1 INTRODUCTION

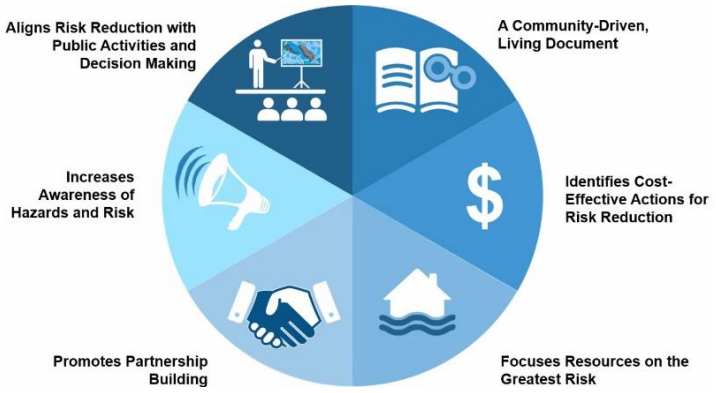
Mitigation planning provides an opportunity for local government to lessen the impact of the next natural disaster. The goal of this Plan is to advance and prioritize mitigation investment to reduce risks posed by natural hazards and to increase the Town of Waterbury's resilience to damages from natural hazard impacts.

Hazard Mitigation is any sustained policy or action that reduces or eliminates long-term risk to people and property from the effects of natural hazards. FEMA and state agencies have come to recognize that it is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck. This Plan recognizes that opportunities exist for communities to identify mitigation strategies and measures during all the other phases of Emergency Management – Preparedness, Response and Recovery. While the hazards can never be completely eliminated, it is possible to identify what the hazards are, where their impacts are most severe, and identify local actions and policies that can be implemented to reduce or eliminate the severity of the impacts.

2 PURPOSE

The purpose of this Plan is to assist the Town in identifying all natural hazards facing the community, ranking them according to local vulnerabilities, and developing strategies to reduce risks from those hazards. Once adopted, this Plan is not legally binding; instead, it outlines goals and actions to prevent future loss of life and property.

The benefits of mitigation planning include:



Source: FEMA LHMP Skill Share Workshop 2021

Furthermore, the Town seeks to be in accordance with the strategies, goals, and objectives of the 2023 State Hazard Mitigation Plan.

3 COMMUNITY PROFILE

Land Use and Development Patterns

According to the 2018 Waterbury Town Plan, the town charter was granted in 1763. First surveyed in 1782 with first permanent colonial settler following a year later. Many water powered mills fed by the tributaries of the Winooski River fueled the early development of the town.

The town grew into
regional transportation a
hub providing access alo
the Winooski River throu
the Green Mountains f
both Rail and Interst
commerce and connectivi
This allowed the town
grow as a major connecti
and commerce point.

Waterbury, Vermont nity
encompassing Waterbur and
Waterbury Center – locat er of
Washington County, in t reen
Mountains. The Winooski River Valley, several mountain ranges, and the gently rolling hills surrounding Waterbury offer a spectacular year-round setting. Waterbury sits just a 20-minute drive from Montpelier, 30 minutes from Burlington, and midway between the popular resort areas of Stowe and the Mad River Valley.

With a lively downtown, numerous tourist attractions, an emphasis on healthy living and family life, and a business-friendly economic climate, our community has become a regional hub. Waterbury is home to Darn Tough, Ben & Jerry's and the Vermont State Office Complex.

With its small-town values, employment opportunities, and disaster recovery experience, Waterbury faced the challenge of rebuilding after the destruction wrought by Irene and continues to maintain its thoughtful approach to future development.

Land Features

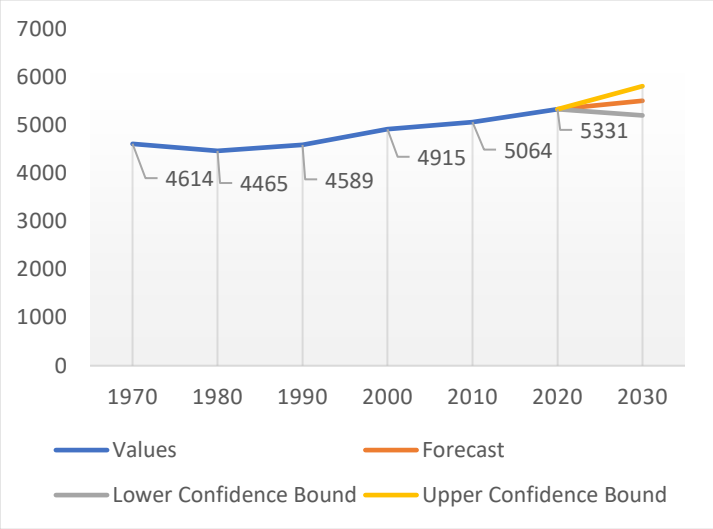
Waterbury's landscape is defined by the Green mountains, Thatcher Brook, Little River and the Winooski River. The Town is nestled between the Green Mountain Range and the Middlesex Range. The southern border

of the town is the Winooski River. The lowest elevation of the Winooski River being ~340ft, the highest point being at 3,327 feet, on the side of Ricker Mountain with the summit being in neighboring Bolton.

Several extensive land areas are owned by the State including Mt. Mansfield State Forest, and C.C. Putnam State Forest.

Demographics and Growth Potential

The 2020 Decennial Census prepared by the U.S. Census Bureau shows an estimated population of 5,331 and 2,559 housing units. Over the last 40 years Waterbury has undergone slow and steady population growth.



Source: Census data with excel projection of expected growth

Between 2010 and 2020, the median age of Waterbury residents changed minimally by +0.9 to 42.8; almost matching the Vermont median age of 42.9. The portion of the population over 65 is 19.0%, compared to 20.6% in Vermont and 16% in the country. The population density of the Town is 111 people per square mile compared to an overall state density of 68.

Precipitation and Water Features

Average annual precipitation is 42 inches per year; with July being the wettest month. Average annual snowfall is 92.8 inches; with January being the snowiest month.

The Winooski River and its many tributaries (Graves Brook, Thatcher Brook, and the Little River) are a major water features in Waterbury.

The most significant water body in Waterbury is the Waterbury Reservoir. Waterbury Reservoir was created in 1935 with a total area of 850 acres and a maximum depth of 100ft. The reservoir was created by the construction of an 1,845 ft dam that stands 187 ft tall.

Drinking Water and Sanitary Sewer

Public drinking water is supplied by the Edward Farrar Utility District. The district serves a population of 1200 accounts throughout the town. The district has 12 wells that serve the overall system. They maintain ~9 miles of pipeline and have 150 hydrants. This system is a gravity fed system with most of the wells being on Sweet Road or Waterworks Road along the Waterbury/Stowe town line.

The Wastewater system

The Edward Farrar Utility District supplies wastewater services for 800 connections. This system has ~45,000 linear feet of gravity sewer lines with an additional ~4,000 feet of 12" forced main line. There are 4 pump stations, 34 North Main Street, 200 Lincoln Street, 546 River Road Ice Center, and 43 Grandview Heights. This system has 293 manholes and

Transportation

Waterbury is ±50 square miles in size with primary access via US Interstate 89, a north-south major arterial route, US Route 2, VT Route 100, served by the New England Central Railroad and the Amtrak Vermonter.

The 2023 VTrans Town Highway data indicates that Waterbury has 55.63 municipal road miles: 1.49 Class 1; 7.94 miles of Class 2; 39.61 miles of Class 3; 6.59 miles of Class 4 (or functionally Class 4). Of the total municipal road miles, ~57% are paved and ~43% are gravel. In addition, there are 10.28 miles of State highway in Waterbury, and 7.998 of US interstate a for a total of ±67.3 traveled highways, including Class 4 roads.

According to the Town's 2017 road erosion inventory, 46% of Waterbury's Road mileage is hydrologically connected - meaning it is within 100-feet of a water resource (i.e., stream, wetland, lake, or pond). Proximity to water resources can make these sections of road more vulnerable to flooding and fluvial erosion. These sections must be up to the standards created for the Municipal Roads General Permit program with a

requirement of 7.5% of non-compliant segments being upgraded per year.

According to the Town's 2023 bridge inventory, Waterbury has a total of 7 municipal bridges – 1 short structures (6′–20′ length) and 6 long structures (>20′ length). The town's 6 long structures are inspected every two years by VTrans through the Town Highway Bridge Program.

Waterbury has a total of 311 culverts in the municipal road right-of-way; all were inventoried in 2018 by the Central Vermont Regional Planning Commission. Several culverts were listed in critical or poor condition and ideally been considered for replacement and/or upgrade in accordance with Town Road and Bridge Standards. The local road network is maintained by the municipal highway department, whose garage is located on Guptil Road.

Electric Utility Distribution System

Electric service to approximately 2,300 Structures with electricity provided by Green Mountain Power. Average annual outage statistics between 2017 and 2019 are summarized in Table 1.

Table 1: Power Outage Summary

Average Annual (2017-2019)	
Avg # outages per year less than 24 hours	60
Number of outage greater than 24 hrs.	19

The above data was from Department of Public Service created for review of energy burdened communities.

There were 19 power outages that lasted longer than 24 hours between 2017 and 2019 and 180 between 1 and 24 hours. This negatively effects the town in life safety and economics. When combined with a storm event or extreme heat or cold, long power outages can be dangerous.

Public Safety

Fire protection is provided by the Waterbury Fire Department, an all-volunteer organization. The Fire Department is a member of the Capital Fire Mutual Aid Association. Law enforcement is provided by the Vermont State Police resident trooper program with 2 troopers being involved. The nearest hospital is the Central Vermont Medical Center. Ambulance services are provided by Waterbury ambulance service.

Emergency Management

Per the Town's Local Emergency Management Plan, the Town Manager serves as Emergency Management Coordinator and Fire Chief serves as Local Emergency Management Director. They work with others in town to keep the LEMP up to date and coordinate with nearby towns and regional emergency planning efforts.

4 4 PLANNING PROCESS

Plan Developers

The Town assembled a Hazard Mitigation Planning Team to participate in updating the Plan. Team members included: Selectboard member (local EMD), Emergency Management Coordinator, representative of the Planning Commission, and Friends of the Mad River staff.

The Central Vermont Regional Planning Commission (CVRPC) assisted the Town with this Plan update. FEMA Building Resilient Infrastructure and Communities (BRIC) funds supported this process.

Plan Development Process

The 2024 Local Hazard Mitigation Plan is an update to the 2018 single jurisdiction mitigation plan. A summary of the process taken to develop the 2023 update is provided in **Table 2.**

5 HAZARD IDENTIFICATION AND RISK ASSESSMENT

Local Vulnerabilities and Risk Assessment

One of the most significant changes from the 2017 Plan is the way hazards are assessed. To be consistent with the approach to hazard assessment in the 2018 State Hazard Mitigation Plan, the Hazard Mitigation Planning Team conducted an initial analysis of known natural hazard events* to determine their probability of occurring in the future (high probability events are **orange** in **Table4**).

The Team then ranked the impacts associated with the natural hazard events based on 1) probability of occurrence and 2) potential impact to people, infrastructure, the environment, and local economy.

This assessment considered the effects of future conditions, like climate change, on the type, location, and range of intensities of identified hazards.

*This plan defines a natural hazard as a source of harm or difficulty created by a meteorological, environmental, or geological event.
FEMA Local Mitigation Planning Handbook, May 2023

The ranking results are presented in **Table 4** and reflect the following **highest risk hazard impacts** that the Town believes they are most vulnerable to:

***Floods** associated with thunder and/or winter storms and ice jams.*

***Extreme cold, snow, and ice** associated with severe winter storms.*

Each of the **highest risk hazard impacts** are profiled in this section. Lower risk hazard impacts do not justify mitigation due to a low probability of occurrence and/or low impact and are not profiled in this Plan. See the State Hazard Mitigation Plan for information on the lower risk hazards.

Table 4: Community Hazard Risk Assessment

2024 Hazard Mitigation Plan - Hazard Assessment							
Hazard Impacts	**Probabilit**	**Potential Impact**					**Score*:**
		Infrastructur	Life	Economy	Environmen	**Average:**	
Fluvial Erosion	**4**	**4**	**3.5**	**3.5**	**3**	**3.5**	**14**
Inundation Flooding	**4**	**4**	**3.5**	**3.5**	**2.5**	**3.375**	**13.55**
Ice	**2.5**	**2**	**1.5**	**2**	**1.5**	**1.75**	**4.375**
Snow	**3.5**	**2.5**	**2**	**2.5**	**2**	**2.25**	**7.88**
Wind	**4**	**3**	**2**	**2.5**	**2.5**	**2.5**	**10**
Heat	**3.5**	**1.5**	**3**	**2**	**2**	**2.125**	**7.43**
Cold	**3.5**	**1.5**	**3**	**2**	**2**	**2.125**	**7.43**
Drought	**2**	**1.5**	**1.5**	**2**	**2.5**	**1.875**	**3.75**
Landslides	**2**	**2**	**2**	**1**	**1.5**	**1.625**	**3.25**
Wildfire	**1.5**	**1**	**2**	**1.5**	**2**	**1.625**	**2.44**
Dam Failure	**2.5**	**2.5**	**4**	**4**	**3**	**3.375**	**8.44**
Invasive Species	**1.5**	**1**	**1**	**1**	**1**	**1.0**	**1.5**
Infectious Disease Outbreak	**3**	**2.5**	**3.5**	**3**	**2.5**	**2.875**	**8.625**
Ice Jam Flooding	**3**	**2**	**2**	**3**	**3**	**2.5**	**7.5**

*Score = Probability x Average Potential Impact

Other hazards removed from list

- Earthquakes-minimal risk in region
- Hail- most damages in region come from associated strong wind (severe storm)

*Score = Probability x Average Potential Impact

	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:** <1% probability of occurrence per year	**Negligible:** isolated occurrences of minor property and environmental damage, potential for minor injuries, no to minimal economic disruption
2	**Occasionally:** 1–10% probability of occurrence per year, or at least one chance in next 100 years	**Minor:** isolated occurrences of moderate to severe property and environmental damage, potential for injuries, minor economic disruption
3	**Likely:** >10% but <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% probability in a year	**Major:** severe property and environmental damage on a community or regional scale, - multiple injuries or fatalities, significant economic impact

IMPACT DEFINITIONS

INFRASTRUCTURE IMPACTS: (Effects on Roads, Bridges, Structures, Homes)

- 1—Minor: Localized/Isolated impacts to Infrastructure (Temporary loss of use)
- 2—Moderate: Neighborhood level impacts (1-2-day loss of use)
- 3—Severe: Community-wide impacts (2-5-day Loss of use)
- 4—Disastrous: Regional losses of roads, bridges, homes (Extensive replacement/rebuild)

LIFE SAFETY ISSUES: (Health and Welfare of Population)

- 1—Minor scrapes/injuries
- 2—Occasional Hospitalization required due to injuries
- 3—Multiple hospitalizations required and/or fatality
- 4—Community-wide hospitalizations and/or fatalities

ECONOMIC IMPACTS: (Direct recovery costs to municipality and residents)

- 1— < $10,000 in damages (Can generally be handled within budget or via insurance)
- 2—$10,000-$100,000 (May require assistance for the uninsured or large impact on local budget)
- 3—$100,000-$1,000,000 (Requests of assistance/FEMA eligible)
- 4— > $1,000,000- (All resources used, Possible National Guard use)

ENVIRONMENTAL IMPACTS: (Effects to municipal operations and environment)

- 1 – Negligible: Short term impacts, low clean-up costs for spills
- 2 – Minor: Moderate clean-up costs, temporary redirection of municipal resources
- 3 – Moderate: Extended redirection of local resources/ impacts to normal operations, high clean-up costs
- 4 – Major: Long-term recovery efforts (could take years for full recovery or permanent loss of use)

Highest Risk Hazard Profiles

Floods can damage or destroy property; disable utilities; destroy or make impassable roads and bridges; destroy crops and agricultural lands; cause disruption to emergency services; and result in fatalities.

People may be stranded in their homes for a time without power, heat, or communication or they may be unable to reach their homes. Long-term collateral dangers include the outbreak of disease, loss of livestock, broken sewer lines or wash out of septic and wastewater systems causing water supply pollution, downed power lines, loss of fuel storage tanks, fires, and release of hazardous materials.

As noted in the 2023 State Hazard Mitigation Plan and 2021 Vermont Climate Assessment, the most common recurring hazard event impacting Vermont communities is flooding. There are two types of flooding: inundation and flash flooding. Inundation is when water rises onto low lying land. Flash flooding is a sudden, violent flood which often entails stream bank erosion (fluvial erosion).

Inundation flooding of land adjoining the normal course of a stream or river is a natural occurrence. If these floodplain areas are in their natural state, floods likely would not cause significant damage. However, most business districts within Vermont are built within this floodplain due to the historical significance of water power.

While inundation-related flood loss can be a significant component of flood disasters, the more common mode of damage in Vermont is fluvial erosion, often associated with physical adjustment of stream channel dimensions and location during flood events. These dynamic and often catastrophic adjustments are due to bed and bank erosion of naturally occurring unstable stream banks, debris and ice jams, or structural failure of or flow diversion by human-made structures.

December of 2023 North Main Street. -Photo by Lisa Scagliotti from Waterbury Roundabout

Damage from high flows is the single most costly type of disaster in Vermont, primarily due to the erosive power of water. Many roads and culverts conflict with the room needed by streams and rivers."
2021 Vermont Climate Assessment

Several major flooding events have affected the state in recent years, resulting in multiple Presidential Disaster Declarations. From 2003 to 2019, Washington County experienced roughly $88.82 million in municipal property damage due to flood events. The totals from the most recent July 2023 flood event are still being totaled at the time of this writing.

The worst flooding event in recent years to strike the town of Waterbury came in August of 2011 from Tropical Storm Irene (DR4022), which dropped up to 5-7+ inches of rain in some areas of Washington County. Irene caused 2 deaths and $60 million in reported property damages and $2.5 million in crop damage in Washington County alone.

The December 2023 rain on snow flooding caused localized flooding in the town but the mitigations actions that were implemented post Irene helped to prevent any large damages, limiting the effects to minor flooding of low-lying areas and road closures due to inundation. For a short period of the event the town was almost cut off and had to adjust medical transport to the local hospital to avoid inundation areas. The effects of these storms are profiled in this flooding section.

The town is concerned with the increased temperatures in winter seasons brought on by climate change. The increase in temperature fluctuations and associated precipitation is worrisome of rain on snow events impacting the region and specifically the town of Waterbury due to its location and associated mountains. The snowpack can become hazardous due to the rapid melting from rain on snow and sudden warming, fueling extreme and rapid runoff.

Waterbury is vulnerable to inundation flooding primarily along the Winooski River. A wide range of assets are at risk from inundation flooding in these areas. There are 175 buildings in the FEMA floodway; as well as roads, culverts, bridges well as roads, culverts, and bridges.

With inundation flooding, there are cascading impacts involving infectious disease as floodwater can contain numerous types of infectious agents and host insects that transmit disease. Mosquitos, for example, breed in standing water and when their population increases, so does the risk of diseases they transmit – such as West Nile Virus.

Flash flooding can occur any time the area has heavy rain. It can impact areas that are located outside of designated floodplains, including along streams confined by narrow valleys (also known as River Corridors). Again, a wide range of assets are at risk from flash flooding. There are ? buildings in the State-mapped River Corridors (outside of designated floodplains); as well as roads, culverts, bridges, and dams.

The most common type of flash flood damage is road washouts. When runoff volumes exceed the capacity of the stormwater collection system (ditching and culverts), washouts can occur.

Armory Drive bridge near Union Street- photo by Gordon Miller

The town's structures and road erosion inventories as well as VTrans highway flood vulnerability and risk tools were used to help identify locations and assets at risk from flash flooding.

Sections of several roads have a history of flash flooding – Route 100 and US 2 at the traffic circle. Main Street, Winooski Street, and the Union Street. The locations all show as at risk of inundation or fluvial erosion in the Vermont Transportation Resiliency Planning Tool.

Culvert failures and road washouts can have a significant negative impact on the Town. Especially if they occur on roads considered locally important routes for through-traffic, short-cuts, detours, and/or access to critical facilities – such as VT Route 100, US Route 2, and Guptil Road.

When roads are impacted by flooding, the Town coordinates with the fire department, town road crew and State dispatch to close roads and set up detours. Road closures can create longer commute times and longer emergency service response times.

In addition to stormwater runoff from roads, ice jams and dam failures can result in flash flooding in Waterbury. Ice jams on the _____

There are ____ dams in Waterbury listed in the Vermont Dam Inventory (a database managed by the VT Dam Safety Program containing spatial, structural, historic, and regulatory information on dams in the state).

There is one high hazard potential dam upstream of Waterbury. It is the Waterbury Dam, a flood control dam on the Little River a tributary of the Winooski River. This dam was built in 1938 and is 2130 ft long and 187 ft high and has a normal storage of 37000-acre feet and a maximum storage of 88000-acre feet. The drainage for the lake is 69760 square miles. The last reported inspection of the dam on the ANR dams inventory site was 11/13/2020 and lists the dam as in fair condition.

Community survey respondents ranked [redacted] protect against future severe weather impacts.

Flash flooding often entails stream bank or fluvial erosion. Several existing studies were used to help identify locations and assets at risk from fluvial erosion, specifically, a Structure Stream Geomorphic Assessments.

Stream Geomorphic Assessments (SGAs) provide information about the physical condition of streams and factors that influence their stability. The [redacted] SGA identifies priority locations for river corridor protection, planting stream buffers, stabilizing stream banks, removing berms, and removing/replacing human-placed structures (i.e., dams, bridges, culverts).

Stormwater Master Planning (SWMP) involves identifying stormwater, sediment, nutrient, and septic inputs to waterways and designing projects to mitigate those inputs; either eliminating them at the source through green stormwater infrastructure, septic system improvements, back road projects or improving floodplain access within the stream network to increase sediment attenuation.

As demonstrated in the above referenced studies, environmental impacts from flooding can be significant, especially to the water quality in the Mad River and the Winooski River. This can in turn have an adverse impact on local tourism and recreation. Flood events with associated road closures can also have a short-term impact on the local economy due to fewer shopping trips and commuter delays.

170 buildings are in the Special Flood Hazard Area ([redacted]% of community structures); mostly single family dwellings and businesses. According to FEMA, [redacted]% of these properties have flood insurance. In total, these [redacted] policies cover $[redacted] in value.

There are [redacted] repetitive loss properties with 2 of them being insured.

Floods Hazard History

These are the most up to date significant events impacting Waterbury. Federal declarations are depicted in **bold**.

12/18-19/23: 2" of rain on snow event
7/11/2023: DR4720 5-9"" rain: $Still to be determined
7/20/2021: Heavy rain: $50,000 county damages
7/14/2020: 3-4" rain: $5,000 town damages
11/1/2019: 2-4" rain: $250,000 county damages
6/20/2019: Heavy rain: $25,000 county damages
5/20/2019: Heavy rain: $25,000 county damages
4/15/2019: DR4445 1" rain with significant snow melt:
7/1/2017: DR4330 3-4" rain the previous 3-4 days with flash flooding on 7/1/17: $240,000 county damages
7/19/2015: Heavy rain: $1,000,000 county damages
4/15-18/2014: DR 4178 heavy rain on snow event $250,000 county damages
6/25-7/10/2013: DR4140 1-3" of heavy rain over a half hour: $625,000 county damages
8/28/2011: DR4022 Tropical Storm Irene with 3-7+" rain: $172,500 local damage ($?????Individual / $75,000,000 Public county damages
5/26-27/2011: DR4001 3-5+" rain on snow event: $5,500,000 county damages
5/20/2011: DR4043: Heavy rain: $400,000 county damages
4/23-5/9/2011: DR4043 rain on snow event: $1,000,000 county damages

As weather patterns shift and we see larger storms and more frequent freeze-thaw cycles, the town will monitor for signs that rivers that have historically been stable becoming less stable, with increased erosion, widening, trees falling in from its banks, etc.

Landslides: A landslide is the sliding of a large mass of rock, earth, or debris, down a sloped section of land. Landslides can be caused by rainstorms, fires, alternate freezing or thawing and/or by the steepening of slopes by erosion or human modification. In Waterbury, landslides tend to occur or are exacerbated by fluvial erosion as most of the landslides occur on or near a stream bank, or during extreme wet conditions in areas of clay substrate.

Landslides have three major causes: geology, morphology, and human activity. Geology refers to characteristics of the material itself. The earth or rock might be weak or fractured, or different layers may have different strengths and stiffness.

Morphology refers to the structure of the land. For example, slopes that lose their vegetation to fire or drought are more vulnerable to landslides. Vegetation holds soil in place, and without the root systems of trees, bushes, and other plants, the land is more likely to slide away.

Human activity, such as agriculture and construction, can increase the risk of a landslide. Irrigation, deforestation, excavation, and water leakage are some of the common activities that can help destabilize, or weaken, a slope.

The Town of Waterbury has ■ landslide locations with in the town as listed on the Vermont Agency of Natural Resources Landslide map that was last updated in 2020.

Total damages for landslides are not tracked well within the State of Vermont since often landslides are in association with Fluvial Erosion the damages are often lumped together there. With the increase in precipitation trends due to climate change the risk from landslides is increasing. This can be addressed through land use regulations and mitigation of surface runoff from human actions and development.

Severe Storms with Snow, Wind and Ice events typically occur between the

months of December and March in the Central Vermont Region. They can include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Events can also be associated with strong wind or floods, increasing the potential hazard.

The costs of these storms come in the form of power outages due to heavy snow or ice, damaged trees, school closings, and traffic accidents. From 2014 to 2022, Washington County experienced $585,000 in property and crop damage from winter storms.

There have been two winter storm-related federally declared disasters in the county (the ice storm of January 2020 – DR 4474; and December 2014 DR 4207, respectively (see table at right).

Extreme cold can have impacts on public health and safety, especially if extreme temperatures coincide with power outages, which can cut off heat and communication services. Severe winter storm impacts can put vulnerable populations (e.g., older adults, children, sick individuals, pets) at even greater risk.

See the strong wind profile below for more information about the town's vulnerability to power outages.

Snow accumulation typically does not result in loss of road accessibility. The town's fleet of snowplows ensures all roads are accessible, even in major accumulation events. Roads adjacent to critical facilities are well maintained and along with connector routes, are prioritized in winter storm events.

Environmental impacts are predominantly tree damage. Extreme snow and ice events typically have a short-term impact on the local economy – fewer shopping trips and commuter delays.

Extreme Cold, Snow, and Ice Hazard History

These are the most up to date significant events impacting Waterbury. Federal declarations are depicted in **bold**.

1/11-14/2022: 10-40 below zero with winds: no reported damages
12/18/2021: 5-7" snow $10,000 county damages
1/16/2021: 3-6" wet snow: $50,000 county damages
3/23/2020: 7-10" snow: $5,000 county damages
2/7/2020: 10-16"; ¼" ice: $20,000 county damages
1/16/2020: DR 4474 6-10" snow: $10,000 county damages
3/22/2019: 9" snow: $25,000 county damages
2/12/2019: 7-15" snow: $10,000 county damages
1/29/2019: 6-10" snow: $10,000 county damages
1/19/2019: 10-18" snow: $25,000 county damages
1/8/2019: 8-20+" snow: $25,000 county damages
11/26/2018: 6-14" heavy snow: $125,000 county damages
3/13/2018: 12-30" snow: $20,000 county damages
3/7/2018: 7-13" snow: $10,000 county damages
1/7/2015: 0-10 degrees with wind of 15-30 mph creating wind chills colder than 20-30 below zero: no reported local damage
12/9/2014: DR4207 10-20" snow: $250,000 county damages

Infectious Disease and Invasive Species

This Plan must assess the risk of all hazards identified in the 2018 Vermont State Hazard Mitigation Plan, including infectious disease and invasive species. Due to the different nature of these hazards, the Planning Team assessed them separately from the natural hazards in **Table 4**.

Infectious diseases and invasive species are diverse categories of hazards. So, while their probability of occurrence in Waterbury may be likely, potential impacts will be highly dependent on the specific infectious agent or invasive.

The Planning Team acknowledges that impacts to Waterbury's people, environment, and local economy from infectious disease and/or invasive species could be significant. However, given the diverse nature of these hazards, they cannot be fully explored in this plan. This plan does include information about the potential hazards and risks associated with a specific infectious agent (West Nile Virus) and invasive species (Emerald Ash Borer) due to cascading impacts associated with flooding and storm-related tree damage.

Readers should look to the Vermont Department of Health for more information on significant infectious disease outbreaks, such as epidemics and pandemics and the Vermont Agency of Natural Resources for more information on invasive species, including terrestrial invasives, forest pests, and aquatic invasives.

Strong wind can occur alone, such as during straight-line wind events, or it can accompany other natural hazards, including severe thunder and/or winter storms.

FEMA's National Risk Index defines strong wind as damaging winds that exceed 58 mph. Strong wind poses a threat to lives, property, and vital utilities primarily because of flying debris or downed trees and power lines.

From 1996 to 2022, wind events caused more than $1.270 million in property damage in Washington County, with $450,000 due to one event in December 2022.

Strong wind is possible here; Waterbury is susceptible to high directional winds town wide. Many storms with high winds result in downed trees as well as damaged phone and power lines, buildings, and other property.

Downed trees within the road right-of-way are the root cause of many power outages. Roads that pass through dense wooded areas are prone to downed trees, which often can lead to fallen power lines.

Power outages are the main reason for disrupting communications, which are crucial in times of crisis. For example, the loss of phone service is of particular concern for Waterbury's vulnerable populations and residents. Landline phones that have been converted from copper wire to fiber rely on an in- home battery back-up. The battery life is typically less than eight hours, whether the phone is used or not. Though many residents use cell phones, longer power outages and damage from high winds further complicating the problem of contacting emergency services during power outages.

Telecommunications are also needed for warning systems before a disaster, as well as for response during and recovery after. During a disaster, municipal response is managed by the local Emergency Operations Center (EOC), this would include all communications – from phone calls to internet browsing and 2-way radio.

To mitigate the impacts of power outages, the following public buildings/critical facilities

have been equipped with backup power or generator hookup: Water supply pump house, fire station, Waterbury ambulance, and Brookside Primary school (as emergency shelter).

The public buildings lacking backup power are the ??????.

In addition to power outages, downed trees during strong wind (and heavy snow/ice) events can damage buildings and other property and in rare cases result in fatality.

Environmental impacts are predominantly tree and roof damages. Strong wind events with associated power outages can have a short-term impact on the local economy due to business closures.

Vermont's Emerald Ash Borer infestation was first detected in 2018 in northern Orange County. The potential risk to public and private structures and impacts on the local economy have not been quantified. But the impact of invasive pests has a real economic effect on landowners and utilities in dealing with dead trees and their potential to cause damages.

As weather patterns shift and we see larger storms and more frequent freeze-thaw cycles, the Town will monitor for signs that rivers and streams that have historically been stable are becoming less stable, with increased erosion, widening and trees falling in from its banks, etc.

Strong Wind Hazard History

These are the most up to date significant events impacting Waterbury. Federal declarations are depicted in **bold**. Damages are to Washington County.

12/23/2022: 50-60+ wind gusts: $450,000
10/30/2017: 40 mph wind: $250,000
2/26/2010: 55 mph wind: $15,000
2/17/2006: 37 mph wind: $10,000
9/29/2005: 35 mph wind: $50,000
11/13/2003: 35 mph wind: $10,000
10/15/2003: 50 mph wind: $10,000
3/10/2002: strong wind: $5,000
12/12/2000: strong wind: $5,000
3/28/2000: strong wind: $5,000
9/17/1999: strong wind: $75,000
11/23/1998: strong wind: $10,000
2/22/1997: 50 mph wind: $15,000

Droughts in the Northeast. We frequently experience what are referred to as "flash" droughts, defined as rapid onset of intense dry periods that can follow periods of normal or above normal precipitation. These may last from 2-6 months, and can have profound impacts within the region, on agricultural losses, shortages of water supply and very low stream flows. This pendulum often swings from a dry year to a wet year.

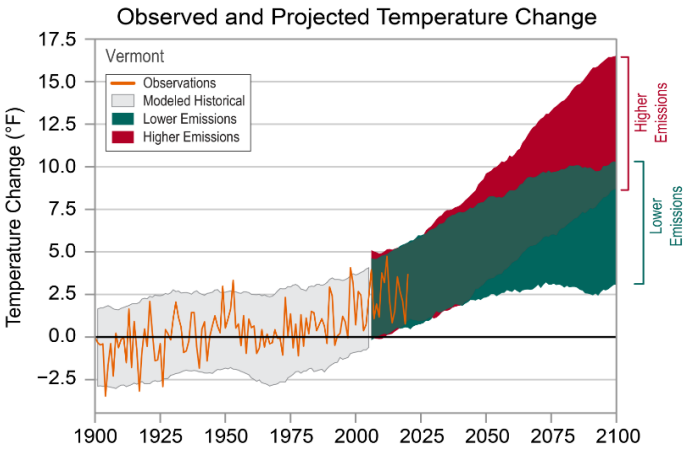
The Town's risk of droughts is mainly addressed through the Ordinances for the Town water supply. Most residents of the Town are on private wells and bear the costs and risks of mitigation themselves. The Town's Water Ordinance has the appropriate language for conserving water and limiting non-essential usage during a drought emergency.

Wildfires are not often much of a concern within our region, although the spring and fall can be times when dry hazardous conditions exist. Opportunity for wildfires occurs due to the lack of foliage in these seasons, before spring green up or in the fall after foliage has died back when combined with dry conditions. Historically, Vermont has seen the most wildland fires between March and June. These are generally times when dry conditions exist for an extended period causing drought conditions.

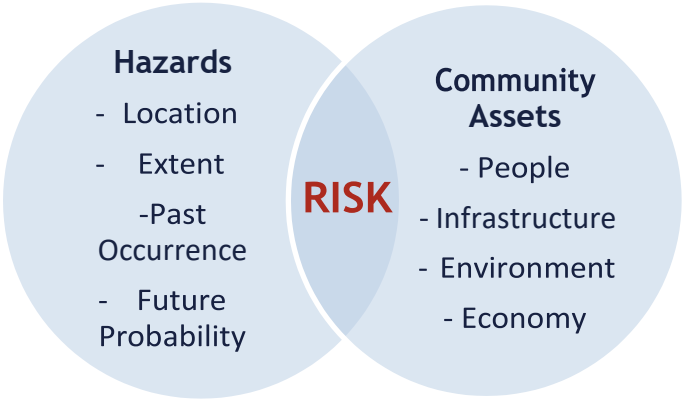
Ignition of wildfires is predominantly caused by human activity and mainly from debris fires that are not contained or not supervised. Thus, messaging when conditions exist is very important to convince individuals not to make mistakes in relation to ignition sources. This messaging is handled by the town fire warden in association with the fire department.

Extreme heat and cold warnings are becoming increasingly more prevalent due to our shifting climate. Vermont has been seeing a increase in 90+ degree temperature days. This trend is expected to continue. Most of our housing stock and individuals are well adapted to dealing with cold temperature, but the quick swings to higher temperatures do not allow for acclimation, and many of our structures are designed to retain, rather than shed, heat. Due to the climate of our region the high temperatures and high humidity often create situations that negatively affect older individuals and those with preexisting conditions.

Due to the instability of the jet stream from climate changes, extreme cold can still be an issue. If it is a long-lasting cold without snow cover, frost can migrate deep into the ground freezing pipes and heaving roadways. Most of this would be dealt with by the town either through their utility contracts or by the town road crew in keeping the transportation infrastructure in usable condition. Loss of power during one of these cold snaps may require use of the town shelter and is planned for in the town Local Emergency Management Plan.



-NOAA 2022 Vermont Climate summary



The Hazard Identification and Risk Assessment is the foundation for the Mitigation Strategy to reduce future risk.

With the increasing risks of events from our changing climate, all weather-related natural events are expected to have an increase in both frequency and in intensity. Vermont is predicted to experience increases in heat waves, downpours and flooding.

The Northeastern United States has already seen an increase of seventy one percent precipitation totals increase since 1950 and an increase in extreme weather events. It is imperative that we have solid plans of mitigating future disasters proactively to minimize risk.

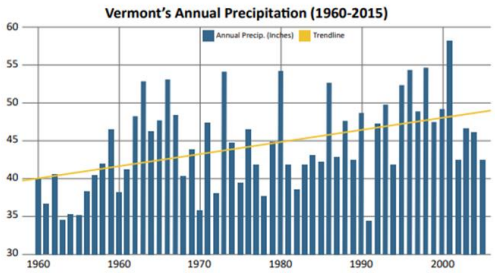


Figure 26: Vermont's annual precipitation (1960-2015)
Source: climatechange.vermont.gov

-precipitation data showing increased precipitation trends from VT state climate action plan

Increase the Town of Waterbury's resilience to natural hazards by advancing mitigation investment to reduce or avoid long-term risk to people, homes, neighborhoods, the local economy, cultural and historic resources, ecosystems, and Community Lifelines such as transportation, water, sewer, energy, and

See Community Survey results in **Appendix D** for which assets survey respondents thought were most important to protect against potential future severe weather impacts.

6 HAZARD MITIGATION STRATEGY

The highest risk natural hazards and vulnerabilities identified in the previous section of this Plan directly inform the hazard mitigation strategy outlined below, which the community will strive to accomplish over the coming years. The mitigation strategy chosen by the Town includes the most appropriate activities to reduce future risk from potential hazards.

Mitigation Goals

The Hazard Mitigation Planning Team identified the following as the community's primary mitigation goal:

Community Capabilities

Each community has a unique set of capabilities, including authorities, programs, staff, funding, and other resources available to accomplish mitigation and reduce long-term vulnerability. Waterbury's mitigation capabilities that reduce hazard impacts
or that could be used to implement hazard mitigation activities are listed below.

Administrative & Technical This capability refers to the Town's staff and their skills and tools that can be used for mitigation planning and to implement **actions.**

In addition to the Emergency Management staff described in Section 3, municipal staff that can be used for mitigation planning and to implement specific mitigation actions include: Municipal Manager, Zoning Administrator, Town Clerk & Treasurer, Planning Director, Assistant Town Clerk & Treasurer, Assistant Town Clerk, Public Works Director, Town and EFUD Engineer. Highway Supervisor.

In addition to paid staff, there is a 5-member Selectboard, 5-member Planning Commission, Fire Warden, Town Health Officer, Development Review Board, and Natural Disaster Preparedness Committee.

To augment local resources, the Town has formal mutual aid agreement for emergency response – fire. Technical support is available through the CVRPC in the areas of land use planning, emergency management, transportation, GIS mapping, and grant writing. Technical support is also available through the State ANR for floodplain bylaw administration and VTrans Districts for hydraulic analyses.

Planning & Regulatory These capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Examples of planning capabilities that can either enable or inhibit mitigation include land use plans, capital improvement programs, transportation plans, stormwater management plans, disaster recovery and reconstruction plans, and emergency preparedness and response plans. Examples of regulatory capabilities include the enforcement of zoning ordinances, subdivision regulations, and building codes3 that regulate how and where land is developed, and structures are built.

Town Plan: December 2018
Description: A framework and guide for how future growth and development should proceed.
Relationship to Natural Hazard Mitigation Planning: Includes goals and policies related to flood resilience and land use.

Zoning Ordinance with Flood Hazard Area Overlay District Requirements: May 2016
Description: Provides for orderly community growth promoting the health, safety, and general welfare of the community.
Relationship to Natural Hazard Mitigation Planning: Establish site plan review requirements and zoning districts, including Flood Hazard Overlay Districts, with specific standards for proposed development. Requirements are designed to prevent overdevelopment; to mitigate negative impacts to the natural and human environment; minimize effects to the historical and aesthetic character of the community; and ensure design and construction of development in flood and other hazard areas are accomplished in a manner that minimizes or eliminates the potential for flood loss or damage to life and property.