

Town of Tunbridge, Vermont Local Hazard Mitigation Plan

Prepared by the Two Rivers-Ottawquechee Regional
Commission and the Town of Tunbridge

Date of Town Adoption: 8/25/2026

Date of Final Approval by FEMA: 9/1/2026

Tunbridge Local Hazard Mitigation Plan (LHMP) Adoption Resolution

CERTIFICATE OF ADOPTION

8/25/2026

Town of Tunbridge, Vermont Selectboard

A RESOLUTION ADOPTING THE TOWN OF TUNBRIDGE, VERMONT LOCAL HAZARD MITIGATION PLAN

WHEREAS the Town of Tunbridge Selectboard recognizes the threat that natural hazards pose to people and property within Tunbridge; and

WHEREAS the Town of Tunbridge has worked with a consultant to prepare a multi-hazard mitigation plan, hereby known as the Town of Tunbridge, Vermont Local Hazard Mitigation Plan, 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 Tunbridge, Vermont Local Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Tunbridge from the impacts of future hazards and disasters; and

WHEREAS adoption by the Tunbridge Selectboard demonstrates its commitment to hazard mitigation and achieving the goals outlined in the Town of Tunbridge, Vermont Local Hazard Mitigation Plan.

NOW THEREFORE, BE RESOLVED BY THE TUNBRIDGE, VERMONT SELECTBOARD, THAT:

Section 1. In accordance with (local rule for adopting resolutions), the Town of Tunbridge Selectboard adopts the Town of Tunbridge, Vermont Local Hazard Mitigation Plan. While content may require revisions to meet the plan approval requirements, changes occurring after adoption will not require Town of Tunbridge Selectboard 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 0 abstaining, this 25th day of Aug., 2026.

By: Selectboard

ATTEST: By: Isaac McLean



FEMA

September 1, 2026

Caroline Paske, Hazard Mitigation Supervisor
Vermont Emergency Management
45 State Drive
Waterbury, Vermont 05671-1300

Dear Caroline Paske:

As outlined in the FEMA-State Agreements for FEMA-4744-DR-VT, FEMA-4720-DR-VT, FEMA-4695-DR-VT, FEMA-4621-DR-VT, FEMA-4532-DR-VT, and FEMA-4474-DR-VT, your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. Our Agency has been notified that your office completed its review of the *Town of Tunbridge, Vermont Local Hazard Mitigation Plan* effective **September 1, 2026** through **August 31, 2031** in accordance with the planning requirements of the Robert T. Stafford Relief and Emergency Assistance Act (Stafford Act), as amended; the National Flood Insurance Act of 1968, as amended; the National Dam Safety Program Act, as amended; and Title 44 Code of Federal Regulations (CFR) Part 201.

Mitigation plans may include additional content to meet Element H: Additional State Requirements or content the local government included beyond applicable FEMA mitigation planning requirements. FEMA approval does not include the review or approval of content that exceeds these applicable FEMA mitigation planning requirements.

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

The plan must be updated and resubmitted to the FEMA Region 1 Mitigation Division for approval every five years to remain eligible for FEMA mitigation grant funding.

Caroline Paske, Hazard Mitigation Supervisor
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Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing disaster losses. Should you have any questions, please contact Alexis Meehan at (202) 394-6439 or alexis.meehan@fema.dhs.gov.

Sincerely,

CHRISTOPHER J MARKESICH

Digitally signed by CHRISTOPHER J MARKESICH
Date: 2026.09.01 14:31:31 -04'00'

Christopher Markesich
Floodplain Management and Insurance Branch Chief
Mitigation Division | DHS, FEMA Region 1

cc: Ella Ferguson, State Hazard Mitigation Planner, VEM
Richard Verville, Mitigation Division Director, DHS, FEMA Region 1
Alexis Meehan, Community Planner, DHS, FEMA Region 1

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I. Introduction

Natural and human-caused hazards may affect a community at any time. They are not usually avoidable; however, their impact on human life and property can be reduced through community planning. Accordingly, this Local Hazard Mitigation Plan (hereafter referred to simply as the Plan or LHMP) seeks to provide an all-hazards mitigation strategy that will make the community of Tunbridge more disaster resilient.

“Mitigation” is defined as any sustained action that reduces or eliminates long-term risk to people and property from natural and human-caused hazards and their effects. Previous Federal Emergency Management Agency (FEMA), State and Regional Project Impact efforts have demonstrated that it is less expensive to anticipate disasters than to repeatedly ignore a threat until the damage has already been done. While hazards cannot be eliminated entirely, it is possible to identify prospective hazards, anticipate which might be the most severe, and recognize local actions that can be taken ahead-of-time to reduce the damage. These actions, also known as ‘hazard mitigation strategies’ can (1) avert the hazards through redirecting impacts by means of a structure, land treatment, or land use pattern change, (2) adapt to the hazard by modifying structures or standards or, (3) avoid the hazard through improved public education, relocation/removal of buildings in the flood zone, or ensuring development is disaster resistant.

The Four Phases of Emergency Management

Mitigation planning is only one of four phases of emergency management. Preparedness, response, and recovery are the other phases of the cycle. At any one time, a community may be in more than one phase of emergency management. It is important to distinguish between these four phases, especially between mitigation and preparedness. Mitigation is often confused with preparedness, and vice versa. Below are descriptions of each of the four phases of emergency management:

- **Mitigation:** preventing future emergencies or minimizing their effects
 - Includes any activities that prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies.
 - Preventing development in a flood prone area is hazard mitigation.
 - Mitigation activities take place before and after emergencies.
- **Preparedness:** preparing to handle an emergency
 - Includes plans or preparations made to save lives and to help response and rescue operations.
 - Training and proper equipment are preparation
 - Evacuation plans and stocking food and water are both examples of preparedness.
 - Preparedness activities take place before an emergency occurs.



- **Response:** responding safely to an emergency
 - Includes actions taken to save lives and prevent further property damage in an emergency. Response is putting your preparedness plans into action.
 - Rescuing people from flooding or putting out a fire are both response activities.
 - Response activities take place during an emergency.
- **Recovery:** recovering from an emergency
 - Includes actions taken to return to a normal situation following an emergency, preferably incorporating mitigation actions to make future hazards less impactful.
 - Recovery includes getting financial assistance to help pay for the repairs.
 - Rebuilding damaged roads or providing loans to businesses are both recovery activities.
 - Recovery activities take place after an emergency.

Purpose of the Plan

The purpose of this Plan is to assist Tunbridge in identifying all hazards facing the town, ranking them according to local vulnerabilities, and identifying strategies to reduce risks from vulnerabilities of highest concern. Implementation of this plan will make our community more resistant to harm and damages in the future, and it will reduce public costs.

The Town of Tunbridge's Plan seeks to be in accordance with the strategies, goals, and objectives of the State Hazard Mitigation Plan, last updated in 2023.

Benefits of hazard mitigation planning include:

- increased public awareness and understanding of natural and manmade hazards, associated risks and community vulnerabilities,
- reduced physical, financial and emotional losses caused by disasters,
- improved understanding of potential risks and possible risk reduction measures associated with future development,
- increased community and voter support for specific actions the town may take to reduce future losses,
- strengthened partnerships and lines of communication among diverse interests, including opportunities to leverage and share resources, and
- community eligibility for federal hazard mitigation grants and aid prior to and following federally-declared disasters.

This plan reflects local priorities for hazard mitigation, as determined from the planning process, and currently available federal, state and local information. Action items are included to monitor the success or effectiveness of implementation and results, to inform the next update of the plan.

Tunbridge's first hazard mitigation plan was a town-specific 2011 Annex in the Regional Pre-Disaster Mitigation Plan. The 2015 Tunbridge Local Hazard Mitigation Plan was the first stand-alone mitigation plan drafted for the town. The 2021 Plan expanded upon the 2015 plan by analyzing new hazards, adding new and relevant data, and creating new mitigation actions for the Town to follow over the next five years.

The 2026 Tunbridge Local Hazard Mitigation Plan is the latest single jurisdiction mitigation plan drafted for the Town. This new Plan has been updated to reflect changes in vulnerability to natural hazards over the past five years.

Old assumptions have been challenged throughout, and new information has been added to make the plan stronger and more useful for the Tunbridge town officials and residents who will implement the hazard mitigation strategies in the future.

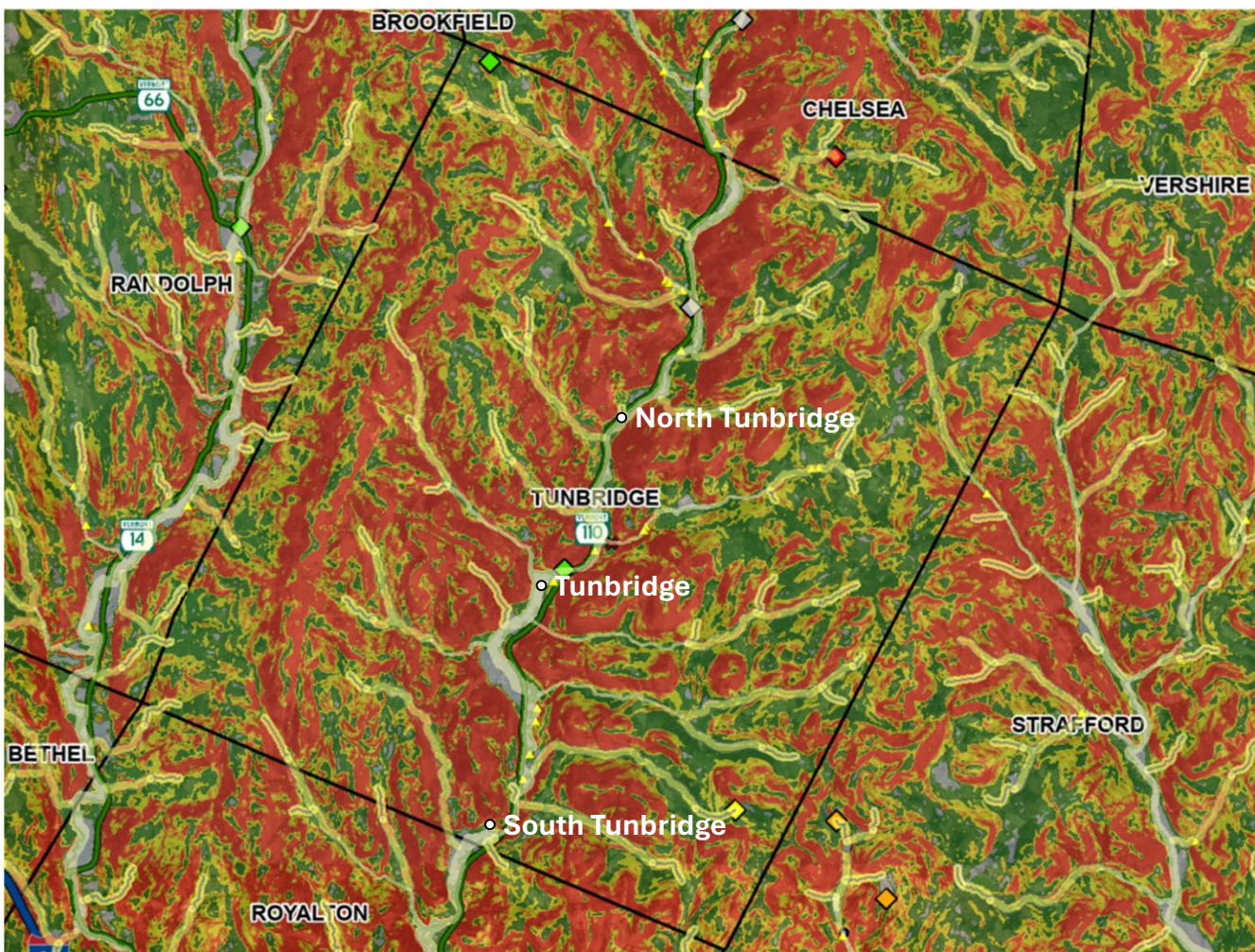
II. Community Profile

Topography and Hydrography

The Town of Tunbridge, consisting of approximately 45 square miles (28,665 acres), is situated on the First Branch of the White River in Orange County, Vermont. Neighboring towns include Randolph, Chelsea, Strafford, Royalton, and Bethel. The town's highest peak, at 2,120 feet, is Brocklebank Hill near Chelsea. Other high points include Old Hurricane Hill (1,920 feet) at the northern end of the ridge running along the town's western border, and East Hill (1,544 feet) just east of Tunbridge Village.

Vulnerabilities

The First Branch drops 200 feet as it flows south through town, from an elevation of 700 feet at the northern border, to a low of 500 feet where it crosses the southern town line. Many slopes along Tunbridge's river corridors (highlighted in yellow) are steeper than 25% (shaded red). These areas can be prone to landslides (yellow triangles), especially along actively eroding river channels. There are four dams remaining in Tunbridge. The Tunbridge Trout Pond dam, marked by a yellow diamond, is considered low hazard potential in case of failure. Grants Mill dam (gray diamond) is already breached. The Lafogg and Haywood & Noble dams marked with green diamonds are minimal hazard potential. Tunbridge could be impacted if the high hazard Keyser Pond Dam in Chelsea (red diamond) were to fail.



Transportation Network

Vermont Route 110 (VT-110) following the First Branch of the White River is the main route in and out of town. Strafford Road, running over the eastern ridge, is the other major road in town. Local roads generally follow tributaries of the First Branch into the surrounding hills.

The Vermont Agency of Transportation (VTrans) maintains eight miles of state highway (VT-110), with state 7 bridges crossing the First Branch. A VTrans garage is also located on VT 110 in Tunbridge.

The Town owns five covered bridges, all of which are listed on the National Register of Historic Places, that span the First Branch. These are maintained through a collaboration between the town and VTrans. In addition to the covered bridges, there are 23 other bridges the town owns and maintains. The town's 831 culverts were assessed and inventoried in 2025 – 660 are in fair, good or excellent condition, but the rest need cleaning, repair and replacement.

The town maintains 71 miles of road; 5 miles of paved Class 2 highway on Strafford Road and 66 miles of gravel Class 3 roads. There are 13 miles of Class 4 roads that are not the town's responsibility to maintain.

Vulnerability

The First Branch can reach flood stage very quickly, and portions of VT-110 become inundated, which routinely restricts access into and out of town. Back roads may provide alternate routes but could also be blocked by flooding at other spots including Gage Rd, Howe Lane by the Cilley Bridge, Recreation Road and Monarch Hill Rd. North Tunbridge can be cut off by flooding over Route 110 and access for fire trucks, town road repair trucks and other equipment are hampered to respond due to the covered bridges and one narrow historic steel bridge in N. Tunbridge.

There have been two landslides on Strafford Hill Rd – one has been addressed, but the other one will need an estimated \$350,000 to \$500,000 to stabilize (combined cost may reach \$1,000,000). Spring Road is also starting to slide.

The adequacy of existing highway bridge crossings and culverts in relation to stream conditions was inventoried and evaluated in association with the geomorphic assessment of the First Branch and some of its tributaries. Of the 47 structures inventoried to date, one – on Dickerman Road (Dickerman Brook) – has been rated as “fully incompatible” meaning that it is structurally incompatible with the stream channel, and therefore at high risk of structural failure. As such it warrants consideration for immediate replacement. Another ten have been identified as “mostly incompatible” – at a moderate to high risk of structural failure. Planning for their redesign and future replacement is recommended (VT DEC).

Development Pattern

Tunbridge is a rural community with three distinct centers located along VT 110 including the small hamlet of South Tunbridge and larger villages of Tunbridge and North Tunbridge. Tunbridge Village, centrally located on a bluff overlooking the Tunbridge Fairgrounds, is listed on the National Register of Historic Places. The main village hosts the town office, library, post office and town meeting hall, as well as church buildings and denser

homes. North Tunbridge, nestled closer to the river about two miles to the north, also hosts church buildings and a number of dwellings in addition to the Tunbridge Central Elementary School. South Tunbridge includes a few homes and a church.

The town has retained its traditional rural character. Outside of its historic village centers, homes are dispersed along dirt roads, surrounded by working farms and forestland.

Vulnerability

All three historic centers are located along the First Branch, either within or just above the river corridor.

Tunbridge Fairgrounds

The Tunbridge Fairgrounds, located along the First Branch, has hosted the Tunbridge World's Fair since 1875. The Tunbridge World's Fair is a treasured institution that supports agriculture and community. Up to 30,000 people attend the fair daily during the four-day event in September. Other events held on the grounds from May through October include horse shows, draft animal days, sheep trials and musical events. The grounds are used by the Fire Department for training. The fairground property is privately held and is supported and maintained through the Friends of the Tunbridge World's Fair.

Vulnerability

Because of their location next to the river, the grounds and its 60 buildings are susceptible to flooding – in the past the water has come up high enough to flow through the horse barns and has left a lot of silt and debris in its wake.

Demographics

According to the 2020 Census, the population of Tunbridge was 1,337, which is a slight increase over 2010 census count of 1,284 residents. About 25% of the population was under age 18 and 15.7% were over age 65.

Vulnerability

The 185 residents over age 65 (including 77 with a disability), the 87 younger residents with disabilities and 80 people living alone may be more isolated, more difficult to evacuate, or more vulnerable to specific hazards (such as extreme heat and cold) than other residents. The Fire Department, the Town Nurse and Tunbridge Neighbors Helping Neighbors have a good understanding of who would benefit from extra assistance during emergencies.

Housing

Per the 2023 American Community Survey, there were a total of 613 housing units in the Town of Tunbridge, of which 389 were owner-occupied, 73 were renter occupied, 87 were seasonal homes, and 64 were vacant. The State of Vermont identified 19 whole units as short-term rentals in 2024. The growth rate of housing stock (average annual from 2010 to 2020) was 0.3%, slightly higher than the state average of 0.2%. Over 28% of Tunbridge's housing units were built in 1939 or earlier, and the median year of homes built as of 2023 was 1982.

Vulnerabilities

In the Town of Tunbridge, there are 25 total structures in the special flood hazard area, meaning they have a 1% chance of flooding every year. These consist of 17 buildings and 8 outbuildings or accessory structures, mostly on the Tunbridge Fairgrounds. If all of the structures in the Special Flood Hazard Area were damaged or destroyed in a flooding event, the damage would total approximately \$1,993,140.

Additionally, there are 43 structures within the mapped River Corridor. These structures consist of 26 single-family dwellings, 7 camps, 6 mobile homes, 1 seasonal home, 1 government building, and 2 commercial structures. If all of these structures were damaged and destroyed, the damage would total approximately \$6,613,830.

Community Lifelines

Community lifelines are the vital services that enable all other aspects of society to function.

Residents identified town government, the highway department, Tunbridge Emergency Management, the Tunbridge Volunteer Fire Department and Rescue, local health clinics, local schools, the Tunbridge Library, community radio, internet, local farms and general stores and safety nets including the food shelf and Neighbors Helping Neighbors as important community lifelines in Tunbridge.

This overview of their capabilities and vulnerabilities informs the hazard assessment for this LHMP update.

Town Government Capabilities and Vulnerabilities

Much of the work of town government is accomplished by local volunteers. Tunbridge is governed by an elected three-member Selectboard. The town has limited staff, including an elected town clerk who handles the daily administration of town affairs. The town also has an appointed road foreman, a road crew of three, health and fire officers, a tree warden and an active Planning Commission. Elected listers track and assess property values in town. The Town Nurse provides patient advocacy, basic assessments, health and wellness education, and helps residents navigate the healthcare system. Tunbridge, as all Vermont towns, relies almost solely on the local property tax base and state aid to fund town government – including town offices and facilities, schools and local roads. The town's property tax also supports local fire and rescue services through annual appropriations.

The Recreation Committee oversees the town's recreation facilities and programs and holds monthly community breakfasts. The Town also has a Conservation Commission that was formed in 2018-2019 and they are involved in a variety of activities including, but not limited to, welcoming new residents, creating and updating walking guides, and identifying vernal pools in the area. In addition, there is a Town Forest Committee that is active as well.

The Tunbridge Town Office (former Market School) and the Tunbridge Town Hall are historic, well-preserved buildings of importance to the community used for town meetings and public gatherings. The Tunbridge Town Office has a generator and hosts the Tunbridge Emergency Operations Center (EOC). There has been discussion of whether the Town Offices or the Town Hall could be activated as emergency shelters if needed. The Tunbridge Central School had a generator but it reached the end of its functional life and the school and the town do not have available funds to replace it in the short term. The Town Hall does not have a generator. None of these facilities have any cooling systems to operate as a cooling shelter during a heatwave. 

The Town Garage is located at the end of Recreation Road, near the river. The garage itself may not be at risk of flooding, but access to it may be. During Tropical Storm Irene in August 2011, the road foreman moved key equipment up to his house in the village. An undersized 6" culvert was upgraded to a 14'x9' culvert and the road has not flooded since. The Town Garage has a portable gasoline generator that can run the doors and lights if needed. There is fuel storage at the garage.

Tunbridge has no public water supply or wastewater treatment systems. Public facilities, local residences and businesses are served by individual wells and on-site septic systems. The Tunbridge Town Office and Town Hall, located in Tunbridge Village, share a well on the Tunbridge Fairgrounds property.

There are two schools in town, both located above North Tunbridge, including the Tunbridge Central School serving grades K-8 – which also serves as the town's designated emergency shelter – and the Orange County Parent Child Center, a community-based non-profit institution that also serves pre-K students. All of these facilities are fortunately located above the flood hazard area.

The town's Recreation Field is also located on Recreation Road along the river. The town has purchased a parcel adjacent to the Recreation Field, removed a snow-damaged building on the property, spruced up the land and added a picnic area and playground.

A map showing critical facilities and other facilities of local significance to the community is included in Attachment A.

Public Safety Capabilities and Vulnerabilities

Tunbridge is served by the Tunbridge Volunteer Fire Department (TVFD), a locally-supported nonprofit organization. The fire department responds to fires, auto accidents, downed power lines, floods and other emergencies in Tunbridge, and in neighboring towns under mutual aid agreements. Neighboring communities' departments are called in for large fires requiring outside resources. Over the past five years, the department has responded to an average of 33 calls per year, including mutual aid calls. It also helps maintain town bridges, clean out clogged road culverts and reopen roads after blowdowns.

Volunteer training is provided through the department and the Vermont Fire Training Council. The fire department has an active and dedicated core group of volunteer firefighters – an average of five to six members respond per call – but it is getting harder to recruit volunteers, given the time commitments required for training and emergency response. The fact that many residents work out of town has also affected volunteer numbers and daytime coverage.

The Tunbridge Fire Department building is located at the junction of Monarch Hill Rd and VT 110 and was repaired following flood damage in the 1990s. The building is undersized for the fire and rescue equipment it currently houses, including two engines, a tanker and a first response vehicle.

Tunbridge does not have a municipal water system, and the water sources the fire department relies upon are vulnerable to drought and ice jams.



Photo 1 Tunbridge Volunteer Fire Department Drafting Site is blocked by an ice jam.

Medical emergencies are handled currently by the First Branch Rescue Squad located in Chelsea for emergencies north of Potash Road, and by Royalton Rescue for emergencies from Potash Road south. When flooding is anticipated, an ambulance is staged in town. Tunbridge has also formed a local rescue squad in the past few years. This has included the purchasing of a rescue vehicle that is outfitted with tools and holds a cascade system for air. The closest hospital is Gifford Medical Center, located in Randolph. Medevac services are provided by the Dartmouth-Hitchcock Advanced Response Team (DHART) helicopter.

Appointed town constables provide limited security and traffic control services as needed. All other police functions are performed by the Orange County Sheriff or the Vermont State Police (Troop D) based out of the Royalton Barracks, located off Route 107 just east of the Bethel/Royalton Town Line in Royalton.

Intelligence Based Policing (IBP) was started by the State Police in 2019 and is active in the Town of Tunbridge, among many other Vermont towns. It has increased community involvement related to policing.

Utility Capabilities and Vulnerabilities

Tunbridge is located within the service areas of the Green Mountain Power Corporation (GMP) and the Washington Electric Co-op (WEC), which supply electrical power to all sections of town. Two transmission lines cross the northern part of town; distribution lines generally follow and are accessed from local highway rights-of-way. Lines are cleared and maintained by the utilities. Sometimes power outages can last more than several days.

Several homes are independently powered. Some residents and the Tunbridge Central School and Town Hall, the town's emergency shelter, also have backup generators for use during power outages. There are no fuel providers other than wood suppliers in town.

Cellular phone reception is inadequate in most of Tunbridge. The nearest cell tower has battery backup, but the batteries are older and don't last long in a prolonged power outage.

The Town road crew and First Responders have a radio repeater and license with a written easement on private property to enhance communications.

Most of Tunbridge is served by high speed internet, with the exception of 5 remote residences.

Tunbridge Community Capabilities and Vulnerabilities

Tunbridge is an extremely well-networked community that supports a number of very active local committees and organizations – for a small community, Tunbridge has a remarkable amount of social capital. Information about town affairs is distributed through the town website and the “Tunbridge Quarterly” newsletter. A town bulletin board is also maintained outside the post office.

Annual Town Meeting in Tunbridge is a social event. School and athletic programs also draw people together. The Tunbridge Church has a diverse and socially active congregation that supports many local activities. The Tunbridge Library hosts regular well-attended events year-round and is also an art gallery. The Tunbridge Historical Society also offers family events, such as fall ghost walks in local cemeteries. The Tunbridge Women's Group (TWG) meets once a month, as does an informal sewing group. Mountain Folk offers regular concerts and “The Shindig” – a monthly dance held during the colder months – at the Tunbridge Town Hall.

There are two general stores in town as well as numerous farms. The Tunbridge Church runs a food shelf. Neighbors Helping Neighbors is a volunteer organization that coordinates and provides basic services such as rides to appointments, prescription or grocery delivery, meal prep, minor home or vehicle repairs and help with household chores.

III. The Planning Process

A. Plan Developers

Ari Lattanzi, Regional Planner at the Two Rivers-Ottawaquechee Regional Commission (TRORC), assisted the Town of Tunbridge with updating its Local Hazard Mitigation Plan. Lattanzi coordinated with the Tunbridge Planning Commission to explain the Local Hazard Mitigation Planning Process on 11/19/2025. The Tunbridge

Planning Commission assembled the LHMP Committee, which met several times to develop and revise the LHMP. See below for more meeting-specific details.

Committee members who assisted with the revisions include:

Name	Role/Organization	Involvement
Brenda Field	Emergency Management Director, Planning Commission Member	<i>Attended 4 of 5 meetings</i>
James McGuire	Emergency Management Coordinator	<i>Attended 3 of 5 meetings</i>
Simon Bradford	Fire Chief	<i>Attended 2 of 5 meetings</i>
Gary Mullen	Selectboard Chair	<i>Attended 2 of 5 meetings</i>
Amy Frost	Planning Commission Chair	<i>Attended all 5 meetings and coordinated with the Selectboard</i>
Janet Wells	Planning Commission Member	<i>Attended 3 of 5 meetings</i>
Shane Young	Planning Commission Member	<i>Attended 4 of 5 meetings</i>
Israel Provoncha	Planning Commission Member	<i>Attended 4 of 5 meetings</i>
Dan Ruddell	Planning Commission Member, Lister, Floodplain Administrator	<i>Attended 4 of 5 meetings</i>
Katharine Maguire	Planning Commission Member	<i>Attended 4 of 5 meetings</i>

Table 1 Tunbridge LHMP Committee Members

B. Plan Development Process

The 2026 Tunbridge Hazard Mitigation Plan is an update to the single jurisdiction Hazard Mitigation Plan adopted by the Town in 2021.

2026 Changes to the Plan

- **General**
 - Data updates: new hazard incidents, new federal emergency declarations, and census data.
 - Hazards have been reevaluated with the hazard ranking system used by the Vermont Department of Emergency Management.
- **Hazard Analysis**
 - Flooding and Fluvial Erosion remains on the list of “top hazards,” which reflects the local officials’ belief that the Town is still vulnerable to these hazards;
 - Drought, Severe Wind, Severe Ice/Snow and Extreme Heat have been added to the list of “top hazards,” which reflects the intention/priorities of local officials to expand their analysis of hazards that the Town is or may be vulnerable to in the next five years;
 - For each hazard, a location/vulnerability/extent/impact/likelihood table has been added to summarize the hazard description.
- **Maps**
 - A map of the Town of Tunbridge depicting critical facilities, town infrastructure, and the NFIP designated floodway, the 100-year, 500-year floodplain, and River Corridor area is included. The map has been updated to include culverts in poor or critical condition based on the most recent culvert inventory. Other features such as streams and critical facilities have been updated.

The following represent the avenues taken to draft the Tunbridge Local Hazard Mitigation Plan:

***Note: The meetings with an asterisk were publicized and open to the public.*

- **Activities and Public Participation and Involvement (44 CFR 201.6(b)(1))**

- 11/19/2025: TRORC staff met with the Tunbridge Planning Commission to outline the LHMP process.
- 1/7/2026: TRORC staff met with LHMP committee members to introduce the update/plan development process, and engage in a ranking exercise to determine “Top Hazards” in the Town. The plan development timeline and public outreach strategies were also discussed.
- 2/11/2026: TRORC staff met with the Tunbridge LHMP Committee to continue identifying the top hazards and to review the status of mitigation actions identified in the 2021 Plan.
- *2/20/2026: An online survey to solicit community input was published on the Tunbridge Town Website, the TRORC website, Front Porch Forum and the Town Listserv.
- *3/3/2026: An announcement of the LHMP process and upcoming public meeting was made at Tunbridge Town Meeting. Paper surveys were distributed to solicit resident input.
- *3/12/2026: TRORC guided LHMP Committee members and 3 members of the public in a discussion of hazard ranking, status of previous LHMP actions and the development of new mitigation strategies. The meeting was publicized on the town website, in the town listserv on Front Porch Forum and in the TRORC February Newsletter. Posters were posted around town. Survey respondents who provided emails and community lifelines identified by the LHMP committee and survey responders were sent email invitations and reminders of the meeting. Community lifelines invited include: Gifford Medical Center, Tunbridge Town Nurse, White River Valley Supervisory Union, Tunbridge Library, Tunbridge Church and Food Shelf, Chelsea Senior Center, Tunbridge Quarterly, Tunbridge Historical Society and South Royalton Rescue.
- *4/1/2026: TRORC met with the Tunbridge LHMP Committee to review the draft of the Plan and to discuss and incorporate the survey responses. A meeting notice was posted on the Tunbridge listserv. A draft of the plan was available for review in the town office and on the town website.
- 4/7/2026: A draft of the 2025 Tunbridge Local Hazard Mitigation Plan was sent to the Tunbridge Selectboard for comment. A draft was also sent to the Selectboard Chair of the following municipalities: Bethel, Brookfield, Chelsea, Randolph, Royalton, Sharon, Strafford, and Vershire. Survey respondents and attendees of LHMP meetings were also sent a copy of the draft. The draft LHMP was also sent to community lifelines including: Gifford Medical Center, Tunbridge Town Nurse, White River Valley Supervisory Union, Tunbridge Library, Tunbridge Church and Food Shelf, Chelsea Senior Center, Tunbridge Quarterly, Tunbridge Historical Society, Orange County Parent and Child Center and South Royalton Rescue. Stakeholders Green Mountain Power, Washington Electric Cooperative, Vermont Agency of Natural Resources, and Vermont Agency of Transportation were also emailed a copy of the draft with an invitation to comment.
- 4/14/2026: Selectboard reviewed and gave comments on the draft Plan, and discussed next steps for review and adoption.
- 4/28/2026: Tunbridge Selectboard gave the go-ahead to submit the 2026 LHMP draft to VEM for review.

- **Local Hazard Mitigation Plan Survey**

- A survey, available both online and in print, was prepared and distributed through in-person

outreach at the Tunbridge Town Meeting, as well as through a notice posted to the town website and at the town office, and through outreach on the local listserv and a QR code on posters around town. A total of 21 survey responses were received. The responses were reviewed and discussed at the 3/12/2026 meeting, and a summary of the survey responses can be found in Appendix D.

- **Review of existing plans, studies, reports, and technical information (44 CFR 201.6(b)(3))**
 - **2023 State of Vermont Hazard Mitigation Plan**
 - This plan was referenced to better understand the hazard ranking for each hazard, historic extents of impact and potential future impacts.
 - **Tunbridge 2021 Hazard Mitigation Plan** (Adopted 12/16/2020, approved by FEMA 6/30/2021)
 - This Plan was referenced extensively during the plan development process, especially in regard to the worst threats and mitigation action strategies identified in 2020.
 - **Tunbridge Town Plan** (Adopted 12/14/2021)
 - The Town Plan provided TRORC's staff with background information on the community, as well as more detail on their emergency services.
 - **Tunbridge Flood Hazard Ordinance** (Adopted 6/17/2014)
 - The Flood Hazard Ordinance was referenced for general knowledge and for Tunbridge's regulations to Flood Hazard Areas and other frequently flooded areas in Town. There is no Flood Insurance Study (FIS) currently available in the FEMA Flood Map Service Center for Tunbridge to incorporate into this plan.
 - **Tunbridge Local Emergency Management Plan (LEMP)** (Adopted 05/13/2025)
 - The Tunbridge LEMP was referenced for general knowledge regarding the Town's emergency operations.
 - **2021 Vermont Climate Assessment**
 - Accessed for climate data that impacts the severity of natural hazards.
 - **US Census Bureau**
 - US Census data was accessed for general demographic information for Tunbridge.

Status Update on Mitigation Actions Identified in 2021

The following table outlines the mitigation actions that were proposed in Tunbridge's 2021 Hazard Mitigation Plan for the Town of Pittsfield. Participants in the new Plan update process reviewed these actions and reported on the status of each.

Table 1: Status Update of Mitigation Actions Identified in 2020				
Mitigation Action	Who (Leadership)	When (Timeframe)	How (Funding / Support)	2026 STATUS
Amend the 2021 Tunbridge Town Plan to incorporate the hazard mitigation plan under (or as) the newly required resiliency element	Planning Commission	Next town plan update	Selectboard, TRORC, Grants Cost to Town: Low	2021 Tunbridge Town Plan covers flood hazards and hazards mitigation planning, moved to Capabilities
Incorporate river corridor management plan recommendations into town plan update and next update of this plan (First Branch)	WRP, Planning Commission	2020-2025	WRP, Ecosystem Restoration Grants, Community Watershed Grants Cost to Town: Low	2021 Tunbridge Town Plan includes recommendations related to the River Corridor Plan, moved to Capabilities
Hold another “all boards” meeting – to include celebration, food, to include update of LEMP, to cross-reference the two plans	Selectboard EMD EMC	Annually, between Town Mtg and June 1, or after major event	Municipal, Nonprofit Boards EMD, Road Foreman Cost to Town: Low	LEMP is updated annually. Only one “all board” meeting has been held. Moved to Capabilities
Strengthen supportive partnerships with adjoining municipalities, the WRP, TRORC and LEPC, and state officials; participate in regional hazard mitigation and emergency response planning	Selectboard, via appointed representatives	2020-2025	VT Emergency Mgt TRORC LEPC Cost to Town: Low	Ongoing, good collaboration with Royalton and Chelsea EMDs, good collaboration with schools, mutual agreements with local fire departments and road crews. Moved to Capabilities
Continue mutual aid agreements with neighboring communities and state	Selectboard, Emergency Response Committee Fire Dept	Reporting quarterly to Selectboard; 2020-2025	Municipal Cost to Town: Medium	Ongoing, want to formalize written agreements. Moved to Capabilities
Update 1975 School Emergency Plan	Selectboard, Emergency Response Committee, School Board and Principal	Initiated 2014, Completed by summer 2020	Model plans have been acquired, are being reviewed Cost to Town: Low	Complete, no further action needed

Monitor progress on adopted hazard mitigation strategies and tasks	Planning Commission	Annually; 2020-2025	EMD, Selectboard, Fire Department, Road Foreman Cost to Town: Low	Ongoing, moved to Capabilities
Update, amend hazard mitigation plan	Planning Commission	Update process to begin 1 year before expiration (2024)	TRORC, Grants Cost to Town: Low	In Progress, moved to Capabilities
Update the Tunbridge Fairgrounds Plan & complete a dry-run evacuation through a table-top exercise in order to assess evacuation vulnerabilities	EMD Fire Dept First Branch Ambulance VSP	2022-2023	Fire Dept Fairgrounds Staff & Organizers, VT Emergency Mgmt., LEPC Cost to Town: Medium	Complete and conducted annually, moved to Capabilities
Create a Plan to address and prioritize upgrades to covered bridges in Tunbridge; Implement upgrades as funding allows.	Road Foreman, Selectboard	Plan: 2021-2022; Implementation: 2022-2025	Selectboard, VTrans Cost to Town: High	There is an informal but functional system to address covered bridge maintenance as funding allows. Maintenance on the Flint Bridge going to bid in 2026. Moved to Capabilities
Continue to update the town's flood hazard area regulations, to further limit development in mapped flood hazard areas	Planning Commission	2024-2025	Municipal budget TRORC VT DEC Cost to Town: Low	Not updated since 2014, will be updated after the NFIP flood maps are updated and the Vermont Flood Safety Act River Corridor Regulation goes into effect. Moved to Capabilities
Continue to evaluate the adoption of river corridor (fluvial erosion hazard area) regulations and/or river setback and buffer requirements	Planning Commission	2024-2025	Municipal budget TRORC VT DEC Cost to Town: Low	State Flood Safety Act will regulate river corridors, no need for Town of Tunbridge action on this.
Continue to update Municipal Road & Bridge Standards to align with state standards.	Selectboard	Review annually; 2020-2025	VLCT, TRORC, VTrans Cost to Town: Low	Municipal Road and Bridge Standards align with state standards as of March 2025. Moved to Capabilities

Update digital town road, bridge and culvert inventories and databases as needed.	Selectboard, Road Foreman	2023-2025	TRORC, VTrans DEC Cost to Town: Low	TRORC completed a digital inventory of Tunbridge's culverts in 2025. The digital inventory of bridges is still needed. Moved to Capabilities
Continue implementing road, bridge and culvert upgrades, giving priority to those most vulnerable to washout and having largest impacts when access is cut off.	Selectboard, Road Foreman	Annually; 2020-2025	TRORC, VTrans Cost to Town: High!	These upgrades are completed as funding allows. Moved to Capabilities
Upgrade culvert located at the bottom of Belknap Rd	Road Foreman	2022-2023	Road Foreman, TRORC, VTrans Cost to Town: Medium	Complete. This culvert was replaced.
Implement high priority road segment improvements that were identified in Tunbridge's Road Erosion Inventory. This includes ditching improvements on Bicknell Hill Road, Falls Hill Road, Foundry Road, Monarch Hill Road, and Russell Road.	Road Foreman	2021-2023	Road Foreman, TRORC, VTrans Cost to Town: Medium	The town has improved 261 road segments to fully meet the municipal roads general permit standards. There are 84 segments remaining to bring into compliance by 12/31/2036. Moved to Capabilities
Identify and secure locations for new dry hydrants, with broadened community participation, and install as resources and funding allow	Fire Department, EMD, Planning Commission	As cooperative landowners and funding allows; 2020-2025	Work Group, VT Rural Fire Protection Task Force Cost to Town: High	Replaced 1, Installed 2, working on 3 rd . Action carried forward into 2026-2031.
Continue to protect strategic land parcels that provide flood storage (e.g., through the acquisition of river corridor easements)	Planning Commission, White River Partnership	2020-2025	Selectboard, TRORC, Ecosystem Restoration Grants Cost to Town: Medium	One parcel implemented, funding in place for a buyout and easement (pink house). Action carried forward into 2026-2031.
Finalize the selection of a second community shelter closer to or in Tunbridge Village.	Planning Commission, EMD	2021-2022	Neighbors Helping Neighbors, EMD, Selectboard Grants	Complete, town hall in addition to school, town office.

Implement education and outreach initiatives for local residents, e.g., to include winter or storm survival tips and evacuation information (town website, Tunbridge Quarterly, tax bills)	EMD/ Fire Department	On an as needed basis; 2020-2025	Town Office, Volunteers Cost to Town: Low	Ongoing. Working with VT EM and other towns. Action carried forward into 2026- 2031.
Sponsor annual river clean-up, promote in Tunbridge Quarterly	Town Office, Selectboard, Planning Commission	One day/year; 2020-2025	Fire Department, Tunbridge Womens' Group Cost to Town: Low	Ongoing, added to Capabilities
Continue to identify and assist town residents who are vulnerable to severe winter hazards (e.g., freezing temperatures, power outages).	Fire Chief/EMD, Planning Commission	As needed; 2020-2025	Town Listers, Utility Companies, Neighbors Helping Neighbors Cost to Town: Low	Ongoing, added to Capabilities

The following preparedness actions continue to be undertaken by the Town of Tunbridge, either annually or on an ongoing basis.

- The EMD, EMC and Selectboard updates Tunbridge's Local Emergency Management Plan (LEMP) yearly.
- The Planning Commission updates the Town Plan once every eight years so that it remains current, updated, and effective.
- The Emergency Management Director (EMD) and Emergency Management Coordinator (EMC) continues to participate in the Regional Emergency Management Committee.
- The Selectboard and EMD continue to alert residents to upcoming hazards, bad weather, and potentially treacherous travel conditions by posting to VTAlert and 511.
- The Road Foreman and Town Clerk continue to document infrastructure damage after weather events.
- The Town continues to annually maintain highway and fire mutual aid agreements.
- The EMD makes available the VEM Family Emergency Preparedness Booklet as a link on the Town Website.
- The Tunbridge Volunteer Fire Department continues to maintain existing dry hydrants by checking, servicing, flushing, and opening them annually. TVFD also assists with culvert maintenance.
- The Tunbridge Volunteer Fire Department conducts an annual fire prevention presentation at the school to protect young residents from loss of life.
- The Tunbridge Volunteer Fire Department ensures that all emergency response and management personnel receive annual HAZMAT Awareness training.
- The Road Foreman and Selectboard continue to maintain and update a geo-referenced culvert inventory, which will identify priority upgrade projects to protect town infrastructure.
- The Selectboard continues to plan for, budget, and maintain roads for safe winter travel.
- The Vermont CARE program is utilized to identify vulnerable populations, for planning and during an incident.
- The Selectboard and EMD post safe winter driving information on the town website.
- While not required, the Town encourages employees to be Incident Command System (ICS) certified. The

town of Tunbridge has formally adopted the Unified Command Structure for any larger emergency and has been practicing it for a couple of years. This structure is utilized for a school event, fair event and many of the flooding events. 

Changes in Development and Vulnerability

There is very minimal development occurring in the Town of Tunbridge. According to the Planning Commission, there have been very few permits for new home construction issued in the last few years, at roughly two or three a year. No new commercial businesses have started up since the last plan update, and no new development has occurred in the flood hazard areas. There are no large-scale development projects proposed for the Town of Tunbridge.

Depending on the location, new development in the Town of Tunbridge may be vulnerable to flood or fluvial erosion hazards. The Town's Flood Hazard Bylaw regulates new development within the Special Flood Hazard Area, which reduces the risk of new structures getting built near flood hazards. However, the areas vulnerable to flood hazards and fluvial erosion hazards are not necessarily analogous; therefore, the Town's Flood Hazard Bylaw may not protect new development from fluvial erosion hazards. The State of Vermont passed the Flood Safety Act in 2024 which authorizes state regulation of river corridor areas where fluvial erosion is a hazard. The Vermont Department of Environmental Conservation Rivers Program will have regulatory authority over all development in mapped river corridors, which will take effect on or before July 1, 2027.

Between 2010 and 2024, Tunbridge has seen the number of residents over the age of 65 increase from an estimated 18% to nearly 21% of the total population. This cohort is likely to increase as an additional 16% of the population between 55 and 64 years moves into this age group over the next decade. Older residents are often more vulnerable to extreme weather events and hazard conditions, including extreme heat, cold, and heavy snow. It is important to ensure mitigation strategies address the needs and vulnerabilities of older residents.

C. Plan Maintenance

This Plan (the Tunbridge Local Hazard Mitigation Plan) will be monitored and evaluated by discussing its effectiveness and making note to incorporate any necessary revisions in the update process. This monitoring and evaluation will occur annually at an April Selectboard meeting along with the annual review of the Local Emergency Management Plan (LEMP). At this meeting, the Selectboard will monitor the implementation of the hazard mitigation and preparedness strategies outlined in this Plan by noting those that have been completed, and identifying the next steps required to implement the Plan's remaining strategies. Comments from local officials and the public will be incorporated when relevant.

This meeting will constitute an opportunity for the public and other town officials to hear about the town's progress in implementing mitigation strategies and to give input on future activities and Plan revisions. The public will be given the opportunity to comment at this meeting. Evaluation of the Local Hazard Mitigation Plan will consist of a thorough analysis of the status of mitigation and preparedness strategies and whether they are being implemented according to the time frames included in tables in this Plan. The Town of

Tunbridge will evaluate the status of mitigation strategies to assess that goals of the Local Hazard Mitigation Plan are being met. Adherence to the mitigation, preparedness, and ongoing strategy implementation tables included in this Plan will constitute the degree of effectiveness of the Plan. The Town will also evaluate the status of vulnerabilities detailed in this Plan to evaluate their validity. The update of the Plan will bring up to date materials that have become outdated due to the passage of time. Tunbridge's Emergency Management Director will be the principal point of contact and will take primary responsibility for the monitoring, evaluation, and update process described here. He or she will bring the Plan's maintenance activities to the Selectboard's agenda and discussions.

Updates and evaluation of this Plan by the Selectboard and the local Emergency Coordinator/Director will also occur within three months after every federal disaster declaration directly impacting the Town of Tunbridge. The Town will monitor, evaluate and update this Local Hazard Mitigation Plan at an April Selectboard meeting and after every federally declared disaster directly impacting the Town according to the graphic in Appendix B. The Town shall reference the Local Hazard Mitigation Plan when working on Town Plan amendments or changes to the Town's bylaws.

At least one year before the Plan expires, the update process will begin (through annual updates, monitoring of progress and evaluation that will occur at the April Selectboard meeting). The update process will be led by the Selectboard or delegated to a town official by the Selectboard. In subsequent LHMP updates, applications for funding should be submitted 2-3 years prior to expiration to ensure the update is funded prior to Plan expiration. For this next Plan update, the Two Rivers-Ottawaquechee Regional Commission (TRORC) will help with Plan updates if assistance is requested by the Town of Tunbridge and if funding is available. If TRORC is unable to assist the Town, then Tunbridge's Town Clerk, Administrative Assistant, or Selectboard will update the Plan, or the Selectboard may appoint a committee of interested citizens (including the current local Emergency Coordinator/Director) to draft changes. Ultimately, it will be the Town's responsibility to update their Local Hazard Mitigation Plan.

The process of evaluating and updating the plan will include continued public participation through public notices posted on the municipal website, notice within the municipal building, and notice in paper of record and the TRORC newsletter and blog, inviting the public to the scheduled Selectboard (or specially scheduled) meeting. The public will be given the opportunity to comment during this process. Additional stakeholders may be invited to the meeting, including: Upper Valley Ambulance, White River Valley Ambulance, First Branch Ambulance, South Royalton Rescue, VTtrans, and the Vermont Agency of Natural Resources (VT ANR). VT ANR may be invited because they can provide assistance with NFIP outreach activities in the community, models for stricter floodplain zoning regulations, delineation of fluvial erosion hazard areas, and other applicable initiatives. These efforts will be coordinated by the Town Clerk.

Updates will address changes in community mitigation strategies; new town bylaws, zoning and planning strategies if appropriate; progress on the implementation of initiatives and projects; effectiveness of implemented projects or initiatives; and evaluation of challenges and opportunities including overall effectiveness of plan goals and actions in reducing vulnerabilities. If new actions are identified in the interim period, the plan can be amended without formal re-adoption during regularly scheduled Selectboard meetings.

Tunbridge shall also incorporate mitigation planning into their long-term land use and development planning documents. The 2021 Local Hazard Mitigation Plan, the previous version of this Local Hazard Mitigation Plan for the Town of Tunbridge, provided guidance in the development of the Tunbridge Municipal Plan update, including directing goals, policies, and recommendations towards mitigating the effects of future hazards on health and property in the Town. The 2013 Vermont Legislature passed a law requiring all towns to incorporate flood resiliency elements into their town plans as of July 2014.

Tunbridge incorporated a Flood Resiliency element into the 2021 Town Plan revision, including flood hazard and fluvial erosion hazard identification, and strategies and recommendations to mitigate risks to public safety, critical infrastructure, historic structures and public investments. This Local Hazard Mitigation Plan will help the town to comply with the flood resiliency requirement for town plans.

The Town should review and incorporate elements of the Local Hazard Mitigation Plan into updates for the municipal plan and Flood Hazard/ River Corridor bylaws. The Town shall also consider reviewing any future TRORC planning documents for ideas on future mitigation projects and hazard areas. The Tunbridge Planning Commission will incorporate hazard mitigation strategies developed and identified in this Local Hazard Mitigation Plan directly into goals, policies, and recommendations in future updates to the Tunbridge Town Plan. Mitigation strategies will directly influence goals, policies, and recommendations in future updates to the Tunbridge Town Plan. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, and Flood Hazard/ River Corridor bylaws will also be considered after declared or local disasters.

IV. Community Vulnerability by Hazard

A. Hazard Identification

Mitigation efforts must be grounded in the rational evaluation of hazards to the area and the risks these hazards pose. This is done through a process, which in essence asks and answers three basic questions:

- What bad things can happen, given the town's vulnerabilities?
- How likely are they to occur?
- How bad could they be?

This process, which is laid out in the table below, is an attempt to inventory the known hazards, establish the likelihood of them occurring in the future, and then assess the community's potential vulnerability to each. In performing this analysis, we are then able to prioritize actions that are designed to mitigate the effects of each of these disaster types and ultimately make Tunbridge a safer place.

It is important that we learn from the past in order to avoid the same disasters and their outcomes. Disasters that have occurred within the Town of Tunbridge, the larger region, and the State of Vermont can give us good information about what types of disasters we can expect in the future and what kinds of damage they might cause. However, while this historical data can inform our perspective of what might happen in the future, it is

by no means a prophecy. While Tunbridge might not have been impacted by a specific hazard in the past, this does not necessarily mean it will never be affected in the future.

Indeed, the advance of climate change means that old weather patterns may not hold. For instance, in recent years, Vermonters have seen an increase in the number and severity of storms, especially rainfall events. Armed with historical data and a healthy respect for climate change and the unknown, we have tried our best to identify hazards and prepare for the future.

A significant change between this Plan and the 2020 plan is the way in which hazards are assessed. This plan follows closely the hazard assessment approach taken in the 2018 and 2023 State Hazard Mitigation Plans. The table below displays the ranking criteria used to score both the potential impact and the frequency of occurrence. The Hazard Mitigation Planning Team evaluated the probability of hazard events occurring in the future.

The following table reflects the hazards that we believe can be expected, or are at least possible, in the central Vermont area. We have considered factors such as frequency of occurrence and potential community impact to rank each and determine which hazards pose the greatest threats to life and property in Tunbridge. The most significant threats (bolded in the table, below) are then followed-up with discussion and mitigation strategies throughout the rest of this Plan.

Score	Probability: likelihood of <u>significant</u> event happening	Average number of years between <u>significant</u> events of this type
1	Unlikely , less than 1% chance of happening in a given year	more than 100 years
2	Possible : 1% to 10% chance of happening in a given year	100 years or less
3	Likely : between 10% to 75% chance of happening in a given year	10 years or less
4	Highly likely : greater than 75% chance of happening in a given year	2 years or less

Score	Overall Impact	People	Built Environment	Natural Environment	Economy
1	Negligible - isolated incidents of:	minor injuries	minor damage	minor damage	minor disruption
2	Minor - isolated incidents of	injuries	moderate to severe damage	moderate to severe damage	minor disruption
3	Moderate - community wide incidents of:	injuries or fatalities	severe damage	severe damage	short-term disruption
4	Major - regional scale incidents of	multiple injuries or fatalities	severe damage	severe damage	significant impact

Hazard	Probability of Significant Event	<i>Impact on People</i>	<i>Impact on Built Environment</i>	<i>Impact on Natural Environment</i>	<i>Impact on Economy</i>	Average Impact	Hazard Score
Drought	3.5	3.0	3.0	3.0	3.0	3.0	10.5
Flooding	4	2.0	2.0	2.0	3.0	2.3	9.0
Fluvial Erosion	4	2.0	2.0	2.0	3.0	2.3	9.0
Landslides	4	2.0	2.0	2.0	3.0	2.3	9.0
Wind	3	2.0	3.0	3.0	3.0	2.8	8.3
Ice	3.4	3.0	1.0	2.0	3.0	2.3	7.7
Snow	3.7	2.0	2.0	1.0	2.0	1.8	6.5
Heat	3.5	4.0	1.0	1.0	1.0	1.8	6.1
Cold	3.6	2.0	2.0	1.0	1.0	1.5	5.4
Infectious Disease	1.8	4.0	1.0	1.0	4.0	2.5	4.5
Invasive Species	2	1.0	2.0	3.0	2.0	2.0	4.0
Wildfire	2	1.0	2.0	1.0	1.0	1.3	2.5
Hail	1.5	1.0	1.0	1.0	2.0	1.3	1.9
Tornado	1.2	1.0	2.0	2.0	1.0	1.5	1.8
Earthquake	1	1.0	1.0	1.0	1.0	1.0	1.0

***Score = Probability x Average Potential Impact**

These are the federal disaster declarations that included Tunbridge in the five years since the last Local Hazard Mitigation Plan:

All Federally Declared Disasters, Orange County VT, 2021 - 2026

Declaration Date	DR #	Disaster
08-22-2021	EM 3567	Tropical Storm Henri (August 22-29)
03-20-2023	DR 4695	Severe Storm/Flooding (December 22-24, 2022 Event)
07-10-2023	EM 3595	Flooding (July 9-17)
07-14-2023	DR 4720	July 2023 Flood Event (July 7-21)
03-02-2024	DR 4762	December 2023 Flood Event (December 18-19)
08-08-2024	EM 3609	Tropical Depression Debby (August 8-10)
08-20-2024	DR 4810	July 2024 Flood Event (July 9-11)

The Tunbridge LHMP committee discussed the results of the hazard ranking activity and decided to focus on hazards that scored highest in probability of occurrence as well as potential impact. Drought came into focus as a major hazard in 2025 when sources of water for firefighting efforts and agriculture became scarce. For the purposes of this Plan, flash flooding, fluvial erosion, and inundation flooding are combined into one hazard profile for analysis due to their overlapping events and potential impacts to the Town. Severe wind poses a risk to both the electrical power infrastructure and roadways given the history of significant blowdowns and increasing wind events. Severe ice and snow are combined into one hazard profile for analysis given their similar impacts and risks to the electrical grid and roads. The LHMP Committee chose to include extreme heat as a top hazard since it ranked highly in the hazard assessment and extreme heat events are becoming more frequent and more intense. As such, these individual hazards are described in the hazard profiles.

Due to low probability or small potential impact, the mitigation committee chose not to detail the following hazards in this LHMP: infectious disease, invasive species, extreme cold, wildfire, lightning, hail, tornado or earthquakes. While the COVID-19 pandemic was a federally declared disaster, the probability of another pandemic in the five years this LHMP covers are quite low. The COVID-19 pandemic demonstrated the need for a strong and coordinated national and state public health response. The role of the town in a pandemic is to be a trusted source of information, which would be covered under the communication plan under All Hazards in the Mitigation section. For definitions and descriptions of hazards omitted from this plan, see the Vermont State Hazard Mitigation Plan.

After engaging in discussions using their best available knowledge, informed by data and community survey responses, the Town of Tunbridge LHMP Committee identified the following “priority hazards” (based on frequency of occurrence and potential impact) that they believe their community is most vulnerable to:

- Drought
- Flash Flood/Inundation Flood/Fluvial Erosion/Landslide
- Severe Wind
- Severe Ice / Snow
- Extreme Heat

The impact of a loss of services is a common element of the hazards discussed in this Plan. These include not only large scale services such as the loss of transportation and communication ability, but also the loss of services more directly associated with basic needs such as water, food preparation, and heat. Loss of power for an extended period of time has the potential to greatly impact households who are entirely reliant on a functional power supply in order to prepare food, heat the household, and ensure that the water supply is available. While many residences in Tunbridge utilize a variety of methods to ensure these basic needs, it is important to be aware that a number of households rely on electricity alone for all of these functions. In addition to the plans described in the Tunbridge LEMP, it is important to reinforce the need for adequate generators in this Plan, so that the town is prepared to ameliorate the effects of a sustained power loss in Tunbridge. Included in this would be an adequate supply of fuel for these generators.

A further focus that is important to address in this Plan includes the awareness of the population demographics of Tunbridge. This includes a comprehensive idea regarding the number of individuals in the town who may require assistance in the event of a hazard. Age and ability should be factors taken into account, and as discussed in the LEMP, identifying vulnerable populations and using the Citizens Assistance Registry for Emergencies (CARE) program.

Each of these “priority hazards” will be discussed in the following sections. Within each section, previous occurrences of each hazard will be listed, including the County-wide FEMA Disaster Declarations (DR-#), where applicable. Provided below is a list of all major disaster declarations for Orange County that have occurred since the previous Plan update. More detail on declared disasters pertaining to top hazards is given in the Historical Occurrences for each top hazard profile. Hazards information was gathered from local sources (ex., town history book), the National Climatic Data Center’s (NCDC’s) Storm Events Database (1950-2012 and 2006-

2012), the Spatial Hazard Events and Losses Database for the United States (SHELDUS) 1960-2012, and Special Reports produced by the National Weather Service in Burlington, Vermont.

The following sections also include a description of each “top hazard” and a hazard matrix with the following information (please see each hazard profile for a hazard-specific matrix):

Hazard	Location	Vulnerability	Extent	Observed and Potential Impact	Likelihood/Probability
Type of hazard	General areas in community that may be vulnerable to the hazard.	Community structures, systems, populations, or other assets as defined by the community that are susceptible to damage and loss from hazard events.	The strength or magnitude and details of the most notable event(s).	Financial impact from an event and/or the number of structures that were or could be impacted	<u>Occasionally</u> : 1–10% probability of occurrence per year, or at least one chance in next 100 years <u>Likely</u> : >10% but <100% probability per year, at least 1 chance in next 10 years <u>Highly Likely</u> : 100% probable in a year

B. Hazard Profiles for Hazards Posing Highest Vulnerabilities

1. Drought

Drought is a deficiency of moisture that results in adverse impacts on people, animals, or vegetation over a sizeable area (NOAA National Weather Service) or a period of abnormally dry weather sufficiently long enough to cause a serious hydrological imbalance (American Meteorological Society). It is a complex phenomenon that is difficult to monitor and assess because it develops slowly and covers extensive areas, as opposed to other disasters that have rapid onsets and obvious destruction. The effects of drought can linger long after the drought has ended. The northeast United States can also experience “flash” or rapid-onset droughts with intense dry periods of about 2 to 6 months followed by a period of above-normal precipitation.

Drought is an inherent, cyclical component of natural climatic variability and can occur at any place at any time. High winds, low humidity, and extreme temperatures can all amplify the severity of the drought. It is difficult to determine the onset, duration, intensity, and severity of a drought, all of which affect the consequences and corresponding mitigation techniques. The different types of drought have different corresponding impacts on people and our environment.

Types of Drought:

- **Meteorological**: a reduction in rainfall from a normal precipitation pattern in regard to the amount, intensity, or timing of the event as well as changes in the temperature, humidity, and wind patterns. The strict threshold differs for every nation; the United States defines meteorological drought as receiving less than 2.5mm of rainfall in 48 hours. Meteorological drought is the first drought stage detected.
- **Agricultural**: deficient moisture conditions that cause a lasting effect on crops and non-natural vegetation. It is dependent on rainfall, temperature, topography, evapotranspiration, permeability, and porosity of soils, precipitation effectiveness, and vegetative demand. Agricultural drought begins when

the available soil moisture supports the actual evapotranspiration rate at only a fraction of the potential evapotranspiration rate.

- **Hydrological:** related to the effects of decreased precipitation on surface or subsurface water supply. It is the last stage of drought and is lagged behind meteorological and agricultural drought because water infiltrates down to the groundwater during the latter portion of the hydrological cycle. Subsurface water supply is the last drought component to return to normal when meteorological conditions and aquifer recharge return.
- **Socioeconomic:** what happens when the consequences of the drought start to affect the socioeconomic sector. It occurs when the demand for an economic good is greater than the available supply due to weather-related drought. Examples of such goods include water, hydroelectric power, food grains, meat, dairy, and much more. Socioeconomic drought affects the associated population both individually and collectively.
- **Ecological:** defined as “a prolonged and widespread deficit in naturally available water supplies — including changes in natural and managed hydrology — that create multiple stresses across ecosystems.” /

The severity of a drought depends on the duration, intensity, and geographic extent of the water shortage, as well as the demands on the area’s water supply. Droughts are rated in classifications from D0–D4, depending on the severity of the drought, the amount of time it will take for vegetation to return to normal levels, and the possible effects of the drought on vegetation and water supply.

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures Coming out of drought: some lingering water deficits pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures Streams, reservoirs, or wells low, some water shortages developing or imminent Voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely Water shortages common Water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses Widespread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses Shortages of water in reservoirs, streams, and wells creating water emergencies

Drought differs from other natural hazards in multiple ways. First, drought is not as obvious as other hazards; it does not have the property destruction of a tornado or hurricane nor the apparent ecological destruction of a wildfire. Second, there is a lack of an exact and universally accepted definition of drought. Finally, the beginning and end of a drought is difficult to determine: though the surface water content may have recovered from a period of drought, the replenishment of groundwater levels is a longer process. In addition, droughts are often spread over a larger geographic area than other natural hazards. These things considered, the economic effects of a drought can be just as devastating as any other natural hazards.

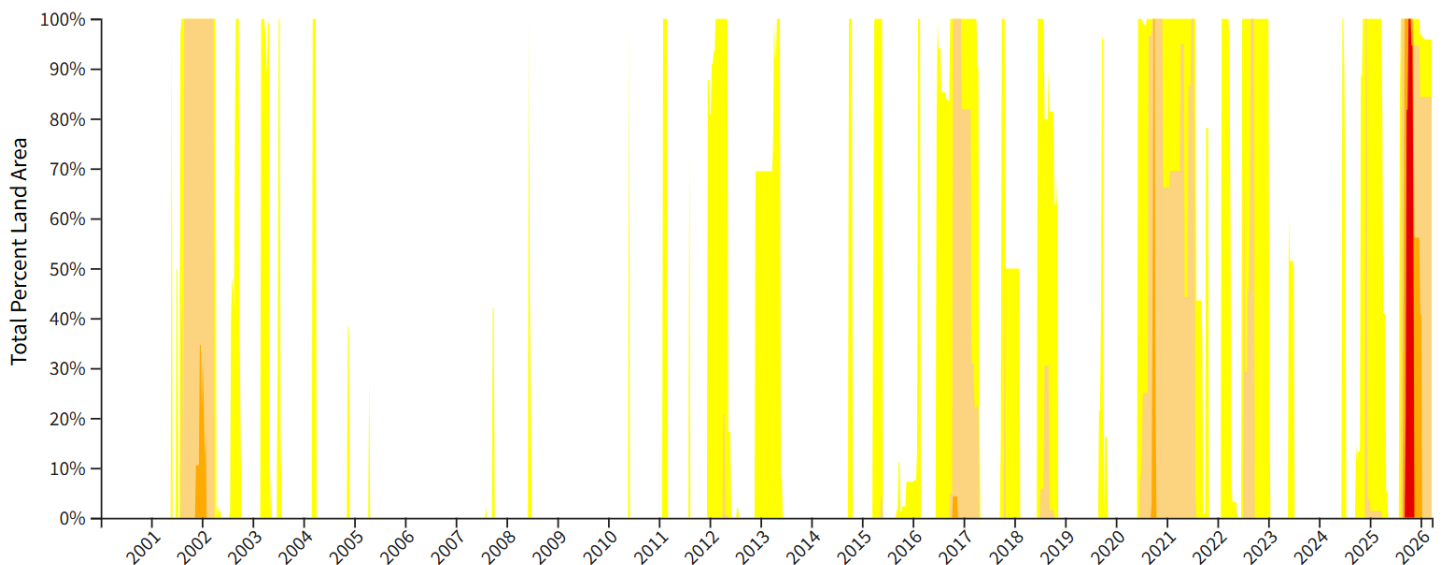
Drought History

Vermont has a highly variable, unpredictable climate. Droughts, while low frequency hazards, are of serious concern to the population of Vermont. It is often difficult to recognize the onset of a drought during its preliminary stages, and together with Vermont's variable climate can lead to the disregard for the seriousness of an oncoming drought. Even though the State usually has adequate rainfall, droughts occasionally occur. Several severe droughts have been recorded during the last century, while moderate and mild droughts are much more common. The droughts in the mid-1960s were the most severe in Vermont. Every county in the State experienced Exceptional Drought (D4) conditions in May of 1965. Since the 1960s Vermont has experienced several less severe periods of drought. There were two declared statewide droughts in June and July 1995. These droughts were due to a lack of rainfall, which required officials to put restrictions on water usage. Lack of rain combined with some of the highest temperatures led to crop loss in some areas. The drought persisted through the summer of 1995, and a third, more severe drought affected Southern Vermont in August of that year. From 1998 to 1999 parts of the state in Chittenden and Franklin Counties experienced Exceptional Drought (D4), and much of the state experienced Moderate Drought (D1) or Abnormally Dry conditions (D0).

In 2025, Vermont experienced widespread and persistent drought conditions, with the U.S. Drought Monitor showing all of the state in at least moderate drought and much of it in severe to extreme drought for much of the late summer and early fall, leading to low streamflows, dry wells, stressed agriculture, farm losses, and water supply concerns. Local rainfall provided only limited relief, and while recent precipitation has eased some extreme conditions in parts of the state, drought impacts on water resources, crops, and ecosystems continue into 2026. As the severity of the drought became apparent, impacts of the federal government shutdown in late 2025 were felt locally when a request for federal assistance was unanswered - leaving Vermont farmers without the information needed to make decisions that impacted the whole region.

Orange County has experienced abnormal dryness and moderate drought periodically since 2000, and most of the county experienced extreme drought in later 2025. Tunbridge is still categorized as moderate drought in spring 2026.

Figure 1 Orange County Drought History 2000-2026



Hazard	Location	Vulnerability	Extent	Observed and Potential Impacts	Likelihood/Probability
Drought	Townwide, especially people served by shallow wells and springs, and farms	Severe drought can cause serious agricultural losses in vegetable production, hay production and loss of irrigation and livestock water. Given there is no public water supply, the fire department drafting sites are vulnerable to drought, which means drought could create conditions for uncontained wildland fires and uncontrolled structure fires.	In October 2025, 100% of Orange County was in D3 Extreme Drought	2025 Drought: 14 water sources went dry, 3 water sources in shortage, 3 replacement wells drilled, firefighting water sources impacted Future severe drought could lead to more residents losing water and more wild fires, with less water to fight them.	<u>Likely:</u> >10% but <100% probability per year, at least 1 chance in next 10 years Tunbridge has been abnormally dry for the past 9 out of 10 years, and climate change will bring continued uncertainty, unpredictability and extreme weather patterns.

2. Flash Flooding, Inundation Flooding and Fluvial Erosion

The most frequent form of flooding in the State of Vermont and the Town of Tunbridge is riverine flooding, or overbank flooding, which occurs when rivers receive more rain or snowmelt from their watershed than they typically experience. Flooding causes the inundation of land that is normally dry. Overbank flooding is experienced more frequently in mountainous and hilly areas where water moves with higher velocities. Flash floods occur when severe storms drop high amounts of rainfall in short periods of time. Flash floods occur more frequently in areas with steep slopes and narrow stream valleys. Riverine erosion is the gradual wearing away of land masses by rivers and streams. River channels are constantly changing. As rivers flow and water moves downstream, water exerts energy upon riverbanks and causes erosion. Fluvial erosion is a more rapid, destruction form of erosion caused by faster-moving, more powerful floodwater. Tunbridge has experienced several landslides due to fluvial erosion destabilizing the base of slopes.

Flooding is one of the worst threats to Tunbridge's residents and infrastructure. Past instances of flooding in Tunbridge have included rain and/or snowmelt events that cause flooding in the major rivers' floodplains and intense rainstorms over a small area that cause localized flash- flooding. Both kinds of events can be worsened by the build- up of ice or debris, which can contribute to the failure of important infrastructure (such as culverts, bridges, and dams).

The worst flood disaster to hit the Town of Tunbridge, as well as the overarching region and the State of Vermont, occurred on November 3, 1927. This event was caused by up to 10 inches of heavy rain from the remnants of a tropical storm that fell on frozen ground. Eighty-four Vermonters, including the Lieutenant Governor, were killed. The flooding in the White River watershed was particularly violent, with an estimated 120,000 to 140,000 cubic feet/second (cfs) flowing out of the White River at West Hartford, Vermont. Like many towns in the region, the Town of Tunbridge received heavy precipitation, seeing roughly 7-8 inches of rainfall over the storm period.

A more recent flooding event that devastated the region and the state was the result of Tropical Storm Irene, which occurred on August 28, 2011. Record flooding was reported across the state and was responsible for several deaths, as well as hundreds of millions of dollars of home, road and infrastructure damage. Due to the strong winds, 50,000 Vermont residents were initially without power, and many did not have electricity restored to their homes and businesses for over a week.

The Town of Tunbridge suffered major damage to property and infrastructure during Tropical Storm Irene, but no lives were lost. It is estimated that Tropical Storm Irene dropped 6.79 inches of rain over the Town of Tunbridge in a very short span of time, some of the highest precipitation totals in Orange County (which averaged 5-7+ inches over its land area). The county-wide damage for Orange County totaled \$5 million. The Town of Tunbridge received a significant amount of damage during Tropical Storm Irene (\$100,000-\$500,000 according to FEMA's Public Assistance database). Specific roads that were damaged during Tropical Storm Irene include VT 110 and its bridges along the First Branch. Fluvial erosion caused a mass failure landslide that lost a lane of travel in front of the Tunbridge General Store.

Most recently, Tunbridge experienced flooding as a result of The Great Vermont Flood of 10-11 July 2023. Tunbridge experienced a loss of power town-wide along with numerous driveway washouts and several road closures. Route 110 was blocked to the north and south by floodwater and debris. Two major landslides on Strafford Rd were caused by fluvial erosion at the toe of the slope. One landslide has been mitigated and there engineering has been completed for the second but there is not yet funding in place. Two minor landslides on Strafford Road have been remediated. An undersized culvert on Strafford Road needs to be upsized dramatically and could cost \$400,000. Strafford Road is an important detour when VT 110 is flooded.

Unfortunately, flooding is very common across the region, with many events impacting the Town of Tunbridge specifically, and Tunbridge has been hit hard by other flooding events that pre-date Tropical Storm Irene. As such, flooding and fluvial erosion is one of the worst threats to Tunbridge's residents and infrastructure. The following list indicates the history of occurrence with regard to this hazard in Orange County (given the small population of Tunbridge, town-specific data is limited); an asterisk "*" denotes the instances in which town-specific data is available, and federal disaster numbers are listed where appropriate. No detailed data was available for fluvial erosion damage in terms of numbers of acres lost or amount of fill that was used to compensate for fluvial erosion after flooding during each event. Specific extent data regarding the physical size of the most significantly eroded area and number of acres of land lost to erosion were not available for events in Tunbridge.

Date	Event	Location	Extent and Impacts
12/18/2023* (DR-4762)	Flooding	Statewide	Mild and moist air moved through New England from the Atlantic, leading to widespread flooding caused by heavy rain and snowmelt. In nearby Corinth, total precipitation was approximately 1.52 inches on December 18 and 1.6 inches on December 19 th . NOAA has estimated the event caused approximately \$2 million in damage across the state. Tunbridge had to close VT 110 due to rising floodwaters but did not have damage.
07/11/2023* (DR-4720)	Flooding	County-wide	The July 10-11 heavy rain event brought flooding to much of East Central Vermont. In nearby Corinth, total precipitation was recorded as 1.57 inches of rain on July 10 th , followed by 3.56 inches on the 11 th . Individual and Public Assistance were both available in Orange County following the event. Tunbridge reported \$517,029.15 in damage, of which about half was damage to the Strafford Stone Bridge.

4/15/2019* (DR-4445)	Severe Storm, Flooding	Statewide	Widespread 0.5 to 1.5 inches of rain and significant melting snow at mid and upper elevations caused flash flooding across portions of southern and central Vermont. Development of a pre-frontal thunderstorm cluster across southern NY during the early morning hours on the 15th tracked northeast into southwestern VT, dropping 1 hour rainfall totals in excess of 2.0 inches. Tunbridge reported \$63,998.23 in damages to Belknap Brook Rd and other town roads.
6/29/2017-7/1/2017* (DR-4330)	Flooding, Severe Storm, and Fluvial Erosion	County-wide	Severe storms featured intense rainfall that fell within short periods and led to flooding and erosion. Heavy precipitation fell in Orange County on already saturated soils. On July 1 a severe thunderstorm and associated rain showers moved across central Vermont causing flash flooding. Tunbridge reported \$38,095.74 in damages. Minimal power outages occurred during this event. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
6/11/2014	Flood and Fluvial Erosion	County-wide	Period of heavy rain resulted in flash flooding in Tunbridge. The neighboring town of Corinth received 1.26 inches of rain on 5/23 and experienced another 1.64 inches of rain 4 days earlier, resulting in 2.9 inches of rain in less than a week.
Period from 06/25/2013—07/11/2013 (DR-4140)*	Severe Storms, Flooding, and Fluvial Erosion	County-; region-wide	Severe storms caused flooding throughout the region, causing damage to some infrastructure and facilities. \$504,855 in damages occurred in Orange County. The neighboring Town of Corinth experienced 7.4 inches during the disaster period. Tunbridge reported \$97,533.59 in damage to roads and culverts.
08/28/2011 (DR-4022, TS Irene)*	Tropical Storm, Flooding, and Fluvial Erosion	County-; region-wide	Widespread rainfall amounts of 3-5 inches occurred across Vermont with 5 to 7+ inches across much of southern and central Vermont. Devastating flash flooding occurred across much of central and southern Vermont mountain valleys with substantial and some record-breaking flood stages on larger rivers. This flood event will likely rank second to the November 1927 flood in the scope of meteorological and hydrological conditions/impacts as well as loss of life (84 in 1927), but likely first in monetary damage (approx. \$500. million statewide vs \$350. million (1927 in 2010 dollars)). There were nearly 2400 roads, 800 homes/businesses, 300 bridges and a half dozen railroad tracks destroyed or damaged from the flooding caused by Irene. Tunbridge reported \$137,886.63 in damage.
07/21/2010	Flash Flooding	County-wide	Several storms strengthened into super cells that produced widespread wind damage to trees, power poles and structures as well as large hail in excess of golf ball size in diameter. Very heavy localized rains caused some temporary problems in many communities. The neighboring town of Corinth received 2.43 inches of rain in 24 hours.
08/21/2009	Flash Flooding	County-wide	Thunderstorms produced torrential downpours in nearby Chelsea, who experienced significant damage on several roads due to flash flooding. Damage was not as severe in Tunbridge, which received 1.26 inches in precipitation. Outage information was not available for this event.
08/07/2008* (Part of DR-1790)	Flash Flooding and Fluvial Erosion	County-wide	Thunderstorms with heavy rainfall in a moist atmosphere moved through central and southern Vermont during the afternoon and evening hours. Tunbridge received 2.6 inches of rain in 24 hours with an additional 1.22 inches of rain in the previous 24 hours. Outage information was not available for this event. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
8/12/2003* DR-1488	Flooding	County-wide	A humid airmass across New England, in conjunction with a stationary front across southern New England, helped develop and focus thunderstorms across the region during the afternoon. Very heavy rain fell resulting in road washouts due to flash flooding. Tunbridge reported \$86,291.56 in damage to roads and bridges.
06/28 – 30 /1973 (DR-397)	Flooding	County-wide	Rainfall as much as 6 inches in 24 hours occurred in some locations and led to a State declared disaster area. 3 deaths occurred and \$64 million in damage occurred in Vermont. Outage information was not available for this event.
11/02-04 /1927 ("Flood of 1927")	Flooding	County-wide	Considered to be one of Vermont's most devastating events, the flood took out 1285 bridges, miles of roads and railways, and countless homes and buildings. 84 people were killed, including Lt. Gov. S. Hollister Jackson. Rainfall totaled 4-9" statewide, following a month with 150% the normal amount of rain.

There are several locations in Tunbridge that are specifically vulnerable to flooding. Several parts of VT 110 flood regularly, both north and south of the main village, as well as low spots on Gage Rd, Howe Lane by the Cilley Bridge, Recreation Road and Monarch Hill Rd.

There have been two landslides on Strafford Rd due to fluvial erosion along the First Branch of the White River eating away at the bottom of the slope. One landslide has been addressed, but the other one will need funding to stabilize. Total mitigation costs of Strafford Slides 1 and 2 when completed may reach \$1,000,000. Spring Road is also starting to slide where the tributary to the First Branch is also destabilizing the slope.



The Town of Tunbridge has a standalone Flood Hazard Bylaw that limits development within areas of potential flooding. The Flood Hazard Overlay District prohibits development in the Floodway. Restricted development in the special flood hazard area is permitted.

In the Town of Tunbridge, there are 25 total structures in the special flood hazard area, meaning they have a 1% chance of flooding every year. These consist of 17 buildings and 8 outbuildings or accessory structures, mostly on the Tunbridge Fairgrounds. If all of the structures in the Special Flood Hazard Area were damaged or destroyed in a flooding event, the damage would total approximately \$1,993,140.

Additionally, there are 43 structures within the mapped River Corridor. These structures consist of 26 single-family dwellings, 7 camps, 6 mobile homes, 1 seasonal home, 1 government building, and 2 commercial structures. If all of these structures were damaged and destroyed, the damage would total approximately \$6,613,830.

One structure has been repetitively damaged by flooding. The property changed ownership and the new owner has attempted to elevate the building above the flood elevation, but unfortunately funding is no longer available. The single-family residence was constructed in 1950 and received its first NFIP policy in 1997. There have been 3 paid NFIP claims of over \$1,000 since 1978, with the most recent date of loss on July 10, 2013. The structure is no longer insured under the NFIP and is not a primary residence.

There is a flood buyout in progress of “the pink house.” This project has funding in place and work continues.

Across Vermont, most child and elder care facilities are not registered with the State. Most child day care in Tunbridge is likely private in-home care. There are 3 licensed childcare facilities in Tunbridge, the Orange County Parent Child Center is at the confluence of a tributary and the First Branch on VT110, there is an afterschool program at the Tunbridge Central School on VT110 just above the First Branch, and there is a private childcare center on Spring Road. There are currently no mobile home parks located in Tunbridge that are registered with the State.

Recent studies have shown that the majority of flooding in Vermont is occurring along upland streams, as well as along road drainage systems that fail to convey the amount of water they are receiving. These areas are often not recognized as being flood prone, and property owners in these areas are not typically required to have flood insurance. It should be noted that, while small, mountainous streams may not be mapped by FEMA

in NFIP FIRMs (Flood Insurance Rate Maps), flooding along these streams is possible, and should be expected and planned for. Flash flooding in these reaches can be extremely erosive, causing damage to road infrastructure and to topographic features including stream beds and the sides of hills and mountains. The presence of undersized or blocked culverts can lead to further erosion and stream bank/mountainside undercutting.

Tunbridge has mapped River Corridors for the First Branch of the White River and tributaries that drain at least a quarter mile of watershed surface area. These areas are vulnerable to flooding and fluvial erosion.

Flooding events are highly likely to occur in the future in Tunbridge. Precipitation trend analysis and climate change research suggests that intense, local storms are occurring more frequently and will continue to do so in the future. According to the 2021 Vermont Climate Assessment, average annual precipitation in Vermont has increased by 21% since 1900. More localized severe weather storms will occur in the Town of Tunbridge, which will be high intensity and will likely result in increased flooding. Due to Tunbridge's topography of steep slopes and narrow river valleys, fluvial erosion also has a high probability of future occurrence.

Following a significant damage event (whether it be from flooding or other hazard), the Floodplain Administrator (FA) is required to make Substantial Improvement or Substantial Damage determinations for damaged structures in the Special Flood Hazard Area. This will involve the FA reviewing the damaged property as soon as possible following the event, and determining the estimated cost of work, along with the structure's market value. The FA has several options available for estimating damage, including FEMA's Substantial Damage Estimator Tool and qualified estimates made by town officials, local contractors, or engineers. The FA may request technical assistance from VT ANR and the Regional Floodplain Managers on how best to evaluate for substantial damage, as not all events will require the same approach. If a structure is determined to have been substantially damaged (no matter the cause), it is required to be brought into compliance with Tunbridge's Flood Hazard Bylaw. The FA is required to maintain a record of all Substantial Improvement/Substantial Damage determinations.

Substantial improvement can also occur without there being a significant damage event. This can occur if a structure undergoes major renovations and additions that cumulatively equal or exceed 50% of the market value of the structure before the start of construction. In cases where substantial improvement may occur, it is the responsibility of the FA to determine if the proposed development meets the Substantial Improvement threshold. If so, the entire development must be brought into compliance with the Tunbridge's Flood Hazard Ordinance.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Flooding, Fluvial Erosion and Landslides	Buildings and roads along the First Branch of the White River and tributaries	Culverts, bridges, road infrastructure and private infrastructure. 25 structures in the 100-year floodplain (mostly fairgrounds buildings) and 40 residential and 3 commercial/	Tropical Storm Irene – 3-5" of rain, several periods with heavy rain on saturated soils	The July 2023 flooding caused over \$500k in damage to town roads and infrastructure.	<u>Likely</u> : >10% but <100% probability per year, at least 1 chance in next 10 years Climate change will likely intensify storms. More powerful storms will likely cause more flooding, fluvial erosion and landslides. Vermont's population

		industrial/public structures in the mapped river corridor. Landslides can cut off roads, leaving residents vulnerable and increasing the time it takes emergency services to reach vulnerable residents.			is aging, and older adults may have a harder time evacuating.
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3. Severe Wind

High wind can be the result of any of the following:

- Wind Storm: high wind event without precipitation.
- Hurricanes/Tropical Storms: the most significant impacts from hurricanes/tropical storms in Vermont are inundation flooding and fluvial erosion. Wind implications of hurricanes/tropical storms are addressed below.
- Thunderstorm: high wind event with the potential for compounding impacts due to precipitation), lightning, and/or hail.
- Tornado: a violently rotating column of air extending from a thunderstorm; not common in Vermont

Wind Storm:

High winds pose a threat to the safety of Vermont's citizens and property. The National Weather Service (NWS) issues a wind advisory when winds are sustained at 31 to 39 mph for at least one hour or any gusts 46 to 57 mph. Sustained winds of 40 to 73 mph or gusts of 58 mph or higher cause the NWS to issue a High Wind Warning.

Hurricane/Tropical Storm:

A hurricane is a tropical cyclone with sustained winds that have reached speeds of 74 mph or higher. A storm reaches hurricane status only after strengthening over a period of days or even weeks. A tropical storm has a maximum sustained one-minute wind speed of 39 to 73 mph. As a hurricane moves toward the coast, it loses wind speed and may be downgraded to a tropical storm. This is the case in many of the tropical storms that have reached Vermont. In general, severe hurricanes are not considered likely, nor do they pose a recurring threat for Vermont. Hurricanes and tropical storms are hazard events that often result in high winds, inundation flooding, and fluvial erosion impacts. The topography and landscape in Vermont contribute to the risk associated with these three hazard impacts. Many of Vermont's villages, towns and cities are located in or proximate to the floodplain and many roads in Vermont run parallel to rivers.

The Atlantic Ocean hurricane season runs from approximately June 1 through November 30, with the majority of hurricane activity occurring between mid-August through October.

Thunderstorm:

Thunderstorms can produce downburst winds that affect the land immediately beneath a storm. These downburst winds are called microbursts and macrobursts, which move outward from the base of a thunderstorm and can reach speeds in excess of 80 mph. Microbursts (the smaller of the two in terms of area

affected) pose an extreme threat to aircraft. Thunderstorms can range in size and type. An ordinary cell thunderstorm consists of one cell with an updraft and downdraft and produce strong winds, rain, lightning, and even hail. Multicell cluster thunderstorms consist of several ordinary cell thunderstorms in the vicinity of each other. Multicell cluster thunderstorms are extremely prone to causing flash flooding. Squall line thunderstorms move in a line or front that can exceed 100 miles in length, with the strongest rains and winds at the front of the storm. Supercell thunderstorms are the largest, longest lasting, and most devastating thunderstorms. Nearly all tornadoes are formed from supercell thunderstorms. Lightning, hail, flash flooding, and tornadoes are all associated with this type of thunderstorm.

In Vermont, high winds are most often seen accompanying severe thunderstorms. In fact, straight-line winds are often responsible for most of the wind damage associated with a thunderstorm. These winds are frequently confused with tornadoes because of similar damage and wind speeds; however, they are not rotating like the winds of a tornado. Thunderstorms and associated hazards can occur anywhere in Vermont at any time of the year; however, spring and summer are the most common times for severe thunderstorms.

Tornado:

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds capable of reaching in excess of 250 mph. Damage paths can be in excess of a mile wide and 50 miles long. Since 1950, Vermont has experienced 49 tornadoes, 14 of which were magnitude F2 (significant) and 19 magnitude F1 (moderate) on the Fujita Scale. F2 tornadoes have maximum wind speeds of 113 to 157 mph, while F1 tornadoes range from 73 to 112 mph. Damage from tornadoes has ranged from a few downed trees to seven injuries during a 1970 tornado in Franklin County. Property damage has totaled over \$5.5 million overall in the State of Vermont due to tornado damage. There have been no deaths as a result of a tornado in Vermont since 1950. Tornadoes typically occur in Vermont between March and August; however, tornadoes can strike at any time of the year if the essential conditions are present.

Location

Wind, which typically flows from west to east across Vermont, is most significant on mountain peaks, where wind speeds are highest. Downslope windstorms can occur as a result of cold dense air traveling over a mountain peak and accelerating down the slope, reaching high wind speeds at the base of the mountain. Wind flow that is orthogonal to mountains will cause more damaging downslope windstorms than wind flow running parallel. Thus, areas of Vermont that are located at the base of the Green Mountains are especially vulnerable to wind-related hazards.

History

Most wind episodes in Tunbridge tend to knock down a few trees, which tend to take out electrical power infrastructure. Occasionally there is enough damage to cause long-lasting power outages. Sometimes downed trees on roads significantly impede access and egress.

Date	Event	Location	Extent and Impacts
2/28/2024	Strong Wind	Orange County	Strong low pressure moved northeast across the Great Lakes on February 28th, but created a strong pressure gradient between this storm and high pressure across the Canadian Maritimes. This allowed strong south-southeast winds ahead of a cold front associated with the strong area of low pressure and southwest winds behind the frontal

			boundary. The strongest winds occurred along and behind the cold front during the evening and early night hours of February 28th. Numerous reports of wind gusts in excess of 45 mph with several gusts in excess of 55 mph occurred along with downed tree limbs, branches and subsequent power outages. Power outages across VT were between 15,000-20,000.
7/18/2023*	High Wind	Tunbridge	High wind snapped and tipped up trees and closed Town Farm Rd, Potash Road, Belknap Rd, and a fallen tree damaged a residential to the roof to the point the whole roof had to be replaced. Power lines were knocked down but there is no count of how many customers lost power.
12/23/2022	High Wind	Orange County	An extremely powerful winter storm located in the eastern Great Lakes and Ontario delivered strong southeast winds of 25 to 35 mph with frequent gusts of 50-60+ mph during the morning hours to higher elevations, western slopes of the Green mountains and the Champlain valley. The result was numerous to widespread tree and utility damage (70,000 customers lost power at the peak, >100,000 total) as well as fallen trees onto vehicles and structures.
6/8/2008*	Thunder-storm Wind	Tunbridge	A mid-atmospheric disturbance moved across central Vermont during the afternoon of June 8th, which created scattered thunderstorms. One thunderstorm caused destructive winds in Tunbridge that sheared dozens of trees and damaged a barn roof and a grain silo was overturned and moved 200 feet.
9/29/2005	High Wind	County-wide	A storm system moved rapidly across the Province of Quebec on the 29th of September. The associated cold front moved across central and eastern Vermont during the late morning and afternoon of September 29th. The front was accompanied by showers and thunderstorms. Large scale damaging winds preceded and followed the front. Trees and power lines were blown down countywide across the counties of Orange and Windsor, with numerous power outages. Winds were generally sustained at an estimated 35 to 45 mph with higher gusts.
9/16-17/1999*	High Wind	County-wide	The remnants of Tropical Storm Floyd moved into southern New England Thursday night (9/16/99) and then across eastern New England on Friday, September 17th. Strong winds combined with saturated soils from heavy rain resulted in many trees and power lines being blown down. The annual "World's Fair", held in Tunbridge, Vermont was closed due to weather and power outages. Rainfall across the county associated with the remnants of Floyd was 5 1/2 to 6 1/2 inches.
8/24/1998*	Thunder-storm Wind	County-wide	An area of low pressure moved across southern Canada. During the afternoon and evening, the associated cold front extended across northern portions of Vermont and New York. Thunderstorms developed along and ahead of the front. In Orange county, numerous trees and power lines were blown down in Chelsea and Randolph, while strong thunderstorm winds damaged a barn in Tunbridge.

Hazard	Location	Vulnerability	Extent	Observed and Potential Impact	Likelihood/Probability
Wind	Town-wide	Wind can damage buildings and blow down trees. Downed trees can cause power outages and block roads, leaving residents vulnerable and increasing the time it takes emergency services to reach vulnerable residents. Trees falling on structures or cars or people can be fatal.	The 2008 shear wind event caused long term power outages and took several days to clear roads.	Damage to electrical infrastructure can cost hundreds of thousands of dollars to repair. Lost economic activity from power outages can affect major events like the Tunbridge World Fair.	<u>Likely</u> : >10% but <100% probability per year, at least 1 chance in next 10 years Climate change could result in stronger windstorms and more intense hurricanes and thunderstorms.

4. Severe Winter Weather: Ice, Snow and Cold

Strong winter weather can include any of the following, alone or in conjunction:

- **Snow Storms:** a heavy accumulation of snow, which can be accompanied by high wind causing drifting snow, low visibility and hazardous travel.
- **Blizzard:** a storm which contains large amounts of snow and/or blowing snow, with winds in excess of 35mph and visibilities of less than 1/4 mile for an extended period of time.
- **Ice storms:** when ice builds up from freezing rain, which can weigh down trees and power lines, causing outages and potentially occurring in conjunction with flooding. Ice storms can occur alone or in conjunction with snow storms, blizzards, and extreme cold.
- **Extreme Cold:** definitions of “extreme cold” can vary across different areas of the country based on what the population is accustomed to in their respective climates. Vermont is adapted to cold conditions; however very cold temperatures remain a threat despite their commonality during Vermont winters.

Severe winter storms bring the threat of heavy accumulations of snow, cold/wind chills, strong winds, and power outages that result in high rates of damage and even higher rates of expenditures. A heavy accumulation of snow, especially when accompanied by high winds, causes drifting snow and very low visibility. Sidewalks, streets, and highways can become extremely hazardous for pedestrians and motorists. Severe winter storms develop through the combination of multiple meteorological factors. In Vermont and the northeastern United States, these factors include the moisture content of the air, direction of airflow, collision of warm air masses coming up from the Gulf Coast, and cold air moving southward from the Arctic. NOAA’s Weather Predictions Center (WPC) recently unveiled a new prediction tool, the Winter Storm Severity Index (WSSI)¹, to provide an indication of the level of winter event severity and impacts (Table 23). The WSSI does not depict official warnings or exact event timing but provides severity level over a given period. The WSSI currently maintains Heavy ice accumulation weighing down mature trees and weighing down power lines in northern, VT 2013. Photo Credit: Vermont Public Radio a 3-day prediction of impacts for the nation, with prototype and experimental systems to display a rolling 24 hr WSSI and a probabilistic WSSI to determine the likelihood of impact, both of which are located on the WPC website.

Potential Winter Storm Impacts	
	Winter Weather Area Expect Winter Weather. • Winter driving conditions. Drive carefully.
	Minor Impacts Expect a few inconveniences to daily life. • Winter driving conditions. Use caution while driving.
	Moderate Impacts Expect disruptions to daily life. • Hazardous driving conditions. Use extra caution while driving. • Closures and disruptions to infrastructure may occur.
	Major Impacts Expect considerable disruptions to daily life. • Dangerous or impossible driving conditions. Avoid travel if possible. • Widespread closures and disruptions to infrastructure may occur.
	Extreme Impacts Expect substantial disruptions to daily life. • Extremely dangerous or impossible driving conditions. Travel is not advised. • Extensive and widespread closures and disruptions to infrastructure may occur. • Life-saving actions may be needed.

The WSSI is broken down into six components that are individually weighted based on the WSSI categories and then summarized into overall severity:

- **Snow Amount:** to depict severity due to total amount of snow or rate of snowfall accumulation.
- **Snow Load:** to depict severity due to total weight of snow on structures (ie. Powerlines and roofs) and natural vegetation (i.e., Trees).
- **Blowing Snow:** to depict severity mainly to transportation due to blowing and drifting snow.
- **Ice Accumulation:** to depict severity of transportation and downed trees/powerlines due to the accumulated ice in combination with wind.
- **Ground Blizzard:** to depict severity to mainly transportation of ground blizzards that develop due to a pre-existing snowpack and strong winds.
- **Flash Freeze:** to depict severity primarily to transportation

of situations where temperatures rapidly fall below freezing during precipitation, with the presence of liquid water.

Significant accumulations of ice can cause hazardous conditions for travel, weigh down trees and power lines, and cause power outages. Freezing rain can also be combined with mixed precipitation and snowfall, hiding ice accumulation and further hindering travel. Ice accumulation on waterways is associated with the potential for ice jams and flooding.

Temperature fluctuations are a result of several meteorological processes. A large area of low pressure and cold air surrounding the poles, known as a polar vortex, is strengthened in the winter (Figure 55). When these polar vortex winds are distorted, due to cyclical strengthening and weakening or interaction with high-amplitude jet stream patterns, they have the potential to split into two or more patterns, allowing arctic air to flow southward along a jet stream. As this arctic air is able to access more southerly regions, extreme cold conditions can be observed in Vermont, which also have the potential to remain over the region for extended periods.

In anticipation of extreme cold temperatures, the National Weather Service may issue the following watches, warnings or advisories, which are aimed at informing the general public as well as the agricultural industry:

- **Wind Chill Warning:** Dangerously cold wind chill values are expected or occurring.
- **Wind Chill Watch:** Dangerously cold wind chill values are possible.
- **Wind Chill Advisory:** Seasonably cold wind chill values but not extremely cold values are expected or occurring.
- **Hard Freeze Warning:** Temperatures are expected to drop below 28°F for an extended period of time, killing most types of commercial crops and residential plants.

- **Freeze Warning:** Temperatures are forecasted to go below 32°F for a long period of time, killing some types of commercial crops and residential plants.
- **Freeze Watch:** Potential for significant, widespread freezing temperatures within the next 24-36 hours.
- **Frost Advisory:** Areas of frost are expected or occurring, posing a threat to sensitive vegetation.

Winter storms are a regular occurrence in Vermont. However, severe winter storms can cause serious damage, including collapse of buildings due to overloading with snow or ice, brutal wind chills, downed trees and power lines, and stranded vehicles. People can be at risk of freezing in extended power outages if they lack wood heat or backup power, and individuals shoveling large accumulations of snow can also be at risk from frostbite, hypothermia, and heart attacks caused by cold and overexertion. While snow removal from the transportation system is standard fare in Vermont winters, extreme snow or ice can close rail and road systems, further jeopardizing any stranded persons that are in danger of freezing or needing medical assistance. Extreme cold in the town of Tunbridge is defined as below zero degrees Fahrenheit for two or more consecutive days.

Severe winter storms include a blizzard on February 15-17 in 1958, which dumped over 30 inches and resulted in 26 deaths in New England. On December 26-27 in 1969, another blizzard left 18-36 inches of snow in northwestern Vermont and a whopping 45 inches in nearby Waitsfield. A string of storms in March 2001 hit the state, beginning with 15-30 inches on March 5-6th (later declared a federal disaster), 10-30 inches on the 22nd, and 10-20 inches on the 30th. Recent years have seen wet snow storms that have toppled trees and caused widespread power outages.

The worst winter storm in terms of damage to hit the state recently was not a snow storm, but an ice storm. In January of 1998, just the right combination of precipitation and temperature led to more than three inches of ice in spots, closing roads, downing power lines, and snapping thousands of trees. This storm was estimated as a 200-500 year event. Power was out up to 10 days in some areas, and 700,000 acres in of forest were damaged in Vermont. Amazingly, there were no fatalities in Vermont, unlike Quebec where 3 million people lost power and 28 were killed. The Town of Tunbridge was impacted by this ice storm.

The most recent winter storm to hit Vermont began on April 3rd, 2024, and lasted through April 5th. Strong winds of 50-60 mph led to over 13,000 outages across the state. A wintry mix of rain, sleet, and snow in the evening of April 3rd transitioned to a heavy, wet snow overnight on April 4th. Snow accumulation in nearby Corinth was approximately 5 inches on April 4th and 13.8 inches on April 5th. Impacts of the storm also included hundreds of motor vehicle accidents, school closings, and 35,000 power outages as a result of weighted trees on power lines.

Over the past few winters, Tunbridge has received numerous snow storms that have dropped significant amounts of snow over a day or two day period. However, the details of these events and the damage they caused are overshadowed by winter weather events of the past. This is not to say such extreme events will not repeat themselves. It should be assumed that extreme winter weather events will occur at some point in the future. The following table documents the occurrence of extreme cold/snow/ice storms in the Town of Tunbridge and in Orange County. Recently some winter weather has knocked out power to Tunbridge for spans of several days.

Date	Event	Location	Extent and Impacts
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04/03/2024-04/05/2024	Winter storm	County-wide; State-wide	Strong winds of 50-60 mph led to over 13,000 outages across the state. A wintry mix of rain, sleet, and snow in the evening of April 3rd transitioned to a heavy, wet snow overnight on April 4th. Snow accumulation in nearby Corinth was approximately 5 inches on April 4th and 13.8 inches on April 5th. Impacts of the storm across the state included hundreds of motor vehicle accidents, school closings, and 35,000 power outages as a result of weighted trees on power lines. Specific damage totals are not known for Tunbridge.
03/09/2024-03/11/2024	Winter storm	Tunbridge; County-wide; State-wide	A wet winter storm led to rain and wet snowfall throughout Vermont. The heavy wet snow led to tree damage, >30,000 in power outages and travel disruptions. Strong wind gusts of over 40 mph led to delays in power restoration. Corinth saw 8.1" of snow accumulation on March 10th.
01/09/2024-01/10/2024	Winter weather	Tunbridge; County-wide; State-wide	A winter storm brought wind gusts of over 60 mph to some locations in Vermont and resulted in over \$1 million in damage across the state. No damages were reported for Orange County. Specific damage totals are not known for Tunbridge.
01/06/2024-01/07/2024	Winter storm	Tunbridge; County-wide; State-wide	A winter storm brought 4-12+" to much of Vermont. Chelsea saw 14" in snowfall. Corinth recorded 4.4" on January 7th and 10.2" on January 8th. The winter storm created hazardous road conditions.
03/13/2023 – 03/14/2023	Winter storm	Tunbridge; County-wide; State-wide	A winter storm brought heavy snow and high wind gusts to much of the region. Many areas saw snowfall rates of 1-2 inches per hour. Corinth recorded 10" of snow on March 14th. The heavy snow and strong wind led to power outages, with 90,000 customers losing power throughout the State. Many roads were closed due to accidents, and many schools were closed as well.
03/03/2022-03/04/2022	Winter storm	Tunbridge; County-wide; State-wide	A winter storm brought snow and mixed precipitation to much of Vermont. Snowfalls generally ranged between 7-12 inches, with nearby Corinth recording 9".
02/03/2022-02/04/2022	Extreme cold/ wind chill	Tunbridge; County-wide; State-wide	An arctic airmass led to dangerously cold temperatures throughout much of Vermont. Daytime temperatures ranged from 0-15 degrees below zero. Wind chills ranged from 20-40 below zero. The extreme temperatures led to school closings and the canceling of outdoor events.
12/16/2022-12/17/2022	Winter storm	Tunbridge; county-wide	A wet snowstorm moved into southern Vermont, bringing heavy, wet snow and causing numerous power outages. 17.2" of snow was reported in nearby Corinth. More than 100,000 power customers were impacted by the storm. Estimated damage costs are not known.
02/03/2022-02/04/2022	Winter storm	Tunbridge; county-wide; state-wide	An arctic front moved across Vermont on the morning of February 3rd, bringing light rain that changed to snow. The front continued in the region through February 4th, with heavy snow, freezing rain, and sleet falling throughout the region. Total snowfalls ranged from 10-14", with some areas seeing ice and power outages. 13" was recorded in nearby Corinth.
12/18/2021-12/19/2021	Winter storm	County-wide; State-wide	A weak low pressure system brought 5-8" of snowfall across the state. 7" was recorded in Corinth. Property damages for Orange County were estimated at \$10,000.
12/16/2020-12/17/2020	Winter storm	Tunbridge; County-wide; State-wide	A nor'easter moved up the Atlantic Coast and through southern Vermont. Snowfall rates ranged from 2-4+ inches per hour. Snowfall ranged from 6-17 inches in much of Orange County, with 17 inches reported in Union Village. 6" was reported in Corinth. There was \$70,000 in estimated damages throughout the region.
02/07/2020	Winter storm	Tunbridge; County-wide; State-wide	On February 6th, a winter storm brought snow, freezing rain, and wet conditions through much of southern Vermont. February 7th brought steadier snowfall, mixed with freezing rain, leading to slick and hazardous road conditions. An estimated 10-20,000 people lost power. Snowfall rates were 1-2+ inches per hour for much of the afternoon of the 7th.
01/20/2019	Winter storm	Tunbridge; County-wide; State-wide	A winter storm brought heavy snow in accumulations of 10"-18", including 15" in nearby Chelsea. The region experienced extremely cold temperatures, with overnight lows at 10-20 below zero and wind chills of 20-40 below zero. Estimated damages for Orange County were \$15,000.
11/26-28/2018	Winter Storm	County-wide	Precipitation moved into the North Country by the afternoon of November 26th, falling as snow at elevations above 1500 feet and rain at lower elevations. By early morning of November 27th, the atmosphere cooled enough to allow for precipitation to change

			over to snow. The heavy wet snow accounted for more than 40,000 outages, leaving 100,000 customers without power due to snow loading on power lines. In Orange county, snow accumulated 6 to 12 inches, including 11 inches in Williamstown, 9 inches in Corinth and Brookfield
12/9-11/2014 (DR 4207 VT)d	Winter Storm	County-wide	The initial phase was rain and wet snow that moved into Vermont during midday of December 9th and changed to a heavy, wet snow during the evening and early night. The second phase was a band of moderate snowfall that impacted much of central and northern Vermont during the afternoon and evening hours of December 10th, then the last phase was scattered snow showers eventually ending on December 11th and 12th. Total snowfall ranged from 4 to 18 inches in Orange county. The heavy, wet nature of the snowfall with snow to water ratios of 8:1 or less accounted for snow-loaded trees that resulted in more than 175,000 power outages in the region from December 9th through December 12th. This was the 2nd most power outages due to weather in the state of Vermont. Tunbridge paid \$25,089.73 to remove debris.
2/23-25/2010	Winter Storm	County-wide	A heavy wet snow fell across Vermont that resulted in snowfall accumulations of 6 to 30 inches with the higher amounts in the higher terrain of central and southern Vermont. The weight of the heavy snow accounted for widespread power outages across the region that resulted in upwards of 50,000 customers without power.
2/14/2007	Heavy Snow	State-wide	Snow moved into southern Vermont around midnight on the 14th, then overspread the rest of Vermont during the early morning hours. Snow fell heavy at times from late morning through early afternoon in southern Vermont and early afternoon through early evening elsewhere, before dissipating during the night. Snowfall rates of 2 to 4 inches per hour and brisk winds of 15 to 25 mph caused near whiteout conditions at times, along with considerable blowing and drifting of the snow, making roads nearly impassable. Further, temperatures in the single numbers above zero combined with these brisk winds created wind chill values of 10 degrees below zero or colder. Snowfall totals ranged from 15 to 25 inches in the Connecticut river valley to 20 to 35 inches elsewhere across Vermont. Some specific snowfall totals include; 19 inches in Chelsea and Strafford (Orange), 27 inches in Corinth (Orange), 31 inches in Randolph (Orange), 32 inches in Bethel (Windsor), 33 inches in Pittsford (Rutland). The deep snowfall (18-30 inches) and deeper snow drifts (4-6+ feet) caused numerous problems, including the blocking of numerous heat vents that resulted in the build-up of carbon monoxide and sent dozens of people seeking treatment at area hospitals. There were additional indirect injuries resulting from this storm, including vehicle accidents and cardiac arrests due to overexertion during snow removal. Snow removal operations took several days and up to a week in some urban communities. In addition, the weight of the heavy snowfall on some weaker roofs, resulted in the partial or total collapse of 20 or more barn roofs and the deaths of more than 100 cattle.

The Town of Tunbridge is no stranger to winter weather and the hazards that it brings. Depending on the event, though especially with heavy, wet snow or ice, and sometimes in combination with high winds, electricity may be knocked out for a few hours or days. The utility companies currently serving the Town of Tunbridge include Green Mountain Power, Washington Electric Coop, EC Fiber and Consolidated Communications. The utilities follow a regular tree- trimming schedule. Tunbridge town officials believe this is satisfactory to mitigate damage and the power outages caused by downed trees and tree limbs during a heavy, wet snow or ice event. In the event of an extended power outage, the Town would evaluate the need to open its overnight emergency shelter, per the guidelines of the LEMP. More often, those without power would seek accommodations with friends or relatives.

Future use of the Town Hall building as a heating center can reduce the safety risks posed by winter weather events. While the Town Hall has not yet been used as a heating center, the hope is to develop the guidelines and a volunteer base over the next year so that the building may be used for this purpose. If there are power

outages, residents would have a space to go where they could stay warm, charge their devices, and maintain lines of communication with friends and family while they wait out the event.

Another complication of falling utility poles is the potential loss of the telephone line. If the landlines are impacted, the possibility presents itself that there is no reliable means of communication in the affected parts of Town as cell reception can be spotty. If the power is out, an internet connection is unlikely to be available.

Heavy, wet snow or large quantities of snow may also leave structures vulnerable to roof collapse. Roof collapse occurs when the structural components of a roof can no longer hold the weight of snow. Flat roofs are most vulnerable to collapse because they do not drain well and the snow on the roof soaks up water like a sponge, increasing the weight that the roof must bear. More common, it seems, is the collapse of barns commonly used for livestock sheltering and other agricultural purposes. Unfortunately, livestock in the barn are often killed, and equipment stored in the barn may be damaged or ruined. It is difficult to determine whether a residential structure or a barn would be rebuilt after a roof collapse because the decision to rebuild would likely depend on the extent of damage. The collapse of a barn roof is likely to be a total loss, and the collapse of a house roof may be a 50% loss.

In general, winter weather is most hazardous to travelers. Icy and snow-covered roads present multiple examples of dangerous driving conditions and situations. In Tunbridge, the mountainous terrain, steep slopes, and remoteness of some roads further complicate travel. The Town relies on Travel Advisories issued by Vermont Emergency Management and the National Weather Service to alert residents of dangerous travel. Despite this, it is difficult to prevent people from driving during winter weather events. As a result, emergency services personnel must always be prepared to provide assistance to stranded drivers or to those who have been in an crash.

Climate change will also likely play a role in the future impacts of this hazard. While average temperatures increase, extreme cold is still possible with the destabilization of the polar vortex. A warming climate will likely lead to more mixed winter precipitation. Mixed precipitation, or heavier, wetter snow, could result in more downed trees, power lines, road closures, and traffic accidents. Vermont is also already experiencing more intense and prolonged mud seasons due to early spring snowstorms and warmer temperatures. This can make rural roads difficult to travel and can complicate access to many parts of town. The probability of winter flooding events may also increase as well. Proactive action to improve road safety and reduce the likelihood of road and infrastructure damage will need to account for these potential changes.

Hazard	Location	Vulnerability	Extent	Observed and Potential Impact	Likelihood/Probability
Severe Winter Weather: Snow, Ice and Cold	Town-wide	The entire Town is vulnerable, including road infrastructure, town and privately owned buildings, and utility infrastructure. Isolation and possible loss of power for vulnerable populations.	Snowfall varies from a few inches to over a foot or more. Heavy snow and wind down trees and power lines. Snow/ice contribute to hazardous driving conditions. Maximum extent for each hazard includes the following: Snowfall: Occasionally	Ice storm of 1998. ¼ inch of ice and road closures. Downed power lines led to power outages of up to 10 days in some areas. 700,000 acres of forest damaged. Estimated \$80,000 in damages for Orange County. Valentine's Day Blizzard in	<u>Likely:</u> >10% but <100% probability per year, at least 1 chance in next 10 years Climate change may reduce winter snow accumulation but could lead to more intense winter storms or more ice storms. Destabilized

			30+”. Ice Storm: The ice storm of 1998 brought ¼ inch of ice and widespread power outages throughout Vermont. No local data is available. Extreme Cold: -50 degrees (Bloomfield, Vermont). Minimum temperature is regularly in the negative twenties in nearby Corinth. No local data is available.	2007 collapsed 20 barns, leading to the death of over 100 cows. Multiple people were hospitalized for motor vehicle crashes, cardiac arrests from exertion during snow removal, and CO exposure when deep snow blocked heating vents.	polar vortex may result in more intense cold snaps where temperatures can drop to dangerous lows and stay below freezing for extended periods of time.
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5. Extreme Heat

The definition of a heat event varies depending upon the typical weather patterns of the local environment and the vulnerabilities of the population. The Burlington Weather Forecast Office of the National Weather Services, which covers the Town of Tunbridge, has established the following thresholds:

- **Excessive Heat Warning:** Daytime heat indices¹ equal to or greater than 105°F for two or more hours
- **Heat Advisory:** Daytime heat indices between 95°F and 104°F for two or more hours.
- **Excessive Heat Outlook:** Three or more days of temperatures equal to or higher than 90°F
- **Excessive Heat Watch:** A prolonged period of excessive heat may occur within 48 hours.

The Vermont Department of Health defines a “hot day” as one during which the maximum temperature is 87°F or hotter. Climate change is increasing both the average annual temperature in Vermont and the number of hot days per year. The state’s climate models predict that the number of days per year with a statewide average temperature at or above 87°F, which averaged about 7 between 2000 and 2016, will increase to 15 to 20 by mid-century and 20 to 34 by the end of the century.

Heat events have serious impacts. Health data have shown that when the statewide average temperature reaches at least 87°F, Vermonters are 8 times more likely to suffer heat-related illnesses (e.g. heat exhaustion, heat stroke, etc.). People aged 15 to 34 or over 74 years old experience the highest rates of heat-related illnesses. Moreover, senior citizen (ages 65 or older) morbidity increases by 1 person per hot day. Chronic medical conditions, a job that requires outdoor work, and a lack of air conditioning are compounding risk factors.

Other potential impacts of higher temperatures include: increased incidence of vector-borne diseases such as Lyme disease and West Nile virus; toxic cyanobacteria blooms in lakes and ponds;

¹ The heat index factors in relative humidity as well as air temperature to provide a measure of apparent temperature (i.e., what temperature feels like to the human body).

ecological changes; economic disruption in the agriculture and forestry sectors; damage to highways, roads, and railroad tracks; stress on automobile and train cooling systems and resulting mechanical failures; power outages caused by excessive demand for electricity or by the sagging of electrical lines in high temperatures; and strains on water supplies, particularly if high temperatures are exacerbating a drought. It is anticipated that climate change will only exacerbate these impacts.

Future use of the Town Hall building as a cooling center can reduce the safety risks posed by extreme heat events. The Town Hall has not yet been used as a cooling center, but the hope is to develop the guidelines and a volunteer base over the next year so that the building may be used for this purpose. While anyone may be at risk during extreme heat events, older adults and people with chronic health conditions or disabilities are often at heightened risk. Along with the vulnerable groups listed above, the State Hazard Mitigation Plan identifies many other factors that could increase susceptibility to extreme heat.² Ensuring residents, especially vulnerable residents, are aware of the Town Hall's use as a cooling center, can help to reduce the health impacts associated with these events.

The following list indicates the history of heat events reported for Orange County in the National Weather Service Database. Tunbridge does not have a weather station. Therefore, data from nearby Corinth was used.

There has been one fatality from heat related causes at the Tunbridge Fairgrounds in recent years. Response to this emergency was delayed by other patients needing care for heat related ailments. One dog left in a vehicle at the fairgrounds died due to heat.

History of Occurrences:

Date	Event	Location	Extent and Impacts
06/23-24/2025	Heat Event	Orange County; Statewide	A heat dome on June 23rd with a considerably hot and humid airmass with temperatures in the 90s and oppressive dewpoints in the low to mid 70s. Heat index values ranged from the mid-upper 90s across northeast VT to the 100 to 110 range across the Connecticut river and Champlain valleys. Temperatures were only a few degrees lower for most of VT on June 24th but still dangerous hot with heat index values mainly between 95 and 110. Health related impacts were not available. Daily High temperature records were set at Burlington on June 23 rd at 99 degrees (tied for 4 th warmest all time) and 24th at 97 degrees.
6/18-23/2020	Heat Wave	Orange County; Region-wide	The 2nd longest heatwave in modern history (1900-onward) occurred across portions of NY and VT from June 18th through June 23rd. Temperatures exceeded

² See 2023 State Hazard Mitigation Plan, Extreme Heat Vulnerability, p. 105.

https://vem.vermont.gov/sites/demhs/files/documents/2023%20SHMP_Adopted%20Draft%20Jan2024.pdf

			90 degrees for up to 6 consecutive days in portions of the Champlain and Connecticut River valleys. Daily High temperature records were set at Burlington on June 22nd and June 23rd with high temperatures of 96 for both days.
07/01/2018-07/06/2018	Heat Wave	Orange County; Statewide	Heat indices ranged from 100-110 degrees across Vermont. Temperatures persisted in the mid-to-high 80s for the duration of this period in nearby Corinth. Several deaths were reported as a result of the heat across the State. There were no deaths reported for Orange County. There is no available local data on the size of land that was impacted.
03/17/2012 – 03/22/2012	Heat Event	Orange County; Statewide	Record heat in July brought maximum temperatures 30-40 degrees above normal. Corinth clocked temperatures in the 70s from March 19-23. These warm temperatures cut the maple sugaring season short, resulting in an estimated 30% loss. Crop damages were estimated at \$1 million. Ski resorts were also hit hard by the unusually warm winter, reduced snow pack, and early closures. No local damage estimates are known, and there is no available local data on the size of land that was impacted.
07/21/2011-07/24/2011	Heat Wave	Orange County;	A heat ridge brought successive days of high temperatures to portions of Vermont from July 21 st through July 24 th . Maximum temperatures were in the 90s, with heat index values of 100-108 in parts of the Connecticut and Champlain Valleys. The high temperature recorded in nearby Corinth was 90 degrees on July 22 nd and 23 rd . There is no available local data on the size of land that was impacted.
08/01/2006-08/02/2006	Excessive Heat Event	Orange County;	A “heat ridge” moved into Vermont on August 1 st , bringing temperatures into the 90s. Dewpoints in the 70s pushed heat index values to between 100-105 degrees. In nearby Union Village, the temperature registered 95 degrees on August 1 st and 97 degrees on August 2 nd . There is no available local data on the size of land that was impacted.

Hazard	Location	Vulnerability	Extent	Observed and Potential Impact	Likelihood/Probability
Extreme Heat	Town-wide	Structures without air conditioning would be most directly impacted. In the event of power outages, all structures would be affected. The elderly and very young are at risk. Extreme heat could pose a risk to fire response.	The highest nearby temperature recorded was in Corinth, VT, when temperatures reached 92 degrees in 2025. Heat indices up to 110 degrees have been reported in Orange County (2025).	Heat events can damage infrastructure, endanger or kill people, and can cause severe crop damage. 30 Orange County residents visited the Emergency Room due to heat-related illness between 2013-2019. A record-breaking warm spell in March 2012 caused approximately \$1 million in damages to the maple sugar harvest in Orange County.	Highly likely, especially as the atmosphere traps more heat and destabilizes jet streams, leading to more heat domes

V. Mitigation

A. Mitigation Goals

- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of drought.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of flash flooding, flooding and fluvial erosion.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazards of high wind.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of severe winter weather, including snow, ice and extreme cold.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of extreme heat.

B. Excerpted Town Plan Goals & Objectives Supporting Local Hazard Mitigation (Excerpts from the Tunbridge Town Plan adopted on 12/14/2021)

- The Tunbridge Selectboard shall annually update the Town's Local Emergency Management Plan. (p. 49)
- Tunbridge's Emergency Services Committee shall review and update Tunbridge's police, fire, ambulance services every five years or as needed. (p. 49)
- The Town of Tunbridge should be proactive in preparation for potential changes in Public Safety Access Point (PSAP) dispatch services. (p. 49)
- New development within the limits of the 100-year floodplain is discouraged to mitigate the damage to health and property from future flooding. Improvements to existing structures in the floodplain are acceptable, provided that careful planning is done to insure against unnecessary loss of property or public endangerment. (p. 66)
- Developments adjacent to wetlands should be planned so as not to result in undue disturbance to wetland areas or their function. Mitigating measures to protect the function of a wetland are an acceptable measure. (p. 71)

- Tunbridge prohibits all new net fill and construction of buildings floodways (p. 76)
- Flood hazard regulations should be extended to limit development in River Corridor areas identified as at risk to fluvial erosion and not protected by town highways or existing development. (p. 76)
- Tunbridge should continue working to update hazard mitigation plans and emergency preparedness and recovery procedures. (p. 77)
- The Town should continue to maintain and update town bridge and culvert inventories. This information should be used to develop a schedule to replace and update undersized structures. (p. 77)

C. Current Capabilities: Existing Hazard Mitigation Programs, Projects & Activities

The Town of Tunbridge is currently engaged in the following hazard mitigation programs, projects and activities:

Table 2 Tunbridge Existing Mitigation Actions and Ability to Improve

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability To Expand/Improve On
Community Preparedness Activities	Program — Annual update of Local Emergency Management Plan (LEMP).	Volunteer time from the Emergency Management Director/ Coordinator; assistance from TRORC. Funding from Vermont Emergency Management (VEM).	This document is reviewed and updated each year to ensure that the contact information of emergency response personnel is up-to-date. This information is then sent to Vermont Emergency Management for their records. Tunbridge could add annexes for specific hazards.
	Program — Participation/attendance in the Regional Emergency Management Committee (REMC)	Staff/volunteer time from the Emergency Management Director/Coordinator, meetings convened by TRORC. Funding from VEM.	The Town's current participation in REMC is satisfactory. Therefore, there is currently no need to expand or improve on this program.
	Completed Action — Designated Red Cross Shelter (Tunbridge Elementary School)	Staff time from the Town Clerk and volunteer time from the Emergency Management Director/Coordinator and Selectboard, and perhaps other emergency management personnel. Funding from American Red Cross.	This was a one-time action, but the Town may want to designate other shelters as Red Cross Shelters. This activity could be expanded by utilizing the Town Hall building on an as-needed basis during extreme weather events. There is also a need to train shelter volunteers in order to operate shelter as needed.
	Action — Keep personal protective equipment stocked	Staff/volunteer time from EMD, Health Officer.	This is working well, no need for improvement
	Action — Ensure that all firefighters have and	Volunteer time from Tunbridge Fire Department	This is working well, no need for improvement

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability To Expand/Improve On
	maintain up-to-date training.		
Insurance Programs	Authority/ Program — participation in National Flood Insurance Program (NFIP) [Note: This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3)(ii).]	The Floodplain Administrator serves as the NFIP Administrator. Assistance from TRORC and Vermont ANR. Funding from annual town budget.	The Town's initial Flood Insurance Rate Map (FIRM) was dated 01/17/1975. The Town's current Flood Insurance Rate Map (FIRM) was dated 04/01/2012. The Town continues its participation in the NFIP by administering and enforcing its Flood Hazard Bylaw. New FEMA FIRM maps are expected to roll out in the next several years and will be adopted by the current flood regulations. The Town of Tunbridge adopted its most current Flood Hazard Bylaw on 6/17/2014.
Land Use Planning	Policy/Program — Town Plan	Volunteer time from Planning Commission, and assistance from TRORC and other state agencies on specific subject matter. Funding from Municipal Planning Grants.	The Town Plan is updated every eight years, as required by statute. The Planning Commission may expand or improve on any section it deems necessary, or that is required by changes in state statute.
	Authority — Flood Hazard Area Regulations	Volunteer time from the Planning Commission, and assistance from TRORC. Funding from Municipal Planning Grants.	During the Town Plan review/update period, the Flood Hazard Bylaw may also be reviewed and updated if needed.
	Vermont has adopted statewide residential and commercial building codes for safety and energy standards. Building codes are enforced by Vermont's Division of Fire Safety. Residential and Commercial Building Energy Standards are building energy codes that apply to all new	Tunbridge does not enforce a local building code.	The Town has limited financial and staff capacity to enact and enforce building codes. Building codes are enforced at the state level by the Vermont Division of Fire Safety.

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability To Expand/Improve On
	residential and commercial construction in the State.		
	Policy/Program — Local Hazard Mitigation Plan	Volunteer time from Town officials; assistance from TRORC and VEM. Funding from FEMA; VEM; TRORC.	The 2026 Local Hazard Mitigation Plan will replace the 2021 Plan. The LHMP will be updated at least every five years.
Hazard Control & Protection of Critical Infrastructure & Facilities	Program/Action — Flood Buyouts	Volunteer time from Town officials; assistance from TRORC and VEM. Funding from HMGP and CDBG.	This is working well, no need for improvement
	Program — Projects with White River Partnership for water quality improvement	Staff time from the White River Partnership, volunteer time from town officials, possibility for volunteer hours or town match requirements (based on grant). Permission/buy-in from private landowners for some projects. Funding (state and federal) sought and obtained by the White River Partnership.	This is working well, no need for improvement
	Action — Structures Grant from Vermont Agency of Transportation (VTrans)	Staff time from the Town Grants Manager and Vermont Agency of Transportation (VTrans) staff. Funding from VTrans Structures grant program.	This is working well, no need for improvement
	Action — Better Roads / Grants in Aid	Staff time from the Road Foreman and Highway Department. Funding from Rural Roads grants.	This is working well, no need for improvement
	Program — Planned road maintenance program.	Staff time from the Road Foreman and Highway Department. Assistance from TRORC, Possible funding from VTrans Class 2 Paving Program	This is working well, no need for improvement
	Action — Ensure that all emergency response and management personnel continue to receive	Volunteer time from Fire Department. Funding from local resources.	This is working well, no need for improvement

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability To Expand/Improve On
	HAZMAT Awareness training at a minimum.		
	Action — Issue a Conserve Order in instances of drought.	Volunteer time from Fire Department and Fire Warden	There is no municipal water. Enhanced awareness of forest fires and limited issues with firefighting water supply
	Action — Enact burn bans when needed to reduce wildfire risk	Volunteer time from Fire Warden and Tunbridge Fire Dept	This is working well, no need for improvement
	Action — Consistently document infrastructure damage after weather events.	Staff time from the Road Foreman	This is working well, no need for improvement
	Action — Clear and maintain town road rights-of-way, and work with local utilities to request that utility corridors are cleared and maintained, as needed.	Staff time from Road Foreman and Highway Department, local contractor as needed.	This is working well, no need for improvement
	Action — Maintain and update town bridge and culvert inventories. Regularly inspect and maintain town bridges and culverts; and develop a schedule to replace undersized culverts.	Staff time from Road Foreman and Highway Department. Possible resources include TRORC and VTrans.	Culvert inventory completed in 2025, need to complete Bridge inventory.
	Program — town highway mutual aid	Fire Department and neighboring towns help each other with road maintenance and sharing equipment	This is working well, no need for improvement
Education/ Public Outreach	Ongoing Action — Distribution of 211 Flyers and VTAlert Flyers	Volunteer time from the Emergency Management Director/Coordinator. Funding from 211 for fliers.	This is working well, no need for improvement
	Ongoing Action — Annual River Cleanup	Volunteer time from the Fire Department, Tunbridge Womens' Group, Town Office, Selectboard, Planning Commission	This is working well, no need for improvement
	Ongoing Action -- Continue to identify and assist town residents who	Volunteer time from the Fire Chief/EMD, Planning Commission, Town Listers,	This is working well, no need for improvement

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability To Expand/Improve On
	are vulnerable to severe winter hazards (e.g., freezing temperatures, power outages).	Utility Companies, Neighbors Helping Neighbors	
	Ongoing Action—Community training for Red Cross Shelter designation	Volunteer time from the Emergency Management Director/Coordinator and Selectboard, and perhaps other emergency management personnel. Funding from American Red Cross.	There is a need for more trained volunteers to operate the shelter. The Planning Commission is planning a volunteer fair/block party to recruit new volunteers.
	Seek and participate in trainings for town officials; including but not limited to table top exercises.	Volunteer time from Emergency Management Director with liaison with Staff time from TRORC.	There is no need to expand or improve on this action.

D. Hazard Mitigation Strategies: Programs, Projects & Activities for 2026-2031

Vermont Emergency Management encourages a collaborative approach to achieving mitigation at the local level through partnerships with Vermont Agency of Natural Resources, VTrans, Vermont Agency of Commerce and Community Development, Regional Planning Commissions, FEMA Region 1 and others. That said, these agencies and organizations can work together to provide assistance and resources to towns interested in pursuing hazard mitigation projects.

With each mitigation strategy, general details about the following are provided: local leadership, possible resources, implementation tools, and prioritization. The prioritization category is based upon the economic impact of the action, Tunbridge’s need to address the issue, the cost of implementing the strategy, and the availability of potential funding. The cost of the strategy was evaluated in relation to its benefit as outlined in the STAPLEE guidelines (includes economic, political, environmental, technical, social, administrative, and legal criteria). A range of mitigation strategies was vetted by the committee, and those that were determined to be feasible are included in the table below.

Strategies given a “High” prioritization indicate they are either critical or potential funding is readily available, and should have a timeframe of implementation of less than two years. A “Medium” prioritization indicates that a strategy is less critical or the potential funding is not readily available, and has a timeframe for implementation of more than two years but less than four. A “Low” prioritization indicates that the timeframe for implementation of the action, given the action’s cost, availability of funding, and the community’s need to address the issue, is more than four years.

Estimated costs are also accounted for in mitigation strategy considerations. Potential costs are given a range, and are presented as “high”, “medium”, or “low” in the mitigation strategies table. The cost range is the following:

Low = less than \$50,000

Medium = \$50,000-\$100,000

High = more than \$100,000

The Town of Tunbridge understands that, in order to apply for FEMA funding for mitigation projects, a project must meet more formal FEMA benefit cost criteria. A project seeking FEMA funds would undergo a full benefit-cost assessment in the FEMA-approved format. The Town must have a FEMA- approved Local Hazard Mitigation Plan as well.

The following strategies will be incorporated into the Town of Tunbridge’s long-term land use and development planning documents. In addition, the Town will review and incorporate elements of this Local Hazard Mitigation Plan into updates for the municipal plan, zoning regulations, and flood hazard/ river corridor bylaws. Specifically, the Tunbridge Planning Commission will incorporate mitigation strategies included in this Plan into the Tunbridge Town Plan’s goals, policies, and recommendations. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, zoning regulations and flood hazard/river corridor bylaws will also be considered after declared or local disasters. The Town shall also consider reviewing any future TRORC planning documents for ideas on future mitigation projects and hazard areas. The entity underlined and in bold under “Local Leadership” is the primary lead responsible for undertaking that action.

Table 3 Hazard Mitigation Actions

Hazard Mitigation Action	Benefit	Cost	Local Leadership	Prioritization	Possible Resources	Time Frame
All Hazards						
<i>Develop a communication plan to build awareness by providing information to all residents and visitors prior to priority hazard events.</i>	This action will ensure information regarding hazardous conditions or events is reaching residents and visitors.	Low	<u>Emergency Management Director,</u> Selectboard, Town Clerk	Medium	VT Alert; VEM; REMC, local resources*	2027
<i>Establish a road captain system</i>	Create a system where residents can organize hazard response with neighbors	Low	Emergency Management Coordinator	High	Duxbury EMD for advice, VEM, local resources	2027
Drought						
<i>Continue to develop alternate sources of water for fire department needs</i>	Install additional dry hydrants and potentially water storage tanks	High	Tunbridge Fire and Rescue, Emergency Management Director	High	VT Rural Hydrants, homeowners with ponds, local resources	2030

Hazard Mitigation Action	Benefit	Cost	Local Leadership	Prioritization	Possible Resources	Time Frame
<i>Secure emergency access to alternate drafting sites</i>	Enable the fire department to remedy lack of access to water in emergency situations	Medium	Emergency Management Director	High	State Agencies	2027
<i>Set up public access to Town Office well for residents whose water supply is dry</i>	Enable residents to access potable water when their water supply is insufficient	Low	Emergency Management Director, Town Health Officer	High	Vermont Department of Health	2027
<i>In drought emergency, the Town of Tunbridge will ask the Tunbridge Fairgrounds to allow access to water supply</i>	Enable residents to access potable water when their water supply is insufficient	Low	Emergency Management Director, Town Health Officer	High	Vermont Department of Health	2027
Inundation Flooding / Flash Flooding / Fluvial Erosion						
<i>Update Tunbridge's flood hazard area regulations to ensure that they are compliant and consistent with state and federal guidelines and statutes.</i>	Adopting higher flood regulation standards will better protect future development from flood risk.	Low	Planning Commission	Medium	Municipal Planning Grant; TRORC, local resources	2028
<i>Support projects to protect or restore rivers and water quality, including riparian plantings.</i>	Incorporating riparian plantings and floodplain restoration projects in strategic areas can provide areas for flood storage, helping to alleviate peak flows and reduce the loss of property during flooding.	Low	Selectboard/ Planning Commission/ Road Foreman, White River Partnership	Low	White River Partnership; White River Natural Resources Conservation District, local resources	2028
<i>Flood buyout of the Pink House</i>	This will remove a hazard and restore floodplain capacity.	High	White River Partnership	High	VEM, HMGP	2027
<i>Stabilize landslides on Spring Rd and Strafford Rd</i>	Both Strafford and Spring Roads are critical detours when VT 110 is flooded and both are at risk of slope failures	High	<u>Road Foreman</u> Selectboard	High	BRIC funding	2028
<i>Replace and upsize culvert 5 on Strafford Rd from 48" pipe to 9 ft by 6ft box culvert</i>	Upsizing culverts makes infrastructure more resilient and improve capacity during flood and storm events. This culvert is 47% of bankfull width and could fail.	High	<u>Road Foreman</u> Selectboard	High	Better Back Roads, Hazard Mitigation Grant Program, or other state or federal grant opportunities.	2028

Hazard Mitigation Action	Benefit	Cost	Local Leadership	Prioritization	Possible Resources	Time Frame
<i>Replace and upsize culvert on Spring Rd from 15" pipe to 42" pipe</i>	Upsizing culverts makes infrastructure more resilient and improve capacity during flood and storm events.	High	<u>Road Foreman</u> Selectboard	High	Better Back Roads, Hazard Mitigation Grant Program, or other state or federal grant opportunities.	2027
Wind						
<i>Manage and remove dead and dying trees in the Town right-of-way</i>	Reduces risk to power lines and roads, especially as EAB affects ash trees	Low	<u>Road Foreman</u> Selectboard	High	Road crew, fire department, local contractor, utilities	2027
<i>Host a chainsaw class to educate residents on how to safely address downed trees</i>	Enables residents to help in recovery	Low	Emergency Management Director	Medium	VT Forest Parks and Recreation, Game of Logging	2027
Severe Winter Weather (Snow/Ice/Extreme Cold)						
<i>Identify vulnerable populations prior to winter weather events (CARE), provide education and awareness outreach prior to events to mitigate their impacts, and reach out to residents during the event.</i>	Capacity to reach vulnerable residents prior to winter weather events can help ensure that residents are protected when these events occur.	Low	Selectboard, <u>EMD</u>	High	VEM, EMD, Council on Aging/Area Agency, local resources	2027
<i>Activate heating centers when needed (School or Town Hall). May need to replace School Generator.</i>	Providing a centrally-located heating center for residents can reduce risk to health and safety associated with extreme cold and winter weather events.	Medium	Selectboard, <u>EMD</u>	High	VEM, EMD, Council on Aging/Area Agency, Town Center building	2027
Extreme Heat						
<i>Identify vulnerable populations prior to winter weather events (CARE), provide education and awareness outreach prior to events to mitigate their impacts, and reach out to residents during the event.</i>	Capacity to reach vulnerable residents prior to extreme heat events can help ensure that residents are protected when these events occur.	Low	Selectboard, <u>EMD</u>	High	VEM, EMD, Council on Aging/Area Agency, local resources	2027

Hazard Mitigation Action	Benefit	Cost	Local Leadership	Prioritization	Possible Resources	Time Frame
<i>Make a plan for a cooling center. Road captains could help connect neighbors to nearby homes with AC. Tunbridge will work on an agreement with Royalton to send Tunbridge residents to cooling centers in Royalton.</i>	Providing a centrally-located cooling center for residents can reduce risk to health and safety associated with extreme heat events.	Medium (if local center needed)	Selectboard, <u>EMD</u>	High	VEM, EMD, Council on Aging/Area Agency, Town of Royalton	2027

*Depending on the mitigation action, local resources may include the following: personnel/staff time, volunteer time; budget line items, donations, cash from capital campaigns, among others.

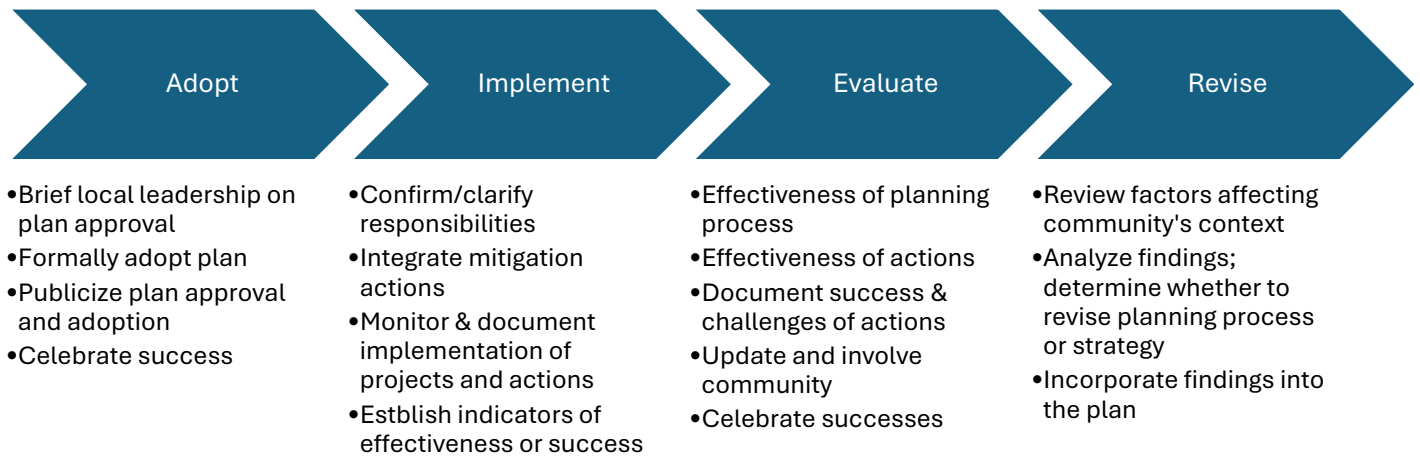
VI. Appendices

Appendix A: Hazard Ranking Methodology

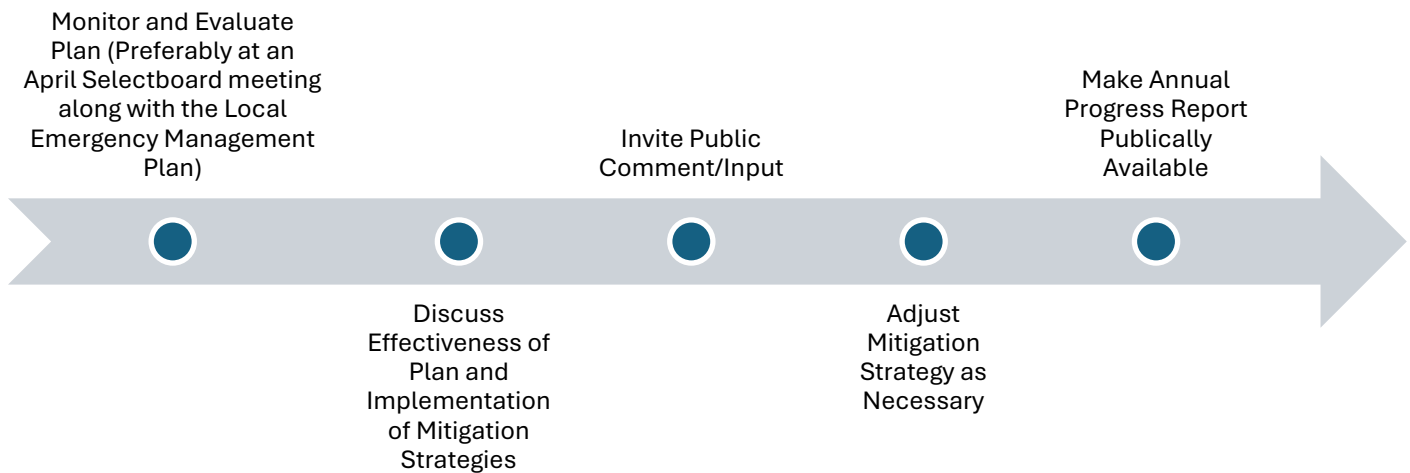
Score	Frequency of Occurrence: Probability of a plausibly significant event.	Potential Impact: Severity and extent of damage and disruption to population, property, environment, and the economy.
1	Unlikely: Less than 1% probability of occurrence per year.	Negligible: Isolated occurrences of minor property and environmental damage, potential for minor injuries, minor economic disruption.
2	Occasionally: 1% through 10% probability of occurrence per year, or at least one chance in next 100 years	Minor: isolated occurrences of moderate to severe property and environmental damage, potential for injuries, minor economic disruption.
3	Likely: between 10% to 75% probability per year, at least 1 chance in next 10 years.	Moderate: severe property and environmental damage on a community scale, injuries or fatalities, short-term economic impact
4	Highly Likely: 75% or greater probability in a year	Major: severe property and environmental damage on a community or regional scale, multiple injuries or fatalities, significant economic impact

Appendix B: Five-Year Review and Maintenance Plan

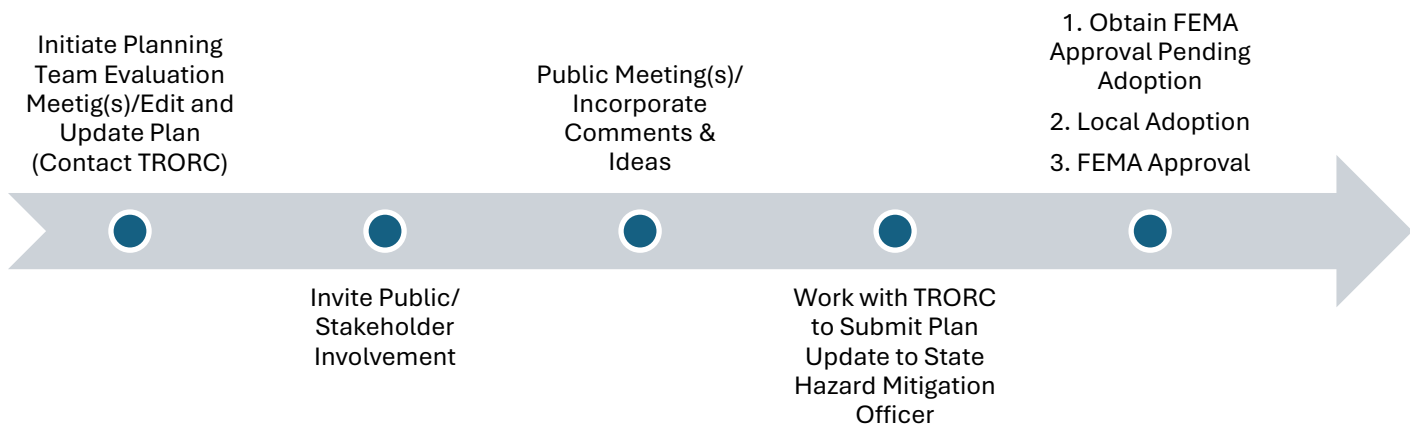
Five-Year Local Hazard Mitigation Plan Review/Maintenance



After Plan Adoption—Annually: Implement & Evaluate



Fifth Year, and After a Major or Federally Declared Disaster Directly Impacting the Town: Evaluate and Revise



Appendix C: Survey Results Summary

Responses Overview Active

Responses

21

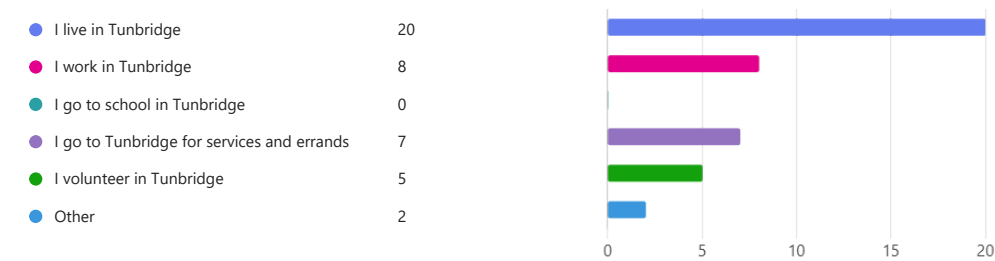
Average Time

73:53

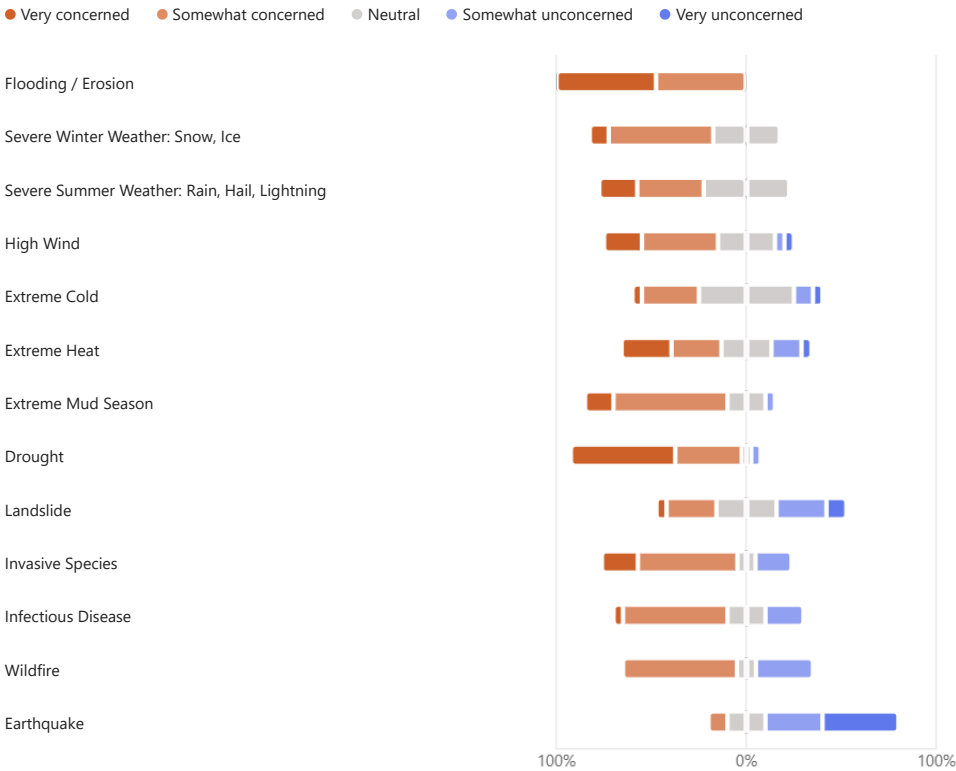
Duration

194 Days

1. What is your relationship with Tunbridge? Check all that apply



2. How concerned are you about the following natural hazards in Tunbridge in the next 5 years?
Consider negative impacts to health and wellbeing, the natural environment, the built environment (homes, infrastructure, etc) and the economy.



3. Are there any other hazards you think should be considered in Tunbridge's LHMP?

6 Responses

unpredictable frost, impact on farming, Blight and junk
Plan for removal, drought conditions, air, water availability, dangerous liquids
easily contaminated, land prices, hazard to our community

Water contamination as a result of or independent of flooding. Lack of water availability due to drought. Many resident have shallow / dug wells that are easily contaminated or become unavailable due to drought conditions. Maintaining water supply is critical.

4. Community Lifelines are the most fundamental services in a community that help all other parts of society work. People, places, infrastructure, and organizations can all be lifelines. Please list community lifelines that are important to you and the town of Tunbridge.

16 Responses

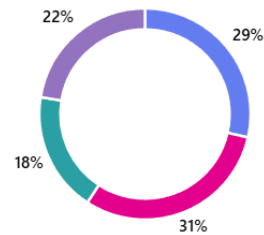
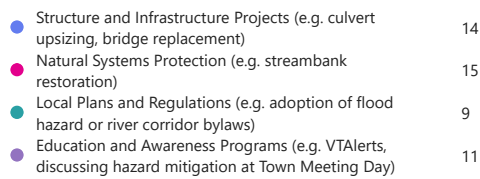
Volunteer Fire, responders - fire, community resource, fire and ambulance, Tunbridge Library, Community Radio, emergency management, town government, Announcements from the town, Fire department, town, neighbors, town hall, town offices, town nurse, things, Tunbridge Neighbors, Local School, Town Clerk, Tunbridge fairgrounds

5. Can you identify any specific "problem areas" that are vulnerable to hazards?

19 Responses

yields due to drought, crossings and few roads, Road washouts, farms - flooding, fairgrounds - flooding, dirt roads, town road, drought, roads, flooding, low-income, flood, hill road, road layouts, road around a river, areas of route, branch, roads - erosion, branch for drought, flooding/erosion

6. What types of mitigation actions would you like to see Tunbridge prioritize?



7. What might make Tunbridge more resilient to hazards?

15
Responses

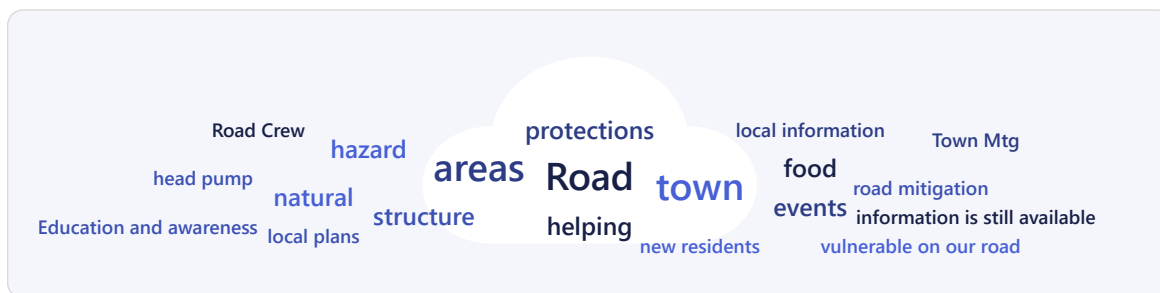
Latest Responses

"Limit building along waterways"

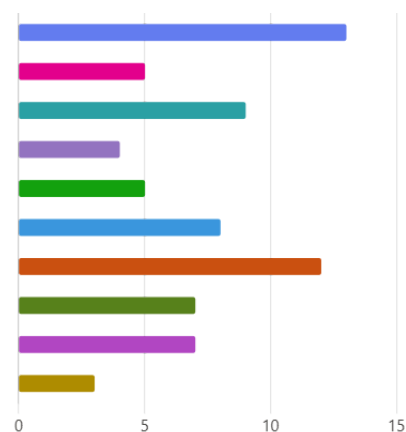
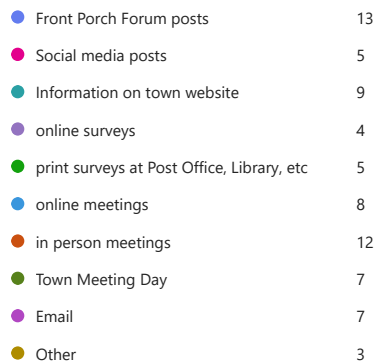
"I think that hazards are going to happen. We need help prevent them or lessen th..."

"natural disaster funds, vote to raise some nominal amount agreed upon by the to..."

...



8. What forums would best involve you in Local Hazard Mitigation Planning?



9. Anything else you would like to provide with regard to hazard mitigation planning or disaster preparedness in Tunbridge?

8 Responses

A word cloud visualization of responses for question 9. The words are arranged in a circular pattern, with the most prominent words in the center. The words are: emergency, helping, Hazard, towns, Emergency Management, nurse for help, Hazard Mitigation, emergency services, project financing, service and TNHN, supply available, lot of these hazard, layer of people, invasive species, better serve, warm weather, ambulance service, people/services, clinic at the Fairgrounds, mowing earlier.

10. **Email** (optional, provide if you would like to be contacted for follow-up and receive email updates)

11 Responses

Are there any other hazards you think should be considered in Tunbridge's LHMP?

- air pollution and solar obstruction (impact on farming) due to wildfire smoke from afar
- collapsing or uninhabitable buildings. Blight and junk piled up on properties and along roadways. Leaking of potentially dangerous liquids from "junked" vehicles or other equipment.
- concerned we won't get snow, ticks, air quality (very concerned), unpredictable frost dates effect home gardens / food production
- Identify if and where there are toxic chemicals environments, brown fields. Plan for removal if possible or containment if not.
- Non local/newly local humans are a great hazard to our community in the upward financial pressure they exert, (even unknowingly) by disrupting our economic fabric, especially around land prices and use. They need to be educated about these affects so they can be responsible to the community. We need to take more control of how land in town is owned and used ~ protected and cared for in many ways ranging from taxation, and ecosystem health.
- Water contamination as a result of or independent of flooding. Lack of water availability due to drought. Many resident have shallow / dug wells that are easily contaminated or become unavailable due to drought conditions. Maintaining water supply is critical.

Community Lifelines are the most fundamental services in a community that help all other parts of society work. People, places, infrastructure, and organizations can all be lifelines. **Please list community lifelines that are important to you and the town of Tunbridge.**

- Every single one, especially Neighbors Helping Neighbors and the Tunbridge Library.
- Fire department, public health, religious groups-clergy, town government and staff.
- Fire Department, Rescue, Highway Department, Local School, Town Clerk, Royalton Community Radio, Local Agriculture
- fire department, town offices, selectboard
- Friendships and events that already exist are wonderful. More robust community programming at the community room next to the library.
- Methods of communication during emergencies when traditional methods may not be operational. I.e., Announcements from the town, reaching fire or police
- Neighbors
- One thing is to identify folks how live off-the-grid as we do. During times of power outage we always have power. We could easily accommodate someone who needs to be medically plugged in. Since our villages are all both in the valley, it would be valuable to identify places that can accommodate people that are on higher land. Also to identify folks who have off road vehicles and snow-machines.
- power response when it's down for >1 week
- Roads are crucial for rural living. We have to travel out of town for most things; also our first responders - fire and ambulance - are key to living in rural areas.

- Safety net after a natural disaster for example funds to help low income people get things they need if drought, flooding and or natural disaster
- school, library, both general stores, fairgrounds, town hall
- Taking care of our elders
- Tunbridge emergency management, neighbors helping neighbors, schools.
- Tunbridge Volunteer Fire Department; Tunbridge Emergency Management Director (Brenda Field); Tunbridge fairgrounds (community resource, including as a water source); Tunbridge town nurse (the concept but not the current person in that role); Tunbridge Neighbors Helping Neighbors; Tunbridge food shelf; Tunbridge Library; Front Porch Forum; Tunbridge Quarterly
- WFVR community radio, Neighbors Helping Neighbors, towing services, local health clinics, internet connection

Can you identify any specific "problem areas" that are vulnerable to hazards?

- "hoarders" of junked cars and other equipment left sitting for years along roadways and near streams.
- all the areas susceptible to flooding; shallow wells; farmland that faces decreased yields due to drought, prolonged rain, prolonged wildfire smoke, etc.; low-income community members who can't afford mitigation efforts
- all the dirt roads!
- Along the river
- Anywhere in the flood plane...that maybe ever expanding. Folks who live across bridges that may be washed out.
- Clear cut logging.
- fairgrounds - flooding, stores - erosion, farms - flooding, all the residential drives/roads - erosion, landslide
- Farms with drought; first branch for drought; invasive plants/bugs
- Flooding in 110 corridor
- flooding/erosion due to hilltops and valleys below as per town road layouts
- I would be concerned about extreme flood events on the First Branch and major tributaries. I don't believe the First Branch has seen the same level of flooding as in Plainfield or other towns impacted by the July 23 and July 24 events
- Inoperable telephone, internet
- Low income elderly and families
- riversides - flood zones
- Road washouts seem way more common than they used to be. I am also worried about wildfires if we have more droughts -- we are so, so heavily forested.
- Several areas of route 110 flood when the first branch reaches flood stage. Lack of alternative routes can be a problem when this occurs. Back roads provide some relief from this condition, but often lead to other areas that may also be cut off. For example - you can take potash hill road to button to avoid the portion of 110 by Belknap that is underwater, but once in Royalton it's likely that the white is up over route 14 at Avery's corner and near Welch's.

- that Tunbridge is organized in two centers along one road around a river with many crossings and few roads that lead out of the valley
- The fairgrounds
- wells and spring affected by drought

What might make Tunbridge more resilient to hazards?

- As a town, Tunbridge needs to take a comprehensive, integrated approach (across structure and infrastructure projects, natural systems protections, and local plans and regulations). Focusing on only one of those areas is merely a bandaid that will not lead to durable mitigation. (Education and awareness programs also are important, but, if we don't significantly reduce the likelihood and/or impact of major events, education and awareness will only go so far.)
- Awareness of the land, e.g. logging, and its effect upon it.
- beaver protection, NOAA weather radio update availability (frequency, strength), getting off fossil fuels dependence when possible, build microgrids.
- Better cell coverage so that information is still available in emergencies. Participation in VT-Alert to send local information. Often there is a heavy reliance on social media to share information, would love to receive information through more local / available options.
- "Comprehensive inventory of culverts - and identification of undersized structures.
- Flood modeling of entire First Branch to identify potential problem areas and scope potential solutions."
- human networks of all kinds that do not rely on digital/wire communications. Perhaps by "neighborhood" or road. Who are the elders, needy, vulnerable on our road? Who on each road could champion this? Where are the ATV's and other small vehicles; strong young people, chain saws, etc....Which houses provide heat when the grid is down. Who has gravity feed water or hand pump or well head pump? Who stores food well, has extra space, etc..... Also, cultivating the spirit of volunteering and knowing each other. Introduce new residents at Town Mtg or have an annual event for Newbies and Oldies, etc....Expand the effort to educate and welcome new residents. We are a perfect town for one or more micro-grids for essential local electricity generation.
- I think that hazards are going to happen. We need help prevent them or lessen the blow and we also need to get things in to place for when they do happen. We have support for our community members.
- I think the Road Crew should keep up the good work. It would be nice if we all knew where to go for information about imminent threats.
- Identify if and where there are toxic chemicals. Plan for removal if possible or containment if not.
- Limit building along waterways
- natural disaster funds, vote to raise some nominal amount agreed upon by the town, voters
- No "quick fixes" to roadways. Spend the money to do it once.
- Promotion of neighborhoods helping each other when isolated: A piece in the Quarterly encouraging neighbors to chat with each other about and form their own network.
- self-preparedness (educ session organized in Royalton recently for 2 week outage was helpful reminder)

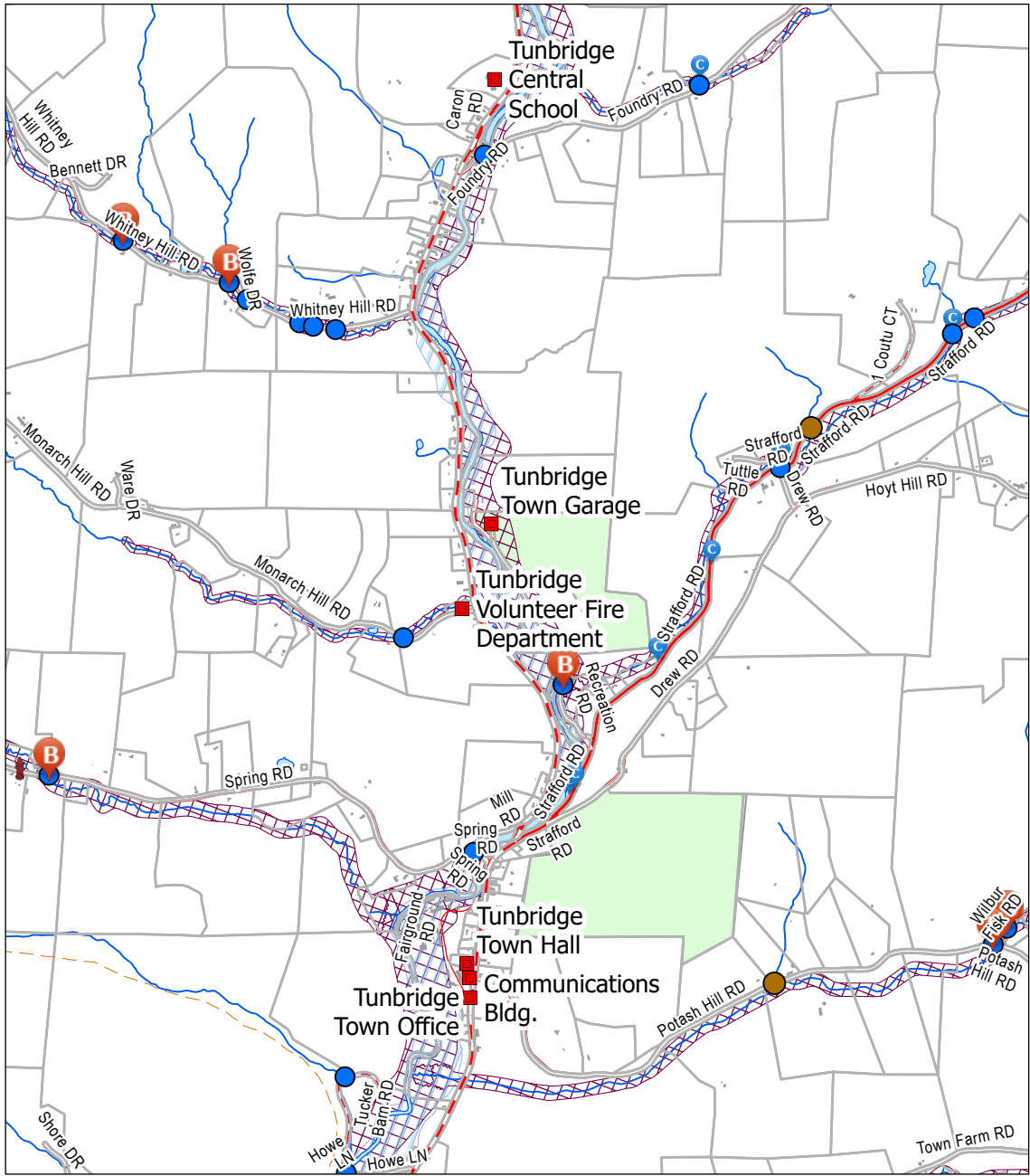
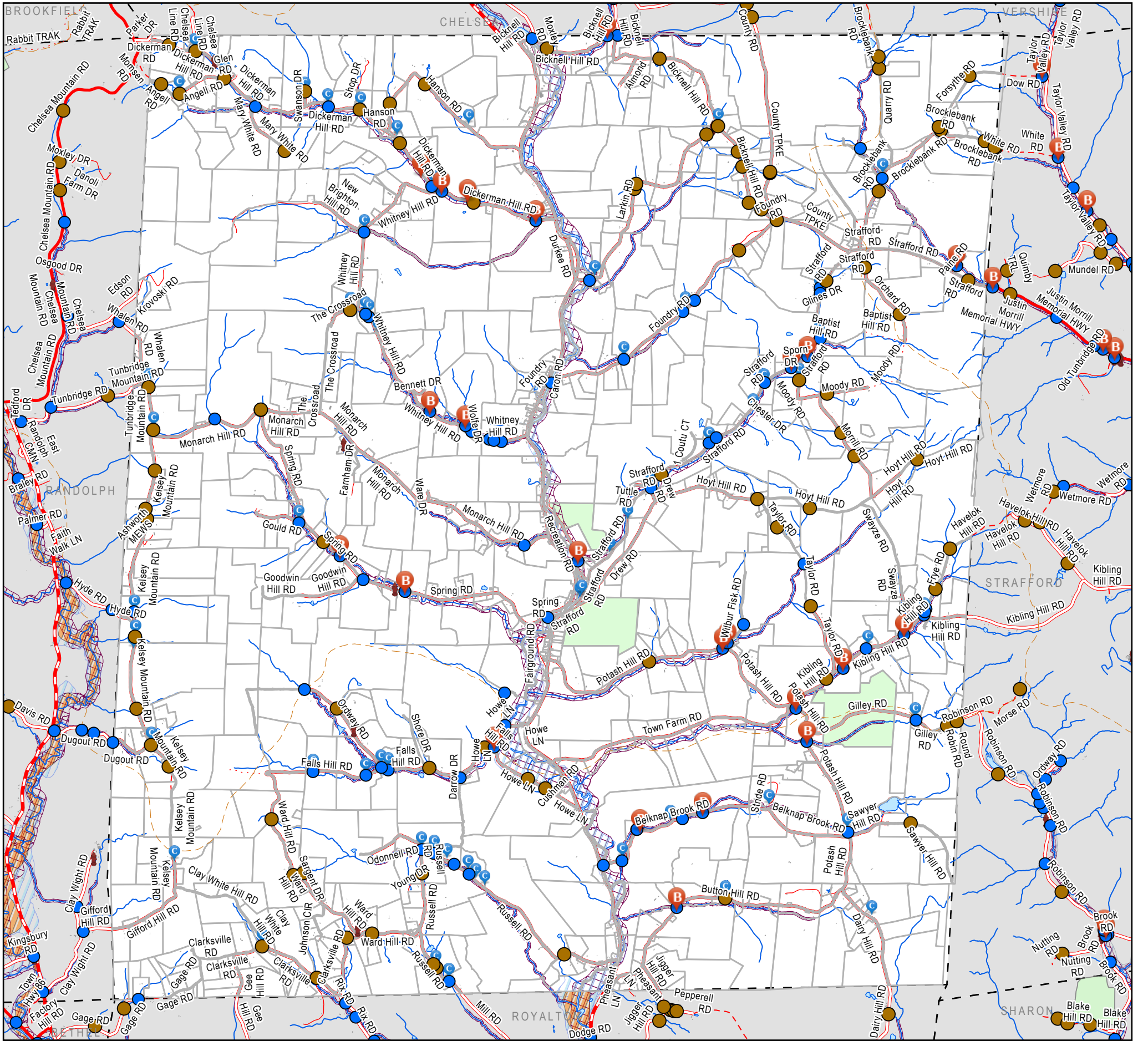
- some cursory hazard mapping (if not/where not in place), budget forecasting for ie road mitigation and protecting esp food producing areas (farm) from destruction

Anything else you would like to provide with regard to hazard mitigation planning or disaster preparedness in Tunbridge?

- A lot of these hazard that occur people reach out to me the town nurse for help during or before or after resources for me to be able to help them. I felt like I was a lot on my own during a lot of of these hazards.
- I work for Vermont Emergency Management's Hazard Mitigation division and am very interested in how VEM can better serve small towns with planning, project financing and project implementation
- Maybe a fun clinic at the Fairgrounds in warm weather re: preparedness, e.g. how to make your own "Go Bag" and kit for being stuck in place.
- natural disaster funds, roadside mowing earlier in order to cut down invasive species prior to their flowering period (this issue has been talked about), residents volunteer to mow with their private tractor with coordination.
- senior housing near emergency services, potable water supply available to townspeople in drought situations (summer and winter)

VII. Attachments

Attachment A: Tunbridge Local Hazard Mitigation Plan Map



Local Hazard Mitigation Plan

Tunbridge, Vermont

Adopted: 2026 DRAFT

- 1% ANNUAL CHANCE FLOOD ZONE
- RIVER CORRIDORS

- Town Facilities
- Stream-Culvert Magnitude
 - Intermittent > 36"
 - Perennial large culvert/box
- Town Bridges
- 36" and greater culverts
- Hydrants
- Trails

- TH cls 1 (village VT rt)
- TH cls 2
- TH cls 2 gravel
- TH cls 3
- TH cls 3 gravel
- TH cls 4 gravel
- TH cls 4 primitive
- TH cls 4 impassable
- VT forest hwy
- trail
- private
- VT route
- US route
- US interstate

Attachment B: Photos

The following 5 photos show the extent of flooding at the Tunbridge Fairgrounds in July 2023.







The following two photos show the damage from an ice jam at the Tunbridge Fairgrounds:







Photo: Tunbridge Volunteer Fire Department using a UTV to combat a wildland fire in 2025



Photo: Table Top Exercise for Mutual Aid Training