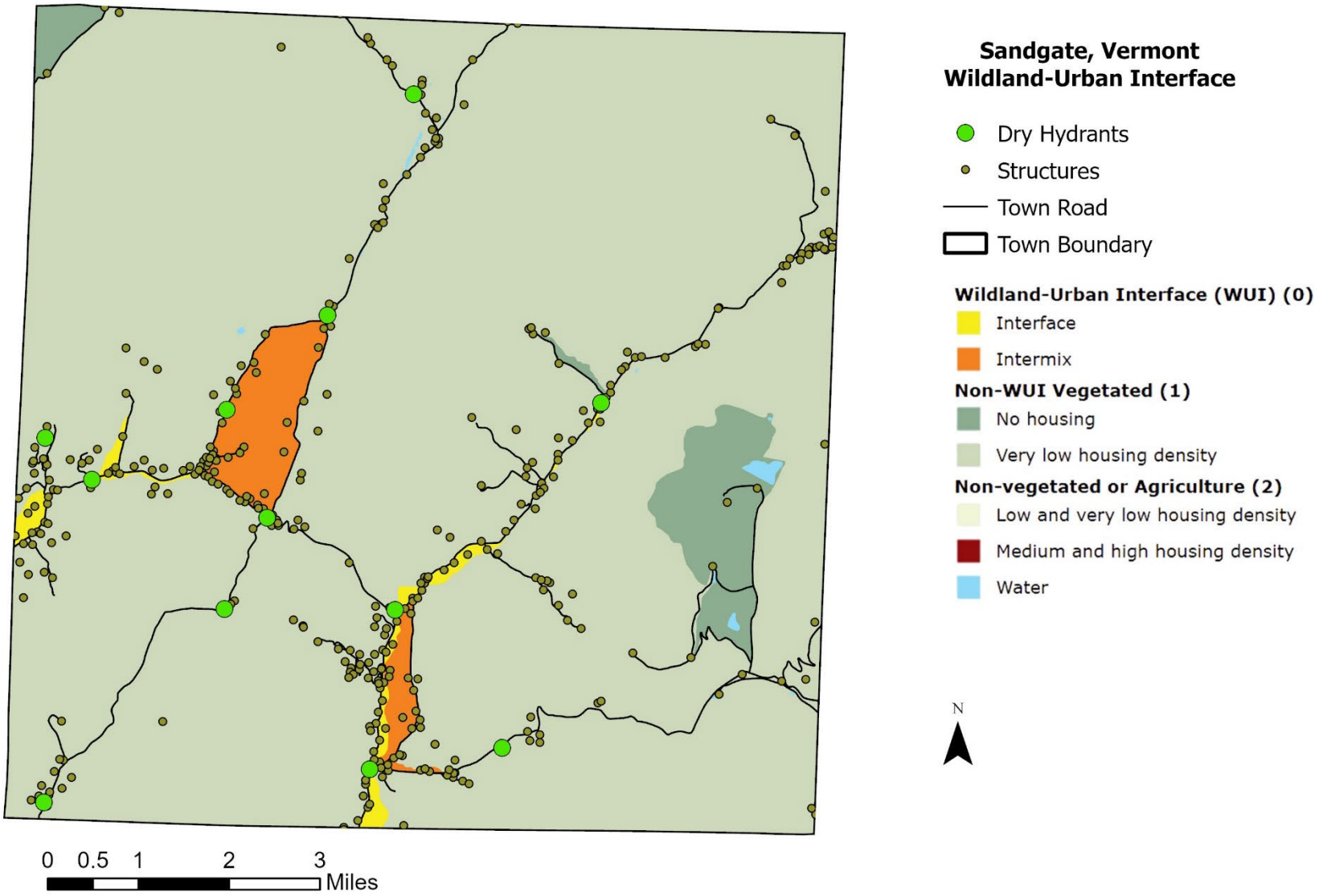
The area's deciduous and coniferous forests create litter that is relatively low in flammability so that wildfires have relatively low intensity and rates of spread. The main hazard is for wildland fire fighters working in steep terrain. The natural fire return intervals in most forests in Vermont are greater than 50 years (Malamud et al 2005) though fires can be more frequent in old fields. Recurrence is likely related to precipitation rather than the buildup of fuels, so drought recurrence is already factored into these interval estimates. Therefore, the potential for large fires is very limited due to the fuel characteristics of the land cover in Sandgate. It is important to point out that the steep topography of Sandgate can make managing wildfires difficult and dangerous and causing increased risk to fire fighters who are called to battle them. Wildfires that do occur tend to happen at higher elevations away from structures and people, and therefore have a negligible impact on the economy.

Sandgate has multiple dry hydrants that can be used to help suppress wildland or structure fires (Map 7). Due to the repeated flooding in town, many of them have become unusable. Dry hydrants should be backflushed annually to clear any debris, silt, or aquatic vegetation from the line and strainer. It is important that the town works with the surrounding fire agencies to come to an agreement on clearing those hydrants that are no longer functional or looking for solutions for those hydrants that quickly become unusable due to silt buildup caused by increased flooding.

The National Risk Index lists Sandgate as having relatively low risk of wildfire. Brush and wildland fire in Sandgate in any given year is likely, with a >10% but <75%

probability in a year, but these are most likely to be small. However, as climate change increases temperatures, it may increase drought recurrence and the probability of larger wildfires may increase, as well. The impact on the natural environment is considered minor with isolated damage to small natural areas. Impacts to the built environment, human life, and the economy were all ranked as negligible by the planning team. Sandgate has an agreement with Arlington Fire Department for structure fires. One possible mitigation action that should be considered is formalizing the agreement with the Arlington Fire Department to flush the hydrants and for firefighting services. The town should also consider formalized mutual aid agreements with surrounding towns to cover that type of fire.

Climate change has also been included in the probability ranking. As climate change increases temperatures, it may increase drought recurrence and the probability of wildfires may increase, as well. The impacts of wildfires may increase due to frequency even as development and population numbers remain the same.



Map 7. Sandgate Wildland-Urban Interface. Source: USDA Forest Service,2024

Hazardous Material Spill

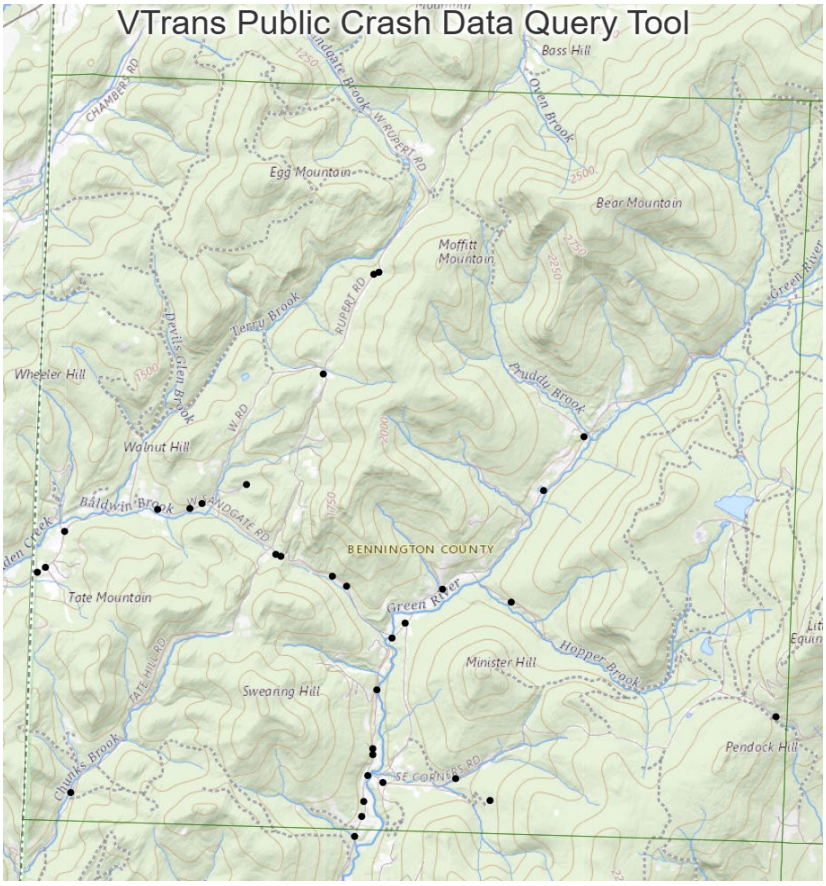
Hazard	Probability	Potential Impact					Score*:
		Built Environment	People	Economy	Natural Environment	**Average:**	
Hazardous Material Spill	**2**	1	1	1	2.5	**1.375**	**2.75**

Description

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.

Location

Hazardous material spills can occur anywhere there are hazardous materials. Roads have the potential to be spill areas as vehicular accidents involving trucks carrying hazardous materials can cause a spill. Roads with average grades greater than 10% present hazards, particularly when wet or during winter storms. Sandgate Road carries substantial traffic and a spill on this road could affect a large portion of the town. Map 8 shows the locations of vehicle crashes in Sandgate from 2010 to 2023.



Map 8. Crash locations from 2010 to 2023 Source: VTrans Public Crash Query

Of particular concern in any hazardous material spill would be the impact on water resources as the hazardous material could quickly flow downstream and impact the natural environment over larger areas. Many of Sandgate's roads follow waterways and the majority of the crashes have occurred along them, particularly the Green River which flows south into the larger Batten Kill.

Extent

Hazardous material spills can occur anywhere there are hazardous materials. Roads have the potential to be spill areas as vehicular accidents involving trucks carrying hazardous materials can cause a spill. Sandgate Road carries substantial traffic and a spill on this road could affect a large portion of the town and negatively impact the Batten Kill.

Previous Occurrence, Disasters

Vermont Agency of Resources maintains a hazardous materials spills list. Reviewing the list indicates that there were eight spills in Sandgate from 2000 to 2023 (Table 21). All these spills affected small areas.

Table 21. Hazardous Materials Spill in Sandgate. Source: Vermont Environmental Tool Spills List (Spills (vt.gov))

Report #	Year	Facility Name	Responsible Party	Date Reported	Date Closed	Incident Description
WMD349	2005	CVPS	CVPS	9/30/2005	9/30/2005 12:00:00 AM	Transformer spill; 1 gallon of transformer oil
WMD225	2006	N/A	CVPS	5/24/2006	5/24/2006 12:00:00 AM	Transformer leak; 1 gallon of transformer oil
WMD517	2008	Pole 58 Line 514	CVPS	10/28/2008	10/29/2008 12:00:00 AM	Transformer shot; 4 gallons of non-PCB MODF
WMD155	2018	roadside	GMP	4/18/2018	4/18/2018 12:00:00 AM	downed transformer during 4/16 storm; 5 gallons of MODF
WMD466	2018	Roadside	GMP	10/28/2018	10/29/2018 12:00:00 AM	Transformer/Capacitor release; 7 gallons of MODF
WMD297	2021	Chunks Brook	Resident	7/31/2021	9/20/2021 12:00:00 AM	Car in brook
WMD684	2023	Residence	Resident	9/15/2023	1/8/2024 12:00:00 AM	Heating Oil UST leak Unknow quantity of #2 oil
WMD830	2023	Roadway	GMP	12/21/2023	12/21/2023 12:00:00 AM	Hydraulic Equipment Failure; 2 gallons of hydraulic oil

Vulnerability

The Town of Sandgate's vulnerability to hazardous material spills is ranked low overall. The planning team ranked it as an occasional occurrence with a 1-10% chance of occurrence per year. Increased truck traffic also increases the possibility of a major spill. Many areas are vulnerable due to the proximity of surface and groundwater resources to roads. Local roads carry materials that could spill and harm aquatic resources as well as individual wells. In most cases, the impact on the built environment, people, and the economy is negligible. Injuries, except in the case of direct injuries from a traffic accident, are likely to be low. The natural environment would experience minor to moderate impacts if aquatic resources and/or water supplies were affected. The National Risk Index does not address risk from hazardous material spills.

Climate change may increase these instances as ancillary events. If roads are washed out due to increased flooding or become unsafe to travel, spills could occur more frequently due to motor vehicle accidents. An increase in winter weather could also cause an increase in motor vehicle accidents, as well. Tracking these instances and working with the Vermont Agency of Transportation (VTrans or VTAOT) to mitigate dangerous roads and intersections may assist in limiting hazardous materials spills and make travel safer for all.

Vulnerability Summary

A summary of the vulnerabilities to each hazard that is experienced within the Town of Sandgate is in Table 22 below.

Table 22. Vulnerability Summary

Hazard	Previous Events	Future Probability	Location	Extent	Vulnerable Assets
Flooding and Fluvial Erosion	49 events from 1996 to 2023	Highly Likely	Community to statewide within special flood hazard zones and river corridors	• >5" of rain • fluvial erosion data is unavailable	Roads, bridges and culverts town wide. Structures located within the SFHA or river corridors. Residents who may be cut off from emergency services due to flooded or washed-out roads. Loss of power may last up to seven days.
High Wind Event	1163 events from 1996 to 2023	Highly Likely	Community to region-wide with possible isolated events	• wind speeds >60 mph	High winds may down power lines cutting off power to residents. Residents who may be cut off from emergency services due to downed lines and lack of cell service coverage. Remote workers without internet access. Timber industry impacted due to large amount of fallen trees.

Table 22. Vulnerability Summary

Hazard	Previous Events	Future Probability	Location	Extent	Vulnerable Assets
Winter storm (snow and ice)	130 events from 1996 to 2023	Highly Likely	Community to statewide	• Up to 30" of snow • 3/4" of ice	• Primarily power supplies but also roads may be blocked due to fallen trees. • Roads may be dangerous to travel on due to large amounts of snow or ice. • Power outages lasting seven days or longer can impact the elderly or those with medical conditions.
Invasive Species	Ongoing	Highly Likely	Community to state-wide	• Not mapped for all invasives. • EAB has been found. • Poison parsnip along roadsides	• Forests, roadsides, water bodies and streams. • Human life may be impacted due to power outages caused by fallen trees. • Poison parsnip can also cause damage to human life when it is in contact with skin.
Drought	• Severe droughts occurred in 27 years from 1895 to 2023. • Extreme droughts occurred in 8 years since 1895.	Likely	Community to statewide	• 12 homes with shallow wells	• Homes with shallow wells lose water for extended periods of time. • The elderly population or those who cannot afford to purchase water may be without water on hot days.
Extreme Cold	14 events since 2000	Highly Likely	Community to statewide	• Wind chills as low as 45^{o} below zero	• Elderly and ill individuals without adequate heating or those without funds to heat their homes. • Unhoused individuals. • Outdoor workers or recreationalists.

Table 22. Vulnerability Summary					
Hazard	**Previous Events**	**Future Probability**	**Location**	**Extent**	**Vulnerable Assets**
Landslide/Debris Flow	• One large landslide and multiple small-scale events along the Green River. • Several small post-Irene slides.	Likely	Subarea of community	• Large Green River landslide • Smaller ones along the Green River	• Most likely along streams and affecting properties adjacent or downstream. • May increase sediment in waterways leading to debris jams at bridges and clogged dry hydrants. • Potential clogging at West Sandgate bridge leading to flooding upstream impacting those residences.
Infectious Disease Outbreak	Annual	Occasionally	Community to state-wide	• All human life	• Varies with type of infectious disease. • Those who are elderly and very young may have higher vulnerability.
Wildfire	7 events from 2020 to 2023	Likely	Subarea of community	• Minimal	• Likely confined to the upland forests. • Structures located within the WUI.
Hazardous Materials Spill	Four events from 1997 to 2008	Occasionally	Site-specific with wider affects if spills affect water resources	• Minimal	• Water supplies and aquatic resources.

V. Capability Assessment

Community Capability

Each municipality has tools and resources available to them that enables them to increase their resilience. FEMA considers these tools and resources to be the municipality's capabilities and categorizes them into four groups: planning and regulatory, administrative and technical, financial, and education and outreach.

Planning and Regulatory

The planning and regulatory capability includes plans, codes, and ordinances that can mitigate hazards or may create additional vulnerabilities within the area. Sandgate's planning and regulatory capabilities include The Sandgate Town Plan, Road and Bridge Standards, the Community Wildfire Protection Plan for the Towns of Arlington, Glastenbury, Sandgate, Shaftsbury and Sunderland, the Local Emergency Management

Plan, Land Use & Development Bylaws and the recently updated State of Vermont Hazard Mitigation Plan. Each of these are briefly discussed below.

It is important to note that Sandgate does not have any local building codes. Instead, the town relies on the State of Vermont which has adopted the 2015 Vermont Fire & Building Safety Code.

Sandgate Town Plan

The Sandgate Town Plan was adopted in December 2022. The Town Plan is part of Sandgate's ongoing process to develop a tool to guide development and "ensure that Sandgate will continue to be an outstanding community in which to live." The Town Plan identifies the goals which support hazard mitigation planning in land use, transportation, recreation, public facilities and services, and natural resources. The town plan also reviews the hazard mitigation planning process and encourages regular updating of this type of plan.

Sandgate Land Use and Development Bylaw

The Sandgate Land Use and Development Bylaw, prepared by the Sandgate Planning Commission with the assistance of the Bennington County Regional Commission in May 2024, consists of the combined zoning, subdivision, flood hazard and river corridor regulations. This bylaw is used to establish flood hazard and river corridor overlay districts within the town, set standards for development within those areas to promote life safety and mitigate future negative impacts due to development, and implement the goals of the 2022 Town Plan. Section 7 addresses Flood Hazard and River Corridor Regulations. Section 7.5.4 includes information about referrals to the State National Flood Insurance Program (NFIP) when applications are received for development in the flood hazard overlay (FHO) or river corridor overlay (RCO). In section 7.6.3, substantial improvement (SI) and substantial damage (SD) determinations are addressed. The zoning administrator has the ability to make both a SD and SI determination based on current FEMA guidelines. Either of these determinations can be appealed to the Zoning Board of Administrators (ZBA).

Local Emergency Management Plan, 2024

Annually, Sandgate updates its Local Emergency Management Plan (LEMP) in accordance with Vermont Emergency Management standards. These plans establish roles and responsibilities, describe procedures, and identify vulnerable populations that may need assistance during a disaster. The local Emergency Management Director works with the Select Board to complete this document. Information from this plan can be used to help facilitate information gathering and requests for funding after a disaster that will lead to future mitigation actions.

Road and Bridge Standards

Sandgate adopted the Town Road and Bridge Standards in August of 2023. These standards provide minimum codes and standards for the construction, maintenance and repair of existing and future town roads and bridges. These standards promote safety, reduce life cycle costs, and address environmental concerns. These standards are directly linked to hazard mitigation as they require practices that will lead to minimization of road damages due to flooding.

Community Wildfire Protection Plan for the Towns of Arlington, Glastenbury, Sandgate, Shaftsbury and Sunderland

A community wildfire protection plan (Batcher and Henderson 2013) was completed by the Bennington County Regional Commission for the towns of Arlington, Glastenbury, Sandgate, Shaftsbury and Sunderland in 2013. The plan was developed in cooperation with the Arlington and Shaftsbury Fire Departments, the Vermont Department of Forests, Parks and Recreation, the fire wardens from each town, Bennington County Mutual Aid and Green Mountain National Forest. Presentations were made to the planning commissions of each town to gather their input as well.

The plan includes actions for education and outreach, improvements to water resources for wildland and structural fire protection, and fuel reduction projects. These have been incorporated in this plan as well. There is no public water system, so water sources include dry hydrants, ponds and similar water source s. Fuel treatments should be focused on fields where structures are often proximate to grass and shrub dominated fields which can carry high intensity, fast moving fires.

Stormwater Master Plan, Town of Sandgate, Vermont (Adopted December 29, 2017)

The Stormwater Master Plan was funded by the Vermont Agency of Natural Resources and was created to “evaluate developed lands and road corridors in the Town to identify sources of increased stormwater runoff and associated sediments and nutrients discharging to the Batten Kill or its tributaries” with a focus on rural roads. This plan lists problem areas and scores them based on several metrics in order to prioritize them and assist the town in proactively addressing trouble areas. Many projects in this plan have been addressed by the town and it is still used as a reference for the town’s future projects.

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

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

- 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).

- A flood resilience section (IX) as required by Vermont statute that identifies hazards from flooding and fluvial erosion. The section encourages avoiding development in flood hazard areas, reconstruction of bridges and culverts that impede flows, creating and/or maintaining an undisturbed buffer 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.

Vermont Hazard Mitigation Plan (2023)

The Vermont Hazard Mitigation Plan identified a series of hazards along with those we considered in this plan. The Sandgate plan tracks the state plan except some hazards are combined. Table 8 in Section IV reflects the hazards included in the State's HMP and how these hazards are reflected in Sandgate's plan.

Administrative and Technical

Administrative and technical capabilities are the municipality's staff, skill, and tools that can be used to carry out mitigation planning and actions. These are people driven capabilities and may include staff or volunteers.

Sandgate is a small town with limited paid staff and many who are volunteers. Those roles that can impact hazard mitigation actions and processes are as follows: a five-person select board, a town clerk/treasurer, a five-person conservation commission, a four-person planning commission/zoning board, road foreman, zoning administrator, fire warden, emergency management director, and a tree warden. Many of the individuals that fill these positions fill multiple roles within the community and operate purely as volunteers. Table 23 below provides a summary of administrative capabilities and the party(ies) responsible for carrying out those functions.

The Select Board is the legislative authority and develops the town budget. The Select Board is responsible for day-to-day management and planning. The Select Board also appoints the Emergency Management Director and members of the Planning Commission and adopts bylaws and ordinances. Vermont has a town meeting form of government, and the budget is approved by voters on town meeting day.

The Emergency Management Director and/or their appointees participate in the Regional Emergency Management Committee and receive information and training on emergency and disaster management. Since Sandgate does not have its own fire station, it has a mutual aid agreement with the Arlington Fire Department. Law enforcement is provided by a constable and by Vermont State Police and the Bennington County Sheriff's Department. Emergency medical services are provided by

the Arlington Rescue Squad. Sandgate also has agreements with Arlington to use their available shelters in case of a disaster.

Technical support is provided by Bennington County Regional Commission (BCRC). BCRC provides assistance in planning in land use, emergency management, transportation, GIS mapping, and grant writing. The State Agency of Natural Resources (ANR) provides assistance with floodplain bylaw administration and VTrans can also provide assistance to the town via training and maintenance of state roads. The Town can get support from the Vermont Emergency Management for hazard mitigation needs and emergency response. The town can also rely on the U.S. Forest Service for maintenance of forest lands, training and other supports.

Table 23. Town of Sandgate administrative and technical capabilities for hazard mitigation

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

Financial

Financial capabilities are monetary resources that Sandgate can access to fund mitigation actions. Sandgate has a small budget with a large portion allocated to the Highway Department to maintain roads throughout the town. Sandgate has an active program to maintain roads, culverts and bridges throughout the town.

Sandgate also has a small emergency management fund, a bridge and culvert fund, and a sinking fund to maintain the town's highway equipment. Sandgate has also been the recipient of grant funding from Grants in Aid, Better Road Grants, and Structures Grants.

Outreach and Education

Sandgate has limited opportunities for outreach and education. However, the town's strengths include a well-run website and a new community group that has come together called the Sandgate Community Table. The Community Table is a group of individuals that come together to learn about the town, how they can prepare for

disasters, and how they can support each other in blue sky days and during emergencies. The town should consider putting together an Emergency Resource page on their website that will allow the town to share important emergency information. Information can also be shared via social media and Front Porch Forum.

Sandgate has a Conservation Commission that has a focus on expanding riparian buffer controls which help mitigate erosion, provide flood protection and support wildlife habitats. The town may want to consider developing a page on the town website to include information about the work being done by the commission and provide further education about the work that they are completing.

National Flood Insurance Program

Vermont municipalities have the authority to regulate development in flood hazard areas under 24 Vermont Statues Annotated (VSA), Chapter 91. Under 10 VSA, Chapter 32, the Secretary of the Agency of Environmental Conservation has the authority to designate flood hazard areas and to assist the towns with flood hazard regulations. Sandgate participates in the National Flood Insurance Program (NFIP) and, as mentioned above, has bylaws in place to implement that program. This program is overseen by the Town Zoning Administrator. According to the FEMA NFIP Insurance Report, only one property in Sandgate has flood insurance coverage.

Previously, the Town had a fluvial erosion zone hazard ordinance. This has been replaced by the Flood Hazard and River Corridor Regulations found within the Sandgate Land Use & Development Bylaws. The Town bylaws have been reviewed and amended to reflect changes in the flood insurance rate maps (FIRMs) prepared by FEMA. DFIRMs (digital flood insurance rate maps) have been developed using LIDAR, a technology that can be used to develop highly accurate elevations and, thereby, predict potential flood elevations from different storm events (FEMA 2010). The current DFIRM for Sandgate is dated December 2, 2015. The latest Flood Insurance Study was effective December 2, 2015.

State Incentives for Flood Mitigation

Sandgate also has access to Vermont's Emergency Relief Assistance Funding (ERAF). After a federally-declared disaster, public costs are reimbursed at 75% by federal funds and the state will contribute an additional 7.5%. The ERAF program offers additional funds, either 12.5% or 17.5%, to those municipalities that take specific steps to proactively reduce flood damage. To be eligible for the 12.5% additional funding, the town needs to do the following:

- Participate in the NFIP
- Adopt Town Road and Bridge Standards
- Annually adopt a Local Emergency Management Plan prior to May 1

- Adopt a Local Hazard Mitigation Plan

The town is eligible for the 17.5% rate if they do all four of the steps above AND they also adopt River Corridor protections and/or participate in the Community Rating System.

Sandgate will be eligible for the 17.5% ERAF rate upon adoption of this Local Hazard Mitigation Plan as they will have met all 4 of the above requirements and they have also adopted the river corridor protections.

Capability Summary

Table 24 summarizes the town's capabilities. Areas needing improvement and suggestions to maintain or enhance those capabilities are also included.

Table 24. Town of Sandgate Capability Summary

Plans/Policies/Ordinances	Description/Responsible Agent	Effectiveness	Improvements Needed/Suggestions
Town Plan	• Planning Commission • Emergency Management Director • Select Board (approval of Town Plan)	• Effective • 2022 update includes flood resiliency information	• None
Local Emergency Management Plan (LEMP)	• Emergency Management Director • Select Board (approval of plan)	• Effective • Annually updated	• Develop a Continuity of Operations Plan to attach to the LEMP • Create annexes to the LEMP to address specific hazard situations • Continue to keep updated
Town Website	• Volunteer maintained	• Effective	• Develop a web page to educate the community on preparedness and list important contacts
Flood Hazard Area Regulations in Zoning Bylaws	• Planning Commission • Zoning Board of Adjusters • Zoning Administrator (permitting) • Town Trustees (approval of bylaws)	• Effective • Adopted new flood hazard area regulations in 2015	• None • Continue to monitor FEMA regulations and new local flood hazards
Zoning Bylaws	• Planning Commission • Zoning Board of Adjusters • Zoning Administrator (permitting) • Select Board (approval of bylaws)	• Effective	• None • Continue to monitor regulations and maintain training of volunteer board members to ensure effective permitting

Table 24. Town of Sandgate Capability Summary			
Plans/Policies/Ordinances	**Description/Responsible Agent**	**Effectiveness**	**Improvements Needed/Suggestions**
Soil and Water Resources/Streams and Water Courses/Protection of Shoreland/Water Resources	• Planning Commission • Zoning Administrator (permitting) • Select Board (approval of bylaws)	• Effective	• None • Continue to review regulations and training of volunteer board members to ensure effective permitting
Road Maintenance Programs and Standards	• Road Foreman • Select Board	• Effective • Town has adopted most recent VTrans Road and Bridge Standards	• Make sure culverts in flood areas are updated when needed
Vulnerable Population Outreach	• Emergency Management Director	• Effective • Vulnerable populations listed in LEMP	• Maintain current training for emergency personnel on responding to vulnerable populations
Mutual Aid Agreements – Emergency Services	• Emergency Medical Services are provided by Arlington Rescue Squad • Fire Services are provided by Arlington Fire Department • Law Enforcement services are provided by Vermont State Police	• Effective	• Formalize the agreement with Arlington Rescue Squad and Arlington Fire Department • Consider contracting with Bennington County Sheriff's Department to provide specific coverage for Sandgate
Mutual Aid Agreements – Road Crews	• Road Foreman • Select Board	• Informal agreements in place • Effective	• It would be beneficial to have formalized agreements for the sharing of equipment and services between towns after hazardous weather events
Maintenance Programs – Bridge and Culvert Inventory	• Road Foreman	• Effective • Completed on an ongoing basis	• Continue to maintain current bridge and culvert inventory on an ongoing basis

VI. Mitigation Strategy

The most important component of every mitigation plan is the mitigation strategy. This strategy is composed of three parts: the mitigation goals, actions, and an action plan that will describe how this strategy will be implemented.

Mitigation Goals

The Town planning committee identified the following mitigation goals in 2016. During the planning process for this updated plan, the same goals were identified by the planning committee with a slight change to the third goal to add telecommunication structures (in bold) as part of the community infrastructure to be considered when creating mitigation projects. The planning team recognizes that being able to communicate during a disaster is important and is also difficult for rural areas like Sandgate to address. These goals are listed below.

1. Significantly reduce injury and loss of life resulting from natural disasters.
2. Significantly 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, **including telecommunication structures**, is not significantly affected by natural hazard events.
4. Design and implement mitigation measures so as to minimize impacts to rivers, water bodies and other natural features, historic structures, and neighborhood character.
5. Significantly reduce the economic impacts incurred by municipal, residential, industrial, agricultural, and commercial establishments due to disasters.
6. Encourage hazard mitigation planning to be incorporated into other community planning projects such as the Town Plan, Capital Improvement Plan, and the Local Emergency Management Plan.
7. Ensure that members of the general public continue to be part of the hazard mitigation planning process.

Based on the above goals and the assessment of hazards, Sandgate identified and prioritized mitigation actions which are specifically described in Table 26.

Mitigation Actions

Methodology

There are four categories of mitigation actions (Table 25) that need to be identified for the priority hazards selected and shown in Section 4 Table 8.

Table 25. Types of Mitigation Actions		
Mitigation Action Categories	**Description of Category**	**Example of Actions**
Local Plans and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	Comprehensive plans, land use ordinances, building codes, capital improvement programs, open space preservation, stormwater management, municipal plans, and master plans.
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.	Acquisitions and elevations of structures in flood prone areas, undergrounding utilities, structural retrofits, floodwalls and retaining walls, detention and retention structures, culvert and bridge upgrades.
Natural Systems Protection	These actions minimize damage and losses and also preserve or restore the functions of natural systems.	Sediment and erosion control, stream corridor restoration, forest and land management, and conservation easements.
Education and Awareness Programs	These actions inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.	Websites with information and maps, trainings and meetings, and information to residents on potential hazards in the community.

The 2016 Hazard Mitigation Plan included 54 mitigation actions. The planning team reviewed each of these actions and felt that such a large number of actions was too cumbersome to be effectively addressed by this plan and chose to carry over 18 actions and included three new actions for a deeper review. The previous actions, the status of each action, and whether the team chose to move forward with that action can be found in Appendix I. Actions for severe heat, hail, and earthquake are not included in this update since those hazards are not addressed in this plan. If an action was not carried to the 2024 plan, the reason is indicated in italics.

Table 26 lists the actions the planning team chose to address in this update and how each was evaluated based on the following criteria:

1. Life safety – Will the action be effective at protecting lives and preventing injuries?
2. Property protection – Will the action be effective at eliminating or reducing damage to structures and infrastructure?
3. Technical – Is the action a long-term, technically feasible solution?
4. Political – Is there overall public support/political will for the action?
5. Administrative – Does the community have the administrative capacity to implement the action?

6. Other community objectives – Does the action advance other community objectives, such as capital improvements, economic development, benefit a vulnerable population, improve environmental quality, or open space preservation?

Each of these criteria were ranked on a scale of -1, 0, or 1 with -1 being ineffective or not feasible, 0 being neutral, and 1 being highly effective. A Benefit Score was then calculated based on the sum of the scores given to each criterion.

Using the Benefit Score, a cost-benefit analysis was also undertaken for each mitigation action. The planning team estimated the cost of each mitigation action. A score of 1 was given for those mitigation actions with an estimated cost of less than $50,000. A score of 2 was given for those actions with an estimated cost of $50,000 to $100,000 and a score of 3 was given for those actions with an estimated cost greater than $100,000. The cost/benefit is then a comparison between the Benefit Score and the Cost Score and considering whether the costs are reasonable compared to the probable benefits.

Priority was assessed slightly independently of the cost-benefit analysis and was instead based largely on the perceived need of each action and the availability of funding.

Of the 21 actions considered by the planning team, 18 actions were chosen to be included in the plan. The other three actions show that the cost/benefit ratio was too low to pursue.

Mitigation Action Evaluation

Table 26 outlines the 21 considered actions, the evaluation of each criteria including the cost-benefit analysis. Those actions not chosen for implementation have explanations included in italics below the evaluation lines.

Table 26. Mitigation Action Evaluation

Action Category	Actions	Life Safety	Prop Protec	Tech	Political	Admin	Other Obj	Benefit Score	Est. Cost	C/B
All Hazards										
Education and Awareness	Provide a “be prepared” section of the Town website with links to information for residents	1	1	1	1	1	1	6	1	Yes

Table 26. Mitigation Action Evaluation

Action Category	Actions	Life Safety	Prop Protec	Tech	Political	Admin	Other Obj	Benefit Score	Est. Cost	C/B
Education and Awareness	Identify and develop methods to communicate with populations vulnerable to potential hazards, particularly drought, extreme temperatures and infectious diseases, but also those in need of assistance for evacuation and/or sheltering	1	1	0	1	0	1	4	1	Yes
Education and Awareness	Identify the most reliable methods of communication to be used in emergencies---for contacting the Selectboard, road crew, police, and emergency services---and communicate these methods to residents.	1	1	1	1	1	1	6	1	Yes
Hazard Type: Floods and Flash Floods										
Local Planning and Regulations	Prepare draft contract for company to provide services if debris pile up on bridges and culverts to prevent blockages and resulting flooding.	1	1	1	1	1	1	6	1	Yes
Structure and Infrastructure Projects	Road crew should regularly survey culverts for blockages including photographs and records of damages and costs and have records readily available to emergency planners after a disaster	1	1	1	1	1	1	6	1	Yes

Table 26. Mitigation Action Evaluation

Action Category	Actions	Life Safety	Prop Protec	Tech	Political	Admin	Other Obj	Benefit Score	Est. Cost	C/B
Structure and Infrastructure Projects	Identify and replace culverts and bridges that do not meet current Vermont Town Road and Bridge Standards	1	1	1	1	1	1	6	2	Yes
Structure and Infrastructure Projects	Implement corridor protection, buffer plantings, structure and berm removal and other projects listed in the 2007 Batten Kill corridor plan (Field 2007)	0	0	1	1	0	1	3	1	Yes
Natural Systems Protection	Identify opportunities to acquire lands or work with conservation organizations to acquire lands subject to frequent flooding or wetlands within or adjacent to flood prone areas to provide flood storage	0	1	0	0	-1	0	0	3	No
		The cost-benefit ratio shows that this is not worth pursuing currently.								
Local Planning and Regulation	Review bylaws to require boats, propane tanks and other items stored outdoors to be secured	1	1	-1	-1	-1	0	-1	1	No
		The cost-benefit ratio shows that this is not worth pursuing currently.								
Structure and Infrastructure Projects	Evaluate and address the causes of repeated culvert failure along West Sandgate Road in The Notch.	0	0	1	1	0	1	3	2	Yes

Table 26. Mitigation Action Evaluation										
Action Category	**Actions**	**Life Safety**	**Prop Protec**	**Tech**	**Political**	**Admin**	**Other Obj**	**Benefit Score**	**Est. Cost**	**C/B**
High Wind Event										
Structure and Infrastructure Projects	Sandgate will remove hazard trees within their road ROW and/or request removal by Green Mountain Power if also within the power line ROW. This will address the town's transportation infrastructure vulnerability by removing potential trees from falling into the road.	1	1	1	1	1	1	6	2	Yes
Winter Storm										
Local Plans and Regulations	Plan for and maintain adequate road and debris clearing capabilities. This includes capital planning and annual funding to support the facilities (garage and equipment) and the appropriate number of staff needed to maintain the transportation network in Sandgate.	1	1	1	1	1	1	6	3	Yes
Invasive Species										
Local Planning and Regulations	Survey for invasive species (specifically Japanese knotweed and bittersweet) along streams to identify potential erosion areas	0	1	1	1	1	1	5	1	Yes
Drought										
Local Planning and Regulation	Incorporate planning for droughts in the emergency management plan	0	0	1	1	1	0	3	1	Yes

Table 26. Mitigation Action Evaluation

Action Category	Actions	Life Safety	Prop Protec	Tech	Political	Admin	Other Obj	Benefit Score	Est. Cost	C/B
Extreme Cold										
Education and Awareness	Identify vulnerable community members through a survey and outreach (CARES Program)	1	0	1	1	1	1	5	1	Yes
Landslide and Debris Flow										
Structure and Infrastructure Projects	Implement visual monitoring in potential landslide areas	0	1	1	0	1	0	3	1	Yes
Structure and Infrastructure Projects	Stabilize and replant stream corridor areas subject to landslides	0	1	1	1	0	0	3	1	Yes
Infectious Disease Outbreak										
Local Planning and Regulations	Monitor disease occurrences and potential outbreaks	1	0	1	1	1	1	5	1	Yes
Wildfire										
Structure and Infrastructure Projects	Ensure adequate water supplies are available including areas identified as gaps in the 2013 Community Wildfire Protection Plan	1	1	0	1	0	0	3	1	Yes
Structure and Infrastructure Projects	Negotiate a contract with a local fire agency to ensure inspections completed on all dry hydrants throughout town and servicing as needed on an annual basis.	1	1	1	1	1	1	6	1	Yes

Table 26. Mitigation Action Evaluation										
Action Category	**Actions**	**Life Safety**	**Prop Protec**	**Tech**	**Political**	**Admin**	**Other Obj**	**Benefit Score**	**Est. Cost**	**C/B**
Natural Systems Protection	Implement fuel reduction, particularly in grass fields	1	1	-1	0	-1	1	1	1	No
		This action would need to be implemented by individuals as most fields are privately owned. The cost-benefit ratio also shows that this is not worth pursuing currently.								
Hazardous Material Spill										
Structure and Infrastructure Projects	Work with VT AOT to identify and mitigate high accident locations	1	0	1	1	1	0	4	1	Yes

Mitigation Action Plan

The Mitigation Action Plan (Table 27) provides a summary of each mitigation action recommended for implementation, the parties responsible for carrying out the action, the timeframe to implement, and possible funding sources.

Table 27. Mitigation Action Plan							
	Hazard	**Action Category**	**Action**	**Responsible Party***	**Time Frame**	**Funding Source**	**Priority**
1	All Hazards	Education and Awareness	Provide a "be prepared" section of the Town website with links to information for residents	Select Board	2025 to 2026	Town General Fund	High
2	All Hazards	Education and Awareness	Identify and develop methods to communicate with populations vulnerable to potential hazards, particularly drought, extreme temperatures and infectious diseases, but also those in need of assistance for evacuation and/or sheltering	Town Select Board; Sandgate Community Table	2025 to 2026	Town General Fund;	High

* If there are multiple parties listed, the primary party responsible for the action is listed first.

Table 27. Mitigation Action Plan							
	Hazard	**Action Category**	**Action**	**Responsible Party***	**Time Frame**	**Funding Source**	**Priority**
3	All Hazards	Education and Awareness	Identify the most reliable methods of communication to be used in emergencies---for contacting the Selectboard, road crew, police, and emergency services---and communicate these methods to residents.	Town Select Board	2025	Town General Fund	High
4	Floods and flash floods	Local Planning and Regulations	Prepare draft contract for company to provide services if debris pile up on bridges and culverts to prevent blockages and resulting flooding.	Town Select Board; Town Clerk	2025	Town General Fund	High
5	Floods and flash floods	Structure and Infrastructure Projects	Road crew should regularly survey culverts for blockages including photographs and records of damages and costs and have records readily available to emergency planners after a disaster	Town Highway Department	Ongoing after severe weather events	Town Highway Fund	High
6	Floods and flash floods	Structure and infrastructure projects	Identify and replace culverts and bridges that do not meet current Vermont Town Road and Bridge Standards	Town Highway Department	Ongoing on an as needed basis	Town Highway Fund; State of Vermont AOT; FEMA HMGP; PDM; FMA; Better Roads Grant	Med
7	Floods and flash floods	Structure and infrastructure protection	Implement corridor protection, buffer plantings, structure and berm removal and other projects listed in the 2007 Batten Kill corridor plan (Field 2007)	Town Select Board; Batten Kill Watershed Alliance	Ongoing	FEMA HMGP; FMA; PDM; Vermont Watershed Gant; Vermont Ecosystem Restoration Program	Med
8	Floods and flash floods	Structure and Infrastructure Projects	Evaluate and address the causes of repeated culvert failure along West Sandgate Road in The Notch.	Town Highway Department; Select Board	2025 Spring Season	Town Highway Fund; FEMA HMGP	Med

Table 27. Mitigation Action Plan							
	Hazard	**Action Category**	**Action**	**Responsible Party***	**Time Frame**	**Funding Source**	**Priority**
9	Extreme Cold	Education and Awareness	Identify vulnerable community members through a survey and outreach (CARES Program)	Town Emergency Management Director; Sandgate Community Table	Ongoing	Town General Fund; Volunteer hours	Med
10	Drought	Local Planning and Regulation	Incorporate planning for droughts in the emergency management plan	Town Emergency Management Director; Select Board	Annually	Town General Fund	Low
11	Wildfire	Structure and Infrastructure Projects	Ensure adequate water supplies are available including areas identified as gaps in the 2013 Community Wildfire Protection Plan	Town Select Board; Emergency Management Director; Arlington Fire Department	Spring 2025	Town General Fund; Rural Fire Protection Grant Program	Med
12	Wildfire	Structure and Infrastructure Projects	Negotiate a contract with a local fire agency to ensure inspections completed on all dry hydrants throughout town and servicing as needed on an annual basis.	Select Board	Fall 2024	Town General Fund	High
13	Landslide and debris flow	Structure and Infrastructure Projects	Implement visual monitoring in potential landslide areas	Sandgate Conservation Commission	Ongoing	Town General Fund	Low
14	Landslide and debris flow	Structure and Infrastructure Projects	Stabilize and replant stream corridor areas subject to landslides	Sandgate Conservation Commission; Bennington County Conservation District	Annually	Town General Fund; Bennington County Conservation District	Low
15	Hazardous materials spill	Structure and Infrastructure Projects	Work with VT AOT to identify and mitigate high accident locations	VT AOT; Town Highway Department	Spring 2025	VT AOT Funding	Med
16	Infectious Disease Outbreak	Local Planning and Regulations	Monitor disease occurrences and potential outbreaks	Town Health Officer; Vermont Department of Health	Ongoing process	Town General fund, VDH funding	Med

Table 27. Mitigation Action Plan							
	Hazard	**Action Category**	**Action**	**Responsible Party***	**Time Frame**	**Funding Source**	**Priority**
17	Invasive species	Local Planning and Regulations	Survey for invasive species (e.g., Japanese knotweed and Bittersweet) along streams to identify potential erosion areas	CISMA; Agency of Natural Resources	Spring 2025 and ongoing	CISMA funding; ANR funding	Med
18	Winter Storm	Local Plans and Regulations	Plan for and maintain adequate road and debris clearing capabilities. This includes capital planning and annual funding to support the facilities (garage and equipment) and the appropriate number of staff needed to maintain the transportation network in Sandgate.	Select Board, Highway Department	Annually during the creation of the annual Town budget	Town General Fund; Town Highway Fund	High
19	High wind event	Structure and Infrastructure	Sandgate will remove hazard trees within their road ROW and/or request removal by Green Mountain Power if also within the power line ROW.	Town Highway Department; Green Mountain Power	Spring 2025 and ongoing	Town General Fund; Town Highway Fund; GMP Funding	High

Bringing the Plan to Life: Implementation and Maintenance

Annual Monitoring and Plan Evaluation

This hazard mitigation plan will remain available on the Bennington County Regional Commission (BCRC) website under the tab for Sandgate. This will make the plan accessible to all officials and the public.

The town will incorporate the mitigation actions outlined in this plan into the town plan in the next update process in 2030. The town plan update process will be led by the Planning Commission, who will review this plan and determine those mitigation actions and goals that should be included in the town plan. The proposed mitigation actions will also be included in the town budget in its development on Town Meeting Day.

The Select Board Members and the Emergency Management Director (EMD) are responsible for the annual monitoring of this plan. This process will take place during the first Select Board meeting in December. This will allow the Select Board time to

review and incorporate any mitigation actions into the annual town budget. Monitoring will take place in the following steps:

1. The Select Board and EMD will review the effectiveness of the Plan in meeting its stated mitigation goals.
2. The Select Board and EMD will monitor the mitigation action progress by reviewing which actions have been completed, are in progress, are scheduled, or there has been no progress
3. The Select Board will solicit input from local stakeholders regarding the effectiveness of plan implementation. This may be completed via a public meeting, a survey, or workshops.
4. The Select Board will then review the collected information and decide whether or not the goals and/or actions within the Plan need to be modified.
5. A report will be generated and shared with the public which outlines the results of the annual monitoring process.

If requested, the Bennington County Regional Commission will provide advice and assistance on the plan evaluation.

Updating the Plan

This hazard mitigation plan is valid for 5 years from the date of approval by FEMA. No later than two and a half years prior to the expiration of this plan, the Trustees and the planning team will work with Vermont Emergency Management to apply for grant funding to update this plan. No later than eighteen months prior to this plan expiring, the Trustees and planning team will initiate a review of the plan by:

1. Updating the descriptions and analyses of events using new information since completion of the 2023 draft.
2. Identification of any new buildings or infrastructure or changes in critical facilities.
3. Estimation of potential probability and extent of hazards based on any new information since completion of the 2025 plan.
4. Review of completed hazard mitigation projects.
5. Identification of new projects and actions given the revised hazard evaluation.
6. Review of any changes in priorities since adoption of the 2025 plan.
7. Revision of the assessment of risks and vulnerability from identified hazards.
8. Development and use of criteria to assess the potential benefits and costs of identified actions for use in prioritizing those actions.
9. Integration of the updated plan into the Sandgate Town Plan and other plans and programs.

The planning team and the Town Trustees will update the Hazard Mitigation Plan or hire a consultant to complete the plan update. The planning team will hold open meetings to solicit opinions and to identify issues and concerns from members of the public and stakeholders, collect feedback via a survey sent to residents and other stakeholders, and collect comments during public meetings on the suggested mitigation actions. The

draft plan will be made available to the public, sent to the State Hazard Mitigation Officer (SHMO), and sent to neighboring towns and organizations for review and input. The revised plan will be submitted for review by the SHMO a second time. Once all questions and comments have been addressed, the SHMO will send the plan to FEMA. Following approval by FEMA, the Town Trustees will adopt the completed plan.

Should a declared disaster occur, Sandgate 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 the findings of any other studies completed, such as the Stormwater Master Plan, culvert and bridge studies, river corridor plans, and other studies.

The 2016 Hazard Mitigation plan was incorporated into the 2022 Town Plan and was used to inform the town budget in order to complete the necessary upgrades to existing infrastructure in Sandgate such as culverts and roads.

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Appendix I.

Table 28. 2016 Mitigation Actions

Hazard	Type	Actions	Responsible Parties	Time Frame	Funding Source(s)	Priority	Status
All Hazards	Education and Outreach	Provide a "Be Prepared" section of the Town website with links to information for residents	Town Select Board	2016 to 2017	Town general fund	High	Carried to 2025 plan
	Local Planning and Regulations	Encourage proper construction techniques and use of appropriate materials to address hazards, particularly flooding, winter storms, wind events, earthquakes, landslides and wildfire	Town Planning Commission; Zoning Administrator	2016 to 2017	Town general fund	High	Removed
			This action has been included in the new bylaws adopted in 2024 and bridge and road standards.				
	Education and Awareness	Identify and develop methods to communicate with populations vulnerable to potential hazards, particularly drought, extreme temperatures and infectious diseases, but also those in need of assistance for evacuation and/or sheltering	Town Emergency Management Director	2016 to 2018	Town general fund	High	Carried to 2025 plan
	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	2016 to 2018	Town general fund	High	Removed
			Existing driveways have been grandfathered in. Any new driveways being built are covered by by-laws & road access permits.				
Floods and Flash Floods	Education and Awareness	Educate owners on importance of securing propane tanks and other items that could float or blow away in storms	Town Zoning Administrator	2016 to 2018	Town general fund	Medium	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				
	Local Planning and Regulations	Adopt and enforce updated flood hazard and fluvial erosion hazard zone bylaws	Town Planning Commission; Zoning Administrator	2016 to 2017	Town general fund	High	Completed
			2024 bylaws include updated flood hazard and fluvial erosion hazard zone bylaws.				
	Local Planning and Regulations	Participate in the Community Rating System to help reduce flood insurance premiums	Town Select Board	2016 to 2018	Town general fund	High	Removed

Table 28. 2016 Mitigation Actions							
Hazard	**Type**	**Actions**	**Responsible Parties**	**Time Frame**	**Funding Source(s)**	**Priority**	**Status**
Floods and Flash Floods			*The planning team feels that this is not administratively feasible for the town at this time.*				
	Local Planning and Regulations	Encourage appropriate stormwater and erosion control measures in new developments	Town Planning Commission	2016 to 2021	Town general fund	High	Completed
			Subdivision regulations are part of the 2024 bylaws.				
	Local Planning and Regulations	Prepare draft contract for company to provide services if debris pile up bridges and culverts to prevent blockages and resulting flooding.	Town Select Board; Town Road Foreman	2016 to 2017	Town highway fund	High	Carried to 2025 plan
	Structure and Infrastructure Projects	Road crew should regularly survey culverts for blockages including photographs and records of damages and costs	Town Road Foreman	2016 to 2021	Town highway fund	High	Carried to 2025 plan
	Structure and Infrastructure Projects	Adopt the 2013 and updates to the Vermont Town Road and Bridge Standards	Town Select Board	2016 to 2017 and as updated	Town general fund	High	Completed
			Sandgate adopted the 2013 and updates to the Vermont Town Road and Bridge Standards on August 7, 2023.				
	Structure and infrastructure projects	Identify and replace culverts and bridges that do not meet current Vermont Town Road and Bridge Standards	Town Road Foreman	2016 to 2021	Town highway fund State of Vermont AOT FEMA HMGP, PDM, FMA, Better Roads	High	Carried to 2025 plan
	Structure and infrastructure protection	Encourage property owners in flood or fluvial erosion hazard zones to consider selling their properties (buy out) or implementing flood proofing including elevating structures	Town Select Board	2016 to 2021	FEMA HMGP, PDM, FMA	High	Removed
			The planning team felt that this was not realistic, and no structures have been repeatedly damaged.				

Table 28. 2016 Mitigation Actions							
Hazard	**Type**	**Actions**	**Responsible Parties**	**Time Frame**	**Funding Source(s)**	**Priority**	**Status**
Floods and Flash Floods	Structure and infrastructure protection	Implement corridor protection, buffer plantings, structure and berm removal and other projects listed in the 2007 Batten Kill corridor plan (Field 2007)	Town Select Board; Batten Kill Watershed Alliance	2016 to 2021	FEMA HMGP, FMA, PDM Vermont Ecosystem Restoration Program, Vermont Watershed Grant	Medium to High	Carried to 2025 plan
	Natural Systems Protection	Acquire lands or work with conservation organizations to acquire lands subject to frequent flooding or wetlands within or adjacent to flood prone areas to provide flood storage	Town Select Board; Batten Kill Watershed Alliance: Vermont Land Trust	2016 to 2021	State of Vermont Watershed Grants, Vermont Ecosystem Restoration Program, Nonprofit organizations	Medium	Carried to 2025 plan
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	2016 to 2017	Town general fund	High	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				
	Education and Awareness	Provide materials for residents on methods to protect property from wind events	Town Emergency Management Director; Zoning Administrator	2016 to 2017	Town general fund FEMA HMGP, PDM, FMA	High	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				
	Local Planning and Regulations	Develop agreements with adjacent towns for sharing of highway equipment	Town Select Board; Town Road Foreman	2016 to 2017	Town general fund	High	Removed

Table 28. 2016 Mitigation Actions							
Hazard	**Type**	**Actions**	**Responsible Parties**	**Time Frame**	**Funding Source(s)**	**Priority**	**Status**
			Informal agreements are already in place between Sandgate and Arlington and Sandgate and Rupert.				
	Structure and Infrastructure Projects	Place utilities underground for critical facilities	Town Select Board	2016 to 2018	FEMA HMGP, PDM, FMA	Medium	Removed
			The planning team felt this was not feasible as most areas are solid rock making the burying of lines extremely difficult.				
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	2016 to 2017	Town general fund	High	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				
	Local Planning and Regulation	Require boats, propane tanks and other items stored outdoors to be secured	Town Planning Commission; Zoning Administrator	2016 to 2018	Town general fund	High	Carried to 2025 plan
	Local Planning and Regulation	Encourage appropriate plantings to avoid future damage from downed trees	Town Emergency Management Director	2016 to 2017	Town general fund	Medium	Removed
			The planning team chose not to go forward with this action as local planning and regulations do not address this.				
	Local Planning and Regulation	Encourage protection and planting of wind breaks in new developments	Town Emergency Management Director; Zoning Administrator	2016 to 2018	Town general fund	Medium	Removed
			This action has not be carried forward as the planning team felt it was not needed due to the lack of building on high terrain.				
	Structure and Infrastructure Projects	Retrofit existing buildings to withstand high winds including protection of power lines and other utilities	Town Select Board Private Owners	2016 to 2018	FEMA HMGP, PDM	Medium	Removed
			It is not feasible to require personal property to be retrofitted.				
		Place utilities underground for critical facilities	Town Select Board; Private Owners	2016 to 2018	FEMA HMGP, PDM	Medium	Removed

Table 28. 2016 Mitigation Actions							
Hazard	**Type**	**Actions**	**Responsible Parties**	**Time Frame**	**Funding Source(s)**	**Priority**	**Status**
	Structure and Infrastructure Projects		*The town hall now has a generator so the team felt there was no need to bury utility lines.*				
Hail	Structure and Infrastructure Projects	Retrofit existing buildings to minimize hail damage	Town Select Board; Private Owners	2017 to 2019	FEMA HMGP, PDM	Low to Medium	Removed
			Hail was not a hazard that was chosen to be addressed in this update.				
Temperature extremes	Education and Awareness	Identify vulnerable community members through a survey and outreach	Town Emergency Management Director	2016 to 2017	Town general fund FEMA HMGP, PDM	High	Carried to 2025 plan*
			**This action has been listed under the hazard "Extreme Cold" in the 2025 update.*				
	Local Planning and Regulation	Develop cooperative agreement with all surrounding towns for the sheltering of vulnerable populations	Town Select Board; Emergency Management Director	2016 to 2017	Town general fund	High	Completed
			This action has been completed. Sandgate has a sheltering agreement with the Arlington Memorial High School shelter. See the 2024 LEMP				
Drought	Local Planning and Regulation	Monitor drought conditions	Town Emergency Management Director	2016 to 2021	Town general fund	High	Removed
			The planning team felt that this was beyond the towns capacity at this time and have removed it from this 2025 update.				
	Education and Awareness	Provide educational materials on dealing with drought	Town Emergency Management Director	2016 to 2018	Town general fund FEMA HMGP, PDM	Medium	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				
	Natural System Protection	Develop improved assessment of groundwater sources and amend bylaws to assure their protection	Vermont Geological Survey Town Planning Commission	2016 to 2019	FEMA HMGP, PDM State of VT	Medium	Removed

Table 28. 2016 Mitigation Actions

Hazard	Type	Actions	Responsible Parties	Time Frame	Funding Source(s)	Priority	Status
			The planning team chose not to move forward with this action as the town does not maintain any public water supplies.				
	Local Planning and Regulation	Incorporate planning for droughts in the emergency management plan	Town Emergency Management Director	2016 to 2018	Town general fund	High	Carried to 2025 plan
Wildfire	Education and Outreach	Acquire materials from Firewise for homeowners and provide to Sandgate to make available for landowners	BCRC	2016 to 2017	BCRC	High	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				
	Education and Outreach	Provide information on outdoor burning safety prior to the spring and fall fire seasons	Fire wardens	2016 to 2021	Fire wardens	High	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				
	Education and Outreach	Provide a review of properties where owners request assessment of their properties for wildfire safety and adequate defensible space	BCRC, Arlington Fire Department	2016 to 2021	BCRC, Arlington FD	Medium	Removed
			This review is not feasible for the town or BCRC to conduct and would be too expensive to contract out.				
	Education and Outreach	Encourage owners to maintain defensible space around structures and to mow fields along road edges to prevent wildfire	Town Emergency Management Director; Arlington Fire Department	2016 to 2021	Town general fund	High	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				
	Local Planning and Regulations	Encourage defensible space around structures	Town Planning Commission	2016 to 2021	Town general fund	High	Removed
			The planning team felt this was not something they could regulate and therefore chose not to include it in this update.				

Table 28. 2016 Mitigation Actions							
Hazard	**Type**	**Actions**	**Responsible Parties**	**Time Frame**	**Funding Source(s)**	**Priority**	**Status**
	Structure and Infrastructure Projects	Assure adequate water supplies are available including areas identified as gaps in the 2013 Community Wildfire Protection Plan	Town Select Board; Emergency Management Director, Arlington Fire Department	2016 to 2021	Town general fund /State of Vermont grants for dry hydrants/ Vermont Department of Parks, Forestry and Recreation	High	Carried to 2025 plan
	Natural Systems Protection	Implement fuel reduction, particularly in grass fields	Arlington Fire Department/Green Mountain National Forest	2016 to 2021	Arlington FD/Green Mountain NF	Medium	Carried to 2025 plan
Landslide and debris flow	Local Planning and Regulations	Map known landslides and identify potential landslide areas	Town/BCRC/State of Vermont	2016 to 2017	FEMA HMGP, PDM	High	Removed
			It is not feasible for the town to maintain consistent mapping due to low staffing capacity.				
	Local Planning and Regulations	Adopt fluvial erosion hazard bylaws	Town Select Board; Town Planning Commission	2016 to 2017	Town general fund	High	Completed
			Fluvial erosion hazard bylaws are included in the 2024 bylaws.				
	Structure and Infrastructure Projects	Implement visual monitoring in potential landslide areas	Town Emergency Management Director	2016 to 2017	Town general fund	High	Carried to 2025 plan
	Structure and Infrastructure Projects	Stabilize and replant stream corridor areas subject to landslides	Batten Kill Alliance	2016 to 2021	State of VT Watershed grants	High	Carried to 2025 plan
Earthquake	Education and Awareness	Educate property owners on proper construction techniques to reduce potential damage from earthquakes	Town Zoning Administrator	2016 to 2017	Town general fund	Medium	Removed
			Earthquake was a hazard that was not chosen to be addressed in this update.				
	Local Planning and Regulation	Complete an assessment of hazardous materials and potential accident locations	LEPC 7	24-48 months	Town general fund	Medium	Removed

Table 28. 2016 Mitigation Actions							
Hazard	**Type**	**Actions**	**Responsible Parties**	**Time Frame**	**Funding Source(s)**	**Priority**	**Status**
Hazardous materials spill			*The planning team felt that the municipality did not have the capacity at this time to assist in this process.*				
	Structure and Infrastructure Projects	Work with VT AOT to identify and mitigate high accident intersections	VT AOT	2016 to 2018	State AOT funds	Medium	Carried to 2025 plan
	Natural Systems Protection	Identify groundwater source areas and develop ordinances to protect those areas	Vermont Geological Survey	2016 to 2018	VT Geological Survey funds	Medium to High	Removed
			The planning team does not believe that they have the capacity at this time to move forward with this action.				
Infectious disease outbreak	Local Planning and Regulations	Monitor disease occurrences and potential outbreaks	Town Health Officer	2016 to 2021	Town general fund	High	Carried to 2025 plan
	Education and Outreach	Provide educational materials in printed form and on the town web site on potential infectious diseases	Town Health Officer	2016 to 2018	Town general fund /State of Vermont Health Department	High	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				
Invasive species	Local Planning and Regulations	Monitor extent of invasive species, particularly forest invasive species such as Emerald Ash Borer	Town Select Board	2016 to 2021	Town general fund	High	Removed
			The planning team does not believe that the town has the capacity to carry out this action.				
	Local Planning and Regulations	Complete surveys for ash trees vulnerable to Emerald Ash Borer	BCRC; Bennington County Conservation District	2016 to 2018	FEMA HMGP, PDM VT Department of Forests, Parks and Recreation	Medium	Removed
			The planning team does not believe that the town has the capacity to carry out this action.				

Table 28. 2016 Mitigation Actions							
Hazard	**Type**	**Actions**	**Responsible Parties**	**Time Frame**	**Funding Source(s)**	**Priority**	**Status**
	Local Planning and Regulations	Survey for invasive species (e.g., Japanese knotweed as well as bittersweet) along streams to identify potential erosion areas	Batten Kill Watershed Alliance	2016 to 2018	State of Vermont Department of Parks, Forestry and Recreation	Medium	Carried to 2025 plan
	Local Planning and Regulations	Encourage use of native species in plantings for commercial and residential development	Town Planning Commission	2016 to 2021	Town general fund	Medium	Removed
			The planning team indicated that there is no precedent in planning and regulations to regulate the growth of plants.				
	Education and Awareness	Provide outreach materials for landowners on using native plants and controlling invasive species	Bennington County Conservation District	2016 to 2017	Town general fund /State of Vermont Department of Parks, Forestry and Recreation	High	Removed
			Incorporated into the first mitigation action to create a "Be Prepared" section on the town website.				

Appendix II.

Certificate of Adoption
Town of Sandgate
Select Board

A Resolution of the Town of Sandgate Adopting the Town of Sandgate Hazard Mitigation Plan dated April 21, 2025.

WHEREAS the Select Board recognizes the threat that natural hazards pose to people and property within the Town of Sandgate; and

WHEREAS the Town of Sandgate has prepared a multi-hazard mitigation plan, hereby known as the Town of Sandgate Hazard Mitigation plan dated **April 21, 2025** in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS the Town of Sandgate Hazard Mitigation plan dated **April 21, 2025** identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the Town of Sandgate from the impacts of future hazards and disasters; and

WHEREAS adoption by the Town of Sandgate demonstrates its commitment to hazard mitigation and achieving the goals outlined in the Town of Sandgate Hazard Mitigation plan dated **April 21, 2025**.

NOW THEREFORE, BE IT RESOLVED BY THE TOWN OF SANDGATE, VT, THAT:

Section 1. The Sandgate Select Board adopts the Town of Sandgate Hazard Mitigation Plan dated **April 21, 2025**. While content related to the Town of Sandgate may require revisions to meet the plan approval requirements, changes occurring after adoption will not require the Town of Sandgate to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

ADOPTED by a vote of 3 in favor and 0 against, and ____ abstaining, this 21st day of April, 2025.

By: Joseph Nolan
JOSEPH NOLAN (print name)

ATTEST:

By: John Pheips
John Pheips (print name)

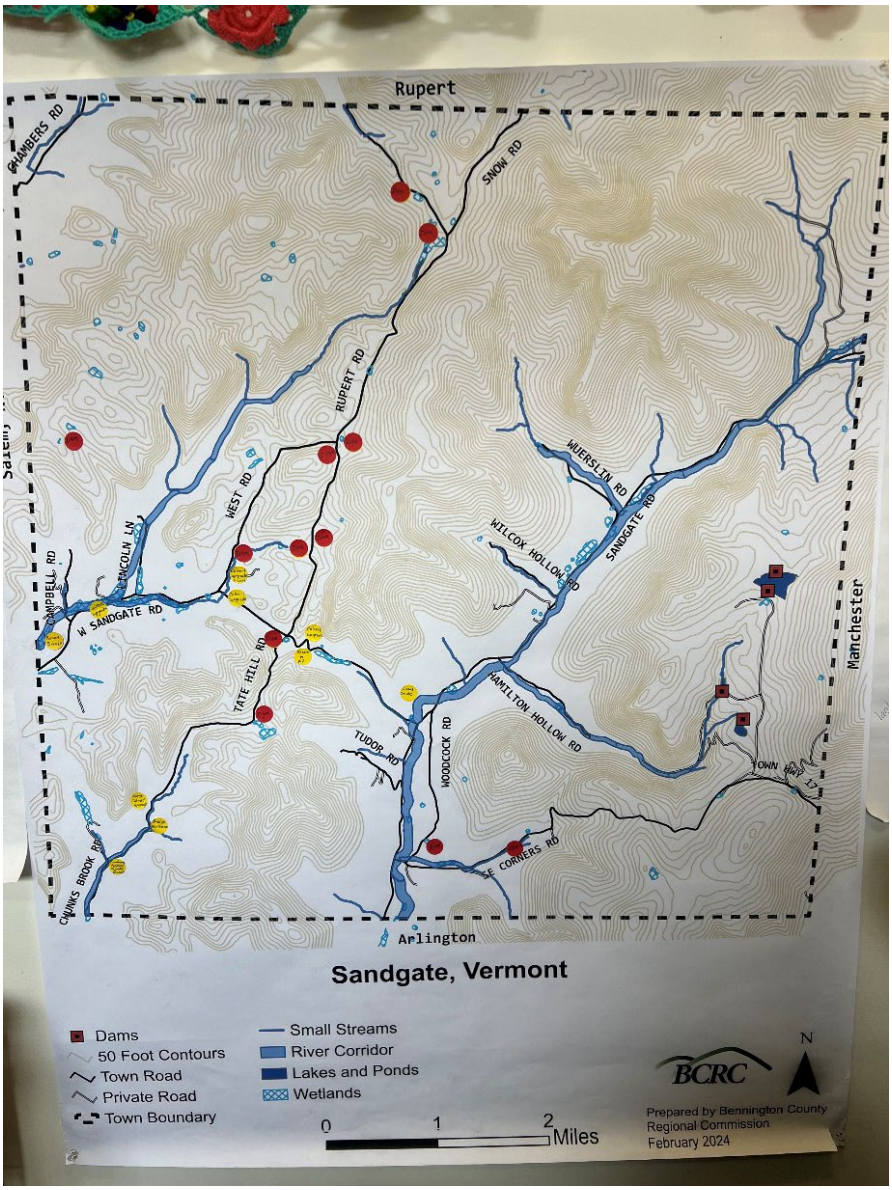
APPROVED AS TO FORM:

By: Dara Fink
Dara Fink (print name)

Appendix III.

Map and ranking tool used at the Community Outreach Meeting on February 26, 2024 and remained on display for public responses until the March 8, 2024 so those who were coming to Town Meeting were also able to participate.

The map of the town of Sandgate was posted for community members to make notes on regarding areas of concern for the attendees. It was marked with red dots indicating small dams that were not marked on the original map. The yellow dots are indicative of other areas of vulnerability within the town that include culverts that may need to be upgraded, bridges that may need to be addressed and areas of poison parsnip that concern residents.

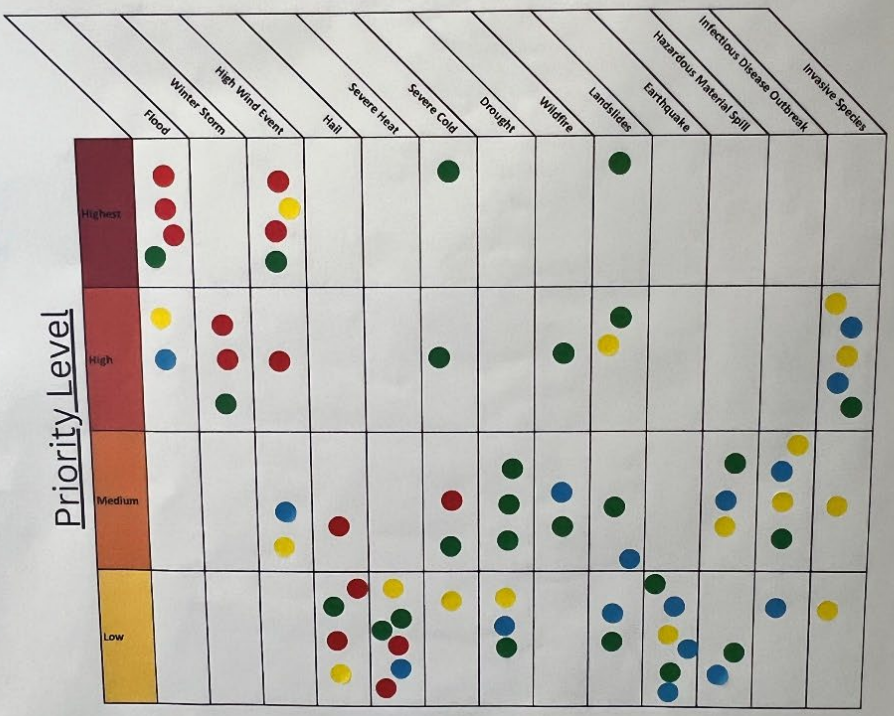


This Potential Hazard Chart allowed community members to rank each hazard from highest priority to lowest priority. This information was taken into consideration when evaluating each hazard that was to be included in the plan and also the prioritization of each action.

What Natural Hazards Should Sandgate Plan For?

Add a sticker for one or more hazards to share your opinion!

Potential Hazards



What other hazards should we plan for?

Take our survey at: www.sandgatevermont.org or scan:

For more information or to get involved, contact Dara Zink at dzink@bcrcvt.org