Castleton, Vermont
2023 Local Hazard Mitigation Plan

South Street Trestle Bridge Washout – April 2019

FEMA Approval Pending Adoption Date:
Municipal Adoption Date:
FEMA Formal Approval Date:

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RUTLAND REGIONAL PLANNING COMMISSION

Key Partners

Vermont State University[1] / Lake Bomoseen Association / Poultney Mettowee Natural Resources Conservation District / Slate Valley Unified School District / South Lake Champlain Clean Water Service Provider / VT Agency of Transportation District 3 / VT Department of Health / Western VT Floodplain Manager

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
RIVERS PROGRAM

VERMONT
DEPARTMENT OF HEALTH

LAKE BOMOSEEN ASSOCIATION

VERMONT
AGENCY OF TRANSPORTATION

Vermont State University

VERMONT

SOUTH LAKE CHAMPLAIN
clean water service provider

[1] Vermont State University's Castleton Campus formerly known as Castleton University and referenced as such in this Plan.

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1 INTRODUCTION

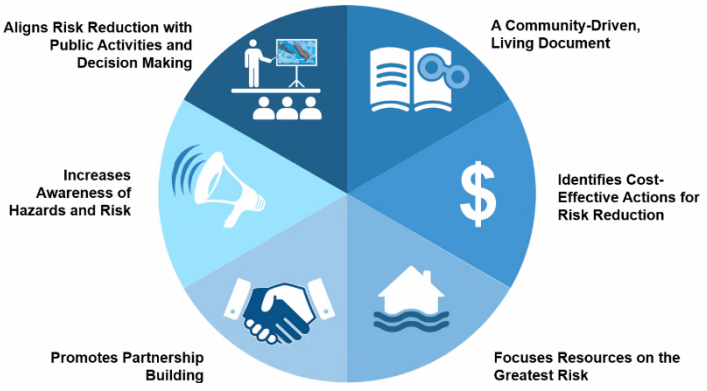
The impact of expected, but unpredictable natural events can be reduced through community planning and action. The goal of this Plan is to advance mitigation investment to reduce risks posed by natural hazards and to increase the Town of Castleton's resilience to natural hazard impacts.

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 communities have opportunities to identify mitigation strategies and measures during all the other phases of Emergency Management – Preparedness, Response and Recovery. While the hazards cannot be 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

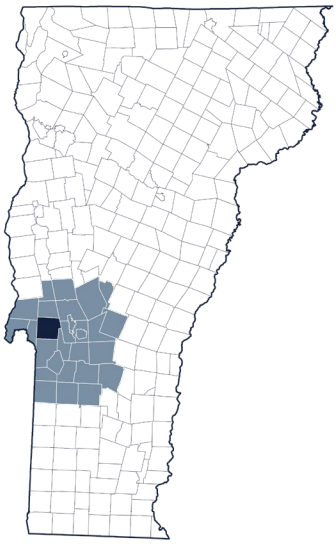
Furthermore, the Town seeks to be in accordance with the strategies, goals, and objectives of the 2018 State Hazard Mitigation Plan.

3 COMMUNITY PROFILE

Land Use and Development Patterns

According to the 2018 Castleton Town Plan, people settled in Castleton in unincorporated villages along the Castleton River, from Castleton Village in the east, west through Castleton Corners, to Hydeville. As the river valley was settled, people moved out into the rolling hills.

Castleton is the second largest community in Rutland County. Its main villages—Castleton Village, Castleton Corners, and Hydeville—are along VT Route 4A and host the major commercial and civic services of the Town. These villages received a State Village Center Designation in March 2019.



Castleton Village has a mixture of residential, commercial, institutional, public, and industrial uses forming a small urban center. Large historic federal-style homes stand along Main Street, but most residences are located on side streets. The Village also hosts Vermont State University's Castleton campus, with ±2,000 full-time students.

Castleton Corners consists of a mixture of residential, commercial, and public uses, including a senior housing complex and health care center. The Town Office, Public Safety Building (which houses municipal police, fire, and rescue), and Community Center are in Castleton Corners.

Hydeville, the gateway to Lake Bomoseen, provides significant economic activity for the Town. The area includes a general store, Lake Bomoseen Inn, a church, a marina, Hydeville Plaza, commercial businesses, and multi and single-family residences.

Villages lying within the slate belt, Blissville, Cookville and West Castleton, were once hubs of residential and civic life due to the slate industry and are now primarily residential.

Outside of the villages, residential development in Castleton has a rural character except along the shores of Lake Bomoseen. Lake Bomoseen, which extends from Hydeville through Castleton's northern boundary into the Town of Hubbardton, is intensively developed with both seasonal homes and year-round residences, as well as recreational and commercial businesses.

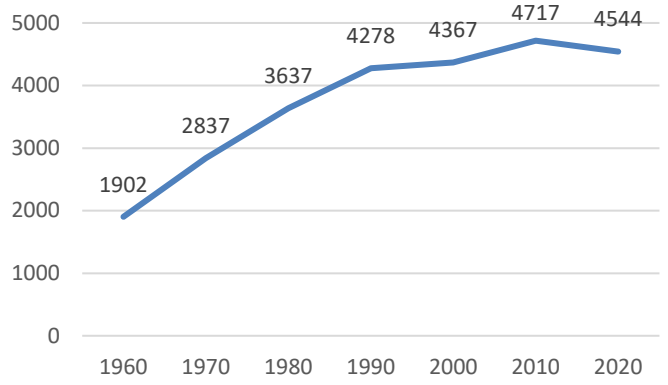
Land Features

Castleton's landscape is defined by rolling forested hills and mountains, scenic rivers, lakes, ponds, and wetlands. The Town is on the western slopes of the Taconic Mountain Range. The western half of town consists of Taconic Foothills, averaging 500 feet in elevation. The higher elevations of the Taconic Mountains rise in the eastern half of town, including Bird Mountain, the highest peak at 2,216 feet, Grandpa's Knob (elev. 1,976 feet), and Blueberry Hill Peaks (from 1,245 to 1,918 feet).

Several extensive land areas are owned by the State including Love's Marsh, Blueberry Hill Wildlife Management Area, and Bomoseen State Park. The Edward F. Kehoe Green Mountain Conservation Camp at Lake Bomoseen is State operated.

Demographics and Growth Potential

The 2020 Decennial Census prepared by the U.S. Census Bureau shows an estimated population of 4,458 and 2,273 housing units. After 30 years of sharp growth from 1960 to 1990, Castleton's population peaked in 2010 and is in slow decline.



Between 2010 and 2020, the median age of Castleton residents remained unchanged at 36; lower than the Vermont median age of 42.9. The portion of the population over 65 is 18.7%, compared to 20.6% in Vermont and 16% in the country. The population density of the Town is 118 people per square mile compared to an overall state density of 68.

Castleton's growth potential is limited by a lack of developable land and public water and sewer utilities. Revitalizing existing infrastructure and properties, encouraging mixed-use development, and repurposing underutilized spaces offer the greatest opportunities for growth in Castleton.

Of Castleton's three village centers, Hydeville has the most potential for new residential development. There is little in the way of property available for development in either Castleton Village or Castleton Corners. Similarly, with the thick density of development around Lake Bomoseen, there is little opportunity for new development. Most of the areas around the lake that are developable do not have access to municipal water or sewer and may be restricted by the required isolation distance between onsite wells and septic systems. The rural countryside also lacks access to public utilities and much of the property is either owned, rented, or leased by a couple of local family farms, or it is State land.

Precipitation and Water Features

Average annual precipitation is 41 inches of rain; with July being the wettest month. Average annual snowfall is 66 inches; with January being the snowiest month.

The Castleton River and its many tributaries (North Breton Brook, Gully Brook, Pond Hill Brook) are a major water feature in Castleton.

Significant water bodies in Castleton include Lake Bomoseen, Glen Lake, Pine Pond, and Lily Pond and their associated tributaries such as Sucker Brook.

8% of Castleton's land area (or 2,175 acres) is Class II wetlands.

Love's Marsh Waterfowl Refuge is the most extensive wetland wholly contained within the Town. Other highly productive wetlands include the northeastern end of Lake Bomoseen, Pine Pond Marsh, and Lilly Pond. These play an important function in water absorption and holding capacity that thereby reduces the hazards of flooding and replenishes groundwater supplies.

Drinking Water and Sanitary Sewer

Public drinking water is supplied by Fire District #1 and Fire District #3. Fire District #1 serves ±345 units in the village center and along VT Route 4A from Ellis Orchard to the Castleton River, on South Street to Meadow Lane, and along Staso Road to the Town Garage.

The Fire District #1 gravity-fed system includes a 700,000-gallon storage tank, ±5-miles of transmission main, and two wells – on North Road and on the north side of the Castleton River off Mill Street. Both wells are in the Castleton River floodway and have been floodproofed. However, during a significant flood event, access to the Mill Street Well may be compromised.

North Road Well houses the automated controls for the system. However, only the Mill Street Well is equipped with standby power; so, during a power outage, the North Road Well is offline and the Mill Street Well must be controlled manually.

Fire District #3 is a consecutive municipal water system that is supplied by Fire District #1. Fire District #3 serves the development along VT Route 4A beginning at the Castleton River and railroad crossing, extending west to the channel at the south end of Lake Bomoseen. This gravity-fed system includes a 345,000-gallon storage tank and ±3-miles of transmission main.

Other small water systems serve the Fort Warren and Windy Hollow Mobile Home Parks. Residents not served by public systems rely on private wells.

Municipal sanitary sewer service is available to ±1,100 users. Service extends throughout the Main Street village center; along most of VT Route 4A and Route 30 north of the Four Corners, including the Lakewood Adult Family Nursing Home and part of the east shore of Lake Bomoseen; and much of Sand Hill Road. The treatment facility is at 320 VT Route 30S along the Castleton River (outside of the floodplain). The collection system includes ±14-miles of piping.

The primary pump station is on Main Street near the Castleton River where the railroad intersects with VT Route 4A. Smaller pump stations are in Hydeville on Blissville Road; on Prospect Point Road near the golf course; on VT Route 4A across from the intersection with Drake Road; at Crystal Beach on the north side of Sucker Brook; on South Street; and at the Castleton Elementary School. The Town owns and maintains 60 grinder pumps on Route 30, primarily north of Drake Road. Residents not served by municipal sewer rely on private onsite systems.

Transportation

Castleton is ±40 square miles in size with primary access via US Route 4, a major east-west arterial route, VT Route 4A, running parallel to US Route 4 through Castleton Village, and VT Route 30, a north-south route running along the east side of Lake Bomoseen.

The 2022 VTrans Town Highway data indicates that Castleton has ±60 municipal road miles: 1.10 miles of Class 1; 17.86 miles of Class 2; 36.11 miles of Class 3; 4.37 miles of Class 4 (or functionally Class 4). Of the total municipal road miles, ±45% are paved and 55% are gravel. In addition, there are 21.65 miles of State highway in Castleton, for a total of ±81 traveled highways, including Class 4 roads.

According to the Town's 2017 road erosion inventory, 78% of Castleton'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.

According to the Town's 2022 bridge inventory, Castleton has a total of 33 municipal bridges – 24 short structures (6'-20' length) and 9 long structures (>20' length). The town's 9 long structures are inspected every two years by VTrans through the Town Highway Bridge Program.

Castleton has a total of 674 culverts in the municipal road right-of-way; all were inventoried in 2022 by the Rutland Regional Planning Commission. Several culverts are listed in critical or poor condition and should be 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 Staso Road.

Electric Utility Distribution System

Electric service to approximately 2,500 accounts is provided by Green Mountain Power via two primary circuits. Average annual outage statistics between 2017 and 2021 are summarized in **Table 1**.

Table 1: Power Outage Summary

Average Annual (2017-2021)	
Avg # of times a customer was without power in a year	2.15
Avg length of each outage in hours	3.10
# of hours the typical customer was without power	6.64
2021 only	
Avg # of times a customer was without power in a year	2.24
Avg length of each outage in hours	3.62
# of hours the typical customer was without power	8.10

The longest power outage affecting the greatest number of accounts between 2017 and 2021 was 3.82 hours and impacted 932 accounts in 2020. In 2021, there was a 17.1-hour long outage that affected 647 accounts. The longest outage between 2017 and 2021 lasted 70.94 hours and occurred in 2017 and affected only 5 accounts.

Public Safety

Fire protection is provided by the Castleton Fire Department, an all-volunteer organization. The Fire Department is a member of the Rutland County Mutual Aid Association. Law enforcement is provided by the Castleton municipal police department, with support from Vermont State Police. The nearest hospital is the Rutland Regional Medical Center. Ambulance service is provided by Castleton First Responders in conjunction with Regional Ambulance Service, Inc.

Emergency Management

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

4 PLANNING PROCESS

Plan Developers

The Town assembled a Hazard Mitigation Planning Team to participate in updating the Plan. Team members included: Town Manager (local EMD and interim Zoning Administrator), Police Chief (local EMC), Fire Chief, Public Works Director, and representatives from the Selectboard, Planning Commission, and Fire District #1.

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

Plan Development Process

The 2023 Local Hazard Mitigation Plan is an update to the 2017 single jurisdiction mitigation plan. A summary of the process taken to develop the 2023 update is provided in **Table 2**.

Table 2: Plan Development Process

Jan 26, 2023: Kick-off meeting. Discussed what an LHMP is; benefits of hazard mitigation planning; current plan status; planning process; outreach strategy; and plan sections. Planning Team working meetings were not open to the public.

Jan/Feb 2023: To notify the Whole Community* of the plan update, the Town posted physical and online notices. Physical notices were posted at the Town Office, Castleton Post Office, Prunier's Market, and Beverage King. Online notices were posted on the Town website (www.castletonvermont.org), Town Facebook page, and Front Porch Forum.

*Whole Community stakeholders include: 1) local and regional agencies involved in hazard mitigation; 2) entities with authority to regulate development; 3) neighboring towns; 4) representatives of business, schools/academia, and other private organizations that sustain community lifelines; and 5) representatives of nonprofit organizations that work directly with or provide support to vulnerable populations.

RRPC posted online notices on the RRPC website (www.rutlandrpc.org) and RRPC Facebook page. RRPC also direct emailed notice to 1) officials (Selectboard and Planning Commission chairs, Town Managers and Clerks, Emergency Management Directors) in neighboring towns of Hubbardton, Pittsford, West Rutland, Ira, Poultney, Fair Haven, Benson, and 2) Key Partners (Castleton University, Lake Bomoseen Association, Poultney Mettowee Natural Resources Conservation District, Slate Valley Unified School District, South Lake Champlain CWSP, VDH Regional Emergency Preparedness Specialist, VTrans District 3 Projects Manager, Western VT Floodplain Manager). Notice included RRPC contact for information on planning process and opportunities for public input – see **Appendix C**.

Feb 9, 2023: Planning Team working meeting – confirmed plan purpose (Section 2) and completed community profile (Section 3). Completed hazard risk assessment (Section 5).

Mar 9, 2023: Planning Team working meeting – compiled information on assets - people; structures; systems; natural, historic, and cultural resources – vulnerable to the highest risk natural hazard impacts (Section 5).

Mar/Apr 2023: To solicit input from the Whole Community, the Town utilized a survey (see **Appendix D**) and hosted an in-person Community Workshop on April 6. The Town provided notice of the survey and workshop by posting physical notices at the Town Office, Castleton Post Office, Prunier's Market, and Beverage King and online notices on the Town website, Town Facebook page, and Front Porch Forum. In addition to these physical and online methods, the Town also published notices for the April Workshop in two newspapers of local circulation – Rutland Herald and Lakes Region Free Press.

RRPC posted online notices on the RRPC website and Facebook page of these two opportunities to provide input on where each hazard might impact the Town; assets most likely to be affected; and preferred types of mitigation actions (Sections 5 and 6). RRPC also direct emailed notice of the survey and April Workshop to local officials in neighboring towns and Key Partners – see **Appendix C**.

Apr 20, 2023: Planning Team working meeting – completed work on the local vulnerabilities and risk assessment (Section 5). This is a critical milestone in the plan development process and the draft plan was prepared for the first public meeting.

May 8, 2023: Draft LHMP presented at joint meeting of Castleton Selectboard and Planning Commission to encourage input from local government and the public that could affect the plan's conclusions and better integrate with Town initiatives. Meeting aired on Public Access Television (PEGTV). Following the public meeting, the draft plan was made available for public comment through May 22, 2023.

Online notice of the public comment period with a link to download the draft Plan was posted on Town and RRPC websites, Town and RRPC Facebook pages, and Front Porch Forum. Notices included instructions to email comments to the Town Manager or attend the May 22 Selectboard meeting to share input. RRPC also direct emailed the draft plan to Vermont Emergency Management, local officials in neighboring towns, and Key Partners seeking input on the Town's risk assessment and hazard identification – see **Appendix C**.

May 22, 2023: Draft LHMP discussed at Castleton Selectboard meeting with opportunity for public comments – coincided with close of public comment period and aired on PEGTV.

May 25, 2023: Planning Team working meeting – discussed comments received on May draft (see **Appendix C**); completed work on hazard identification and risk assessment (Section 5). Began work on hazard mitigation strategy (Section 6) – confirmed goals, discussed community capabilities and status of 2017 actions.

Jun 22, 2023: Planning Team working meeting – continued work on hazard mitigation strategy (Section 6) – completed community capabilities; updated status of 2017 mitigation actions; and evaluated range of possible mitigation actions.

Aug 1, 2023: Planning Team working meeting – continued work on hazard mitigation strategy (Section 6); plan maintenance (Section 7).

Sept 2023: Planning Team completed work on the plan update. This is a critical milestone in the plan development process and the draft plan was prepared for the second public meeting.

Oct 9, 2023: Final draft LHMP presented at joint meeting of Castleton Selectboard and Planning Commission. Meeting aired on PEGTV. Following the public meeting, the draft plan was made available for public comment through October 23, 2023. Online notice of the public comment period with a link to download the draft Plan was posted on Town and RRPC websites, Town and RRPC Facebook pages, and Front Porch Forum. Physical notices were posted at the Town Office, Castleton Post Office, Prunier's Market, and Beverage King. Notices included instructions to email comments to the Town Manager or attend the October 23, 2023 Selectboard meeting to share input. RRPC also direct emailed the draft plan to local officials in neighboring towns, Key Partners, and regional social service agencies seeking input on the complete final draft – see **Appendix C**.

Oct 23, 2023: Draft LHMP discussed at Castleton Selectboard meeting with opportunity for public comments – coincided with close of public comment period and aired on PEGTV.

Nov 2023: Final draft LHMP submitted to Vermont Emergency Management for Approval Pending Adoption.

In addition to the local knowledge of Planning Team members and other relevant parties, several existing plans, studies, reports, and technical information were utilized in the preparation of this Plan. A summary of these is provided in **Table 3.**

Table 3: Existing Plans, Studies, Reports & Technical Information

2023 FEMA Local Mitigation Planning Handbook Used to ensure plan meets the Federal mitigation planning requirements, including those for addressing climate change.

2023 FEMA Hazard Mitigation Assistance Program Policy Guide Used to ensure plan meets the Federal mitigation planning requirements, including those for addressing climate change.

2023 Local Emergency Management Plan Primarily used to identify local organizations that support vulnerable populations to ensure these organizations are invited to participate in the plan update.

2022 Structures Inventory (culverts and short structures) Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

2021 Vermont Climate Assessment Referenced to develop the flood risk profile in Section 5.

2021 FEMA NFIP Insurance Reports Used to determine how many structures are insured, number of repetitive loss properties, and describe NFIP compliance in Section 6.

2021-2017 Green Mountain Power Outage Data Used to develop Table 1 in Section 3.

2021 Zoning Ordinance Referenced to develop Community Capabilities, Integrating into Existing Plans and Procedures, Mitigation Strategy Updates – Changes Since 2017 Plan in Section 6.

2021 American Community Survey Five-Year Estimate Used to develop the Demographics and Growth Potential information in Section 3.

2018 Castleton Town Plan Referenced to develop Community Capabilities, Integrating into Existing Plans and Procedures, Mitigation Strategy Updates – Changes Since 2017 Plan in Section 6.

2018 Castleton River Headwaters Stormwater Master Plan Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

2018 State of Vermont Hazard Mitigation Plan Primarily referenced to develop the risk assessment and profiles in Section 5.

2017 FEMA Region 1 Mitigation Ideas for Natural Hazards Used to develop mitigation actions to address impacts from severe winter storms, high wind, and floods.

2017 Road Erosion Inventory Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

2016 Lake Bomoseen Watershed Stormwater Master Plan Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

2013 Stormwater Infrastructure Mapping Project Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

2013 FEMA Mitigation Ideas Resource for Reducing Risk to Natural Hazards Used to develop mitigation actions to address impacts from severe winter storms, high wind, and floods.

2008 Castleton River Watershed Phase 2 Stream Geomorphic Assessment Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

VTrans Town Highway Bridge Inspection Reports Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

Vermont Statewide Highway Flood Vulnerability and Risk Map Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

VTrans Transportation Resilience Planning Tool Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

Vermont Dam Inventory (VDI) Referenced to develop the risk profile in Section 5 and mitigation actions to address floods in Section 6.

RRPC Local Liaison Reports of Storm Damage Referenced to develop the risk profile in Section 5.

National Oceanic and Atmospheric (NOAA) National Climatic Data Center's Storm Events Database Referenced to develop the risk profile and hazard history in Section 5.

FEMA Disaster Declarations for Vermont Referenced to develop the risk profile and hazard history in Section 5.

OpenFEMA Dataset: Public Assistance Funded Project Summaries for Vermont Referenced to develop the risk profile and hazard history in Section 5.

Vermont Department of Health Referenced to develop the risk profile in Section 5.

Vermont Agency of Natural of Natural Resources Referenced to develop the risk profile in Section 5.

Mitigation Strategy Update - Changes Since 2017

The 2017 local hazard mitigation planning effort analyzed natural hazards and the risk they posed to the Town of Castleton. The risk assessment resulted in the categorization of High and Low risk level hazards. Floods and fluvial erosion; thunder and windstorms/hail; and snow and ice storms were ranked as the community's High risk natural hazards. Actions proposed in 2017 focused on mitigating risks from flooding and power outages.

As the Town has sought to implement the 2017 mitigation strategy, they have looked for opportunities to incorporate information and recommendations from the 2017 Plan into other plans, programs, and procedures. They were successful in doing so in recent Town Plan and Zoning Ordinance updates.

The Castleton Town Plan, adopted in 2018 and amended in 2023, serves as the Town's framework and guide for reaching community goals, including those for how future growth and development should proceed.

It includes flood resilience and land use policies and actions to support the goal of mitigating risks to public safety, critical infrastructure, historic structures, and municipal investments posed by flooding and fluvial erosion.

The Town Plan is the basis for local land use controls such as those in the Castleton Zoning Ordinance, adopted in 2021. Castleton's Zoning Ordinance includes Flood Hazard Area and River Corridor Overlay Districts to ensure the selection, design, creation, and use of development in these hazard areas is reasonably safe and accomplished in a manner that is consistent with public wellbeing, does not impair stream equilibrium, flood plain services, or the stream corridor.

Castleton is one of only 36 municipalities in Vermont that have adopted bylaws regulating development in the river corridor. This is a significant accomplishment to mitigate the impacts of flooding in the community.

In addition, Castleton made significant progress in completing other mitigation actions identified in the 2017 Plan – see **Appendix B**.

They have much to be proud of and noteworthy mitigation accomplishments are highlighted below.

Improvements to Creek Road and Rice Willis Road to make the roads more resilient to flash flooding and fluvial erosion have achieved the intended results and performed well during the July 2023 storms. These mitigation investments have 1) strengthened the community's Transportation lifeline; 2) reduced risk to infrastructure; and 3) supported Town efforts to comply with the Municipal Roads General Stormwater Discharge Permit and protect water quality by controlling erosion and stormwater runoff from municipal roads.

Generators have been installed at the new Public Safety Building (which serves as the Local Emergency Operations Center); local shelter at the American Legion; and sanitary wastewater pump stations at Sucker Brook and Route 4A. These mitigation investments have 1) strengthened the community's Energy; Communications; and Food, Water, Shelter lifelines; 2) reduced risk to people during power outages, especially Castleton's vulnerable populations; and 3) supported Town efforts to comply with the municipal sanitary sewer system's National Pollutant Discharge Elimination System Permit regulating discharges to waters of the State and its requirements to ensure operations even during a power outage.

Actions taken by Castleton since 2017 have made the community more prepared and less vulnerable to future natural hazard impacts.

As described in the Community Profile above, Castleton's population has been in slow decline since its peak in 2010 and growth potential is believed to be limited by a lack of developable land and public water and sewer utilities.

So, changes in population and development since 2017 have not made Castleton more vulnerable to natural hazards and therefore are not the primary drivers for a shift in the Town's mitigation priorities in 2023. Rather changing weather conditions most influenced the Town's current mitigation strategy.

Changes in population and development since 2017 have not made Castleton more vulnerable to natural hazards. Rather changing weather conditions most influenced the Town's current mitigation strategy.

Climate change is increasing the frequency, duration, and intensity of storms, floods, fires, and extreme temperatures across the nation. Local communities are feeling the impacts of climate change now, and these multi-hazard trends are expected to continue to increase in severity over the next century[2].

As a result, Castleton considered the effects of future conditions, like climate change, on the type, location, and range of intensities of identified hazards when they conducted the risk assessment in 2023. The highest risk hazard impacts that the Town believes they are most vulnerable to remained essentially the same as those from 2017:

- Extreme cold, snow, and ice associated with severe winter storms;
- Strong wind associated with thunder and/or winter storms; and
- Floods associated with thunder and/or winter storms and ice jams.

In addition to the traditional natural hazards assessed in 2023, the Town also considered infectious disease and invasive species to align with the hazards identified in the 2018 State Hazard Mitigation Plan.

The primary mitigation goal in the 2023 Plan is to increase the Town'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.

When evaluating mitigation actions, the Town selected actions that support the mitigation goal and are acceptable and practical for the community to implement. Actions that directly benefit a vulnerable population were assigned a high prioritization score – see **Table 6**.

[2] FEMA Hazard Mitigation Assistance Program and Policy Guide, March 23, 2023.

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 **Table 4**).

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.

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:

- ***Extreme cold, snow, and ice*** *associated with severe winter storms.*
- ***Strong wind*** *associated with thunder and/or winter storms.*
- ***Floods*** *associated with thunder and/or winter storms and ice jams.*

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.

***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

Table 4: Community Hazard Risk Assessment

Hazard Event	Hazard Impacts	Probability	Potential Impact					Score
			People	Infrastructure	Environment	Economy	**Average**	
Thunderstorm	**Flash Floods/ Fluvial Erosion**	**4**	**1**	**2**	**4**	**2**	**2.25**	**9.00**
Ice Jam	**Inundation Floods**	**4**	**2**	**3**	**4**	**2**	**2.75**	**11.00**
Tropical Storm Hurricane	**Strong Wind**	**4**	**2**	**4**	**4**	**3**	**3.25**	**13.00**
Tornado	Hail	3	1	2	2	2	1.75	5.25
Landslide	Landslide	2	1	1	2	1	1.25	2.50
Winter Storm	**Cold/Snow/Ice**	**4**	**3**	**3**	**4**	**4**	**3.50**	**14.00**
Drought	Extreme Heat	3	2	1	3	1	1.75	5.25
	Drought	2	1	2	2	2	1.75	3.50
Wildfire	Wildfire	3	2	2	2	2	2.00	6.00
Earthquake	Earthquake	1	3	3	3	3	3.00	3.00

*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

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 Castleton may be likely, potential impacts will be highly dependent on the specific infectious agent or invasive.

The Planning Team acknowledges that impacts to Castleton'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.

Highest Risk Hazard Profiles

Extreme Cold, Snow, and Ice events typically occur between the months of December and March in the Rutland 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 2001 to 2010, Rutland County experienced $2.7 million in property and crop damage from winter storms. 2011 to 2020 experienced $1.58 million in property damage, with $300,000 due to a 10" - 20" heavy, wet snowfall across the county on December 9, 2014.

There have been four winter storm-related federally declared Disasters in the county (the ice storm of January 1998 – DR 1201; severe winter storms in December 2000 and 2014 – DR 1358 and DR 4207, respectively; and severe storm and flooding in April 2007 – DR 1698).

Severe winter weather impacts of greatest concern are power outages and loss of road accessibility. Castleton is vulnerable to power outages; they are a potentially significant risk to many residents.

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.

Extreme cold coinciding with a power outage in Castleton can put residents of the Lakewood Adult Family Home, Fort Warren Mobile Home Park, and Windy Hollow Mobile Home Park at risk. Residents in these facilities constitute approximately 6% of the population.

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. However, there are roads that are vulnerable to drifting (Float Bridge Rd, South St, W Castleton Rd, East Hubbardton Rd, North Rd, Bird's Eye Rd, Pond Hill Rd) and icing (Rice Willis Rd, Coon Hill, W Castleton Rd, Belgo Rd, North Rd, East Hubbardton Rd).

Roads adjacent to critical facilities are well maintained; except the access road to the Fire District #1 water storage tank, which would be accessed by snowmobile in a heavy snow event.

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 Castleton. Federal declarations are depicted in **bold**.

2/3/2022: 8-12" snow mixed with freezing rain: $50,000 regional damage
1/16/2021: 3-6" wet snow: $10,000 regional damage
2/7/2020: 8-12" snow; ¼" ice: $20,000 regional damage
3/22/2019: 9" snow: $15,000 regional damage
11/26/2018: 4-8" heavy snow: $25,000 regional damage
3/14/2017: 18" snow: $25,000 regional damage
2/1-2/2015: Record cold month with 15-20+ days below zero and 10" snow: $15,000 regional damage
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: $20,170 local damage; $200,000 regional damage
3/12/2014: 20" snow: $35,000 regional damage
1/12/2011: 12" snow: $10,000 regional damage
2/23/2010: 6-30" snow: $100,000 regional damage
12/11/2008: 5-9" snow/glaze ice: $50,000 regional damage
4/15-16/2007: DR1698 "Nor'icane" 3" snow and rain, 60-80 mph wind: $4,850 local damage; $1 mil regional damage
1/26/2005: 3" snow: $15,000 regional damage
3/5/2001: EM3167 2-18" snow: $5,025 local damage

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 2004 to 2010, for wind events that caused more than $200,000 in damage, Rutland County experienced nearly $2 million in property damage. From 2011 to 2020, wind events resulted in just under $2.4 million in property damage in Rutland County, with $525,000 due to an event in May 2017.

Strong wind is possible here; Castleton 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 can lead to fallen power lines.

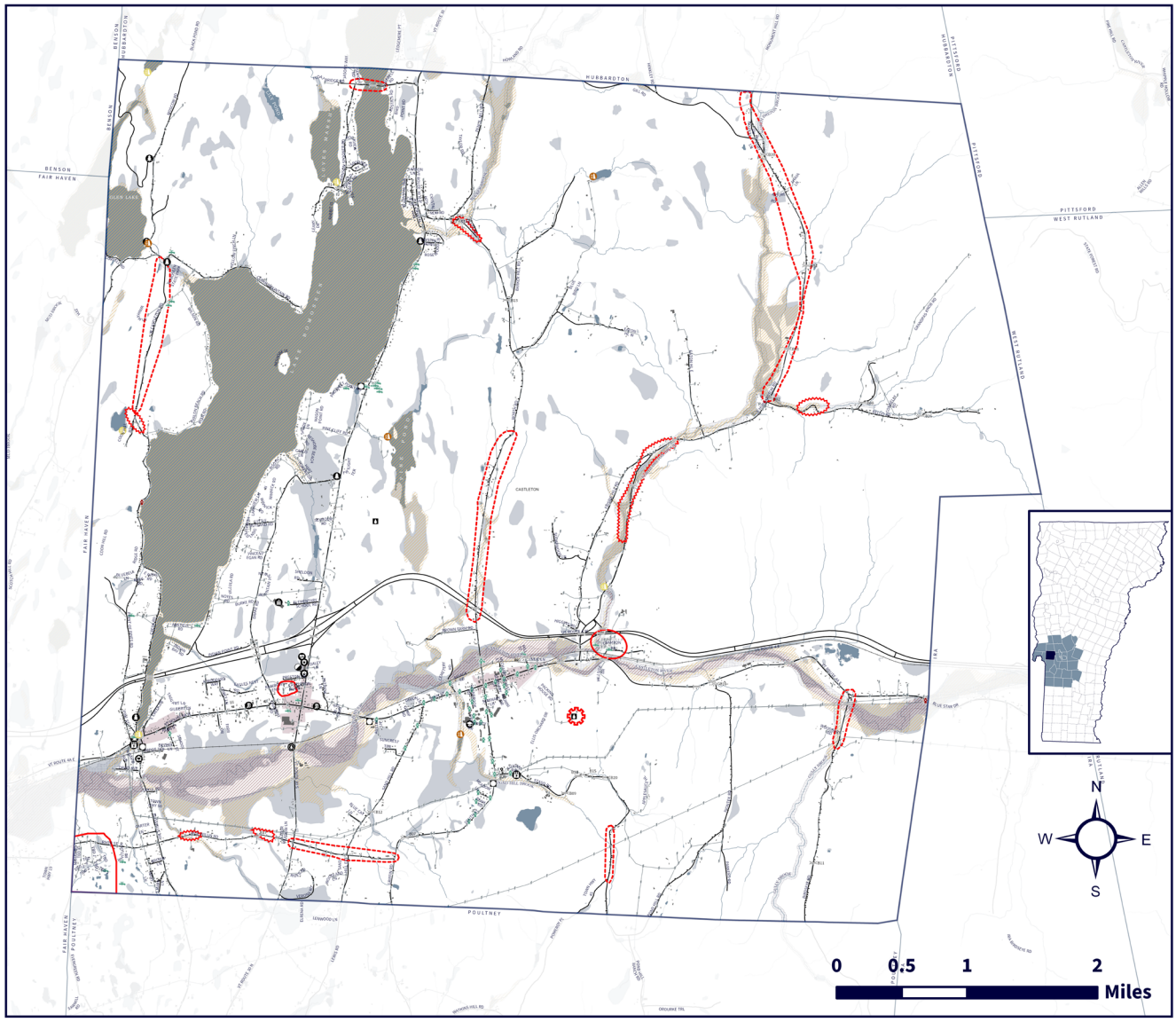
Power outages are the main reason for disrupting communications, which are crucial in times of crisis. For example, the loss of phone service is of particular concern for Castleton's more remote homes, vulnerable populations, and seasonal residents. Landline phones that have been converted from copper 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, service in Castleton is spotty, 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: Public Safety Building (primary local EOC); Town Garage (alternate local EOC); American Legion Post #50 (primary local shelter); and Castleton Elementary School. The municipal sanitary sewer utility also has a system in place to respond to a power outage with a combination of standby and portable generators.

The only public buildings lacking backup power are the Town Office and former Village School. As previously mentioned, Fire District #1's North Road Well also lacks standby power, which means the water system must be operated manually and rely exclusively on the Mill Street Well during an outage.

CASTLETON EXTREME COLD, SNOW, ICE VULNERABILITIES



LEGEND

AREAS OF CONCERN
- Access Road to Fire District #1 Water Storage Tank
- Drifting
- Icing
- Vulnerable Population

- Town Boundaries
- Designated Village Boundaries
- Buildings
- Roads
- Bridges
- Culverts
- Rail Lines
- Power Lines
- Electric Substations

NATURAL WATER
- Lakes & Ponds
- Wetlands

Rivers & Streams
- Perennial
- Intermittent
- River Corridors
- FEMA Floodplain
- FEMA Floodway

- Significant Hazard Potential Dam
- Low Hazard Potential Dam

PUBLIC WATER & WASTEWATER UTILITIES
- Public Water Sources
- Municipal Hydrants
- Dry Hydrants
- Public Waste Water Pump Stations
- Public Waste Water Facilities
- Water Tanks & Towers

- Local Emergency Operation Centers
- Shelter
- Law Enforcement
- Fire House
- Schools
- Higher Ed
- Hospitals & Health Clinics
- Nursing Homes
- Parks

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RUTLAND REGIONAL PLANNING COMMISSION

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. Sixty-six percent (66%) of Community Survey respondents reported having seen areas in the community damaged during a past severe weather event. The most common type of damage that survey respondents reported seeing was downed trees. Fifty-seven percent (57%) of Community Survey respondents reported having experienced damage during a past severe weather event. Roof and other property damage from downed trees was specifically noted by several respondents.

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

Strong Wind Hazard History

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

12/23/2022: 50-60+ wind gusts: 1 fatality
6/21/2021: 55 mph wind: $20,000 local damage
3/1/2021: 39 mph wind: $20,000 regional damage
8/24/2020: 50 mph: $10,000 local damage
8/4/2020: 45 mph wind: $35,000 regional damage
2/24/2019: 48 mph wind: $25,000 regional damage
8/7/2018: 50 mph wind: $10,000 local damage
7/10/2018: 50 mph wind: $15,000 local damage
4/1/2018: 63 mph wind: $50,000 regional damage
10/30/2017: 40 mph wind: $100,000 regional damage
5/5/2017: 64 mph wind: $500,000 regional damage
7/23/2016: 50 mph wind: $10,000 local damage
12/21/2012: 61 mph wind: $50,000 regional damage
12/1/2010: 52 mph wind: $100,000 regional damage
5/26/2010: 55 mph wind: $25,000 regional damage
8/25/2007: 50 mph wind: $50,000 local damage
2/17/2006: 37 mph wind: $75,000 regional damage
9/29/2005: 35 mph wind: $100,000 regional damage
9/19/2003: 40 mph wind: $10,000 regional damage
7/21/2003: 50 mph wind: $25,000 local damage
7/10/2001: strong wind: $50,000 local damage

Castleton is concerned about the potential hazards and risks associated with the Emerald Ash Borer (EAB) due to the cascading impacts associated with storm-related tree damage.

Vermont's EAB infestation was first detected in 2018 in northern Orange County. In 2020, a new detection of EAB in West Rutland was confirmed making Castleton a town in the Confirmed Infested Area. An inventory of trees within the road right-of-way was completed in 2021. A report summarizing the results, to determine how many Ash trees are at risk, is pending. The potential risk to public and private woodlots and impacts on the local economy have not been quantified.

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 systems causing water supply pollution, downed power lines, loss of fuel storage tanks, fires, and release of hazardous materials.

As noted in the 2018 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.

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.

"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 2010, Rutland County experienced roughly $2.6 million in property damage due to flood events.

The worst flooding event in recent years came in August of 2011 from Tropical Storm Irene (DR4022), which dropped up to 10-11 inches of rain in some areas of Rutland County. Irene caused 2 deaths and $55,000,000 in reported property damage and $2.5 million in crop damage in Rutland County.

Although the storm was technically a tropical storm, the effects of the storms are profiled in this flooding section, since the storm brought only large rainfall and flooding to the Town, not the strong wind typically associated with tropical storms. This caused most streams and rivers to flood in addition to widespread and severe fluvial erosion. Castleton experienced approximately $172,500 in local damages during Irene - $37,857 Individual Assistance; $115,262 Public Assistance; and $19,369 National Flood Insurance (NFIP) claims.

From 2012 to 2020, Rutland County experienced approximately $3.5 million in property damage; with $1.9 million due to a flash flood event in July 2017 (DR4330) and $1 million due to a flash flood event in April 2019 (DR4445).

In Castleton, floods are a risk. Damages from Tropical Storm Irene were significant, resulting in approximately $172,500 in impacts. A wide range of assets are vulnerable to flooding.

Castleton is vulnerable to inundation flooding primarily along the Castleton River and to a lesser extent on North Breton Brook. A wide range of assets are at risk from inundation flooding in these areas. There are 14 buildings in the FEMA floodway and 52 buildings in FEMA floodplain; as well as roads, culverts, bridges, and Fire District #1 wells.

66 buildings are in the Special Flood Hazard Area (3% of community structures); mostly single family dwellings and camps.

According to FEMA, 5% of these properties have flood insurance. In total, these 8 policies cover $1,980,000 in value.

There are <u>no</u> repetitive loss properties.

In general, the sanitary sewer utilities are not vulnerable to flooding, even though the treatment plant lies along the Castleton River.

Inundation Flooding at North Road Well – April 2019

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 50 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.

Belgo Road Flash Flood Damage – April 2019

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.

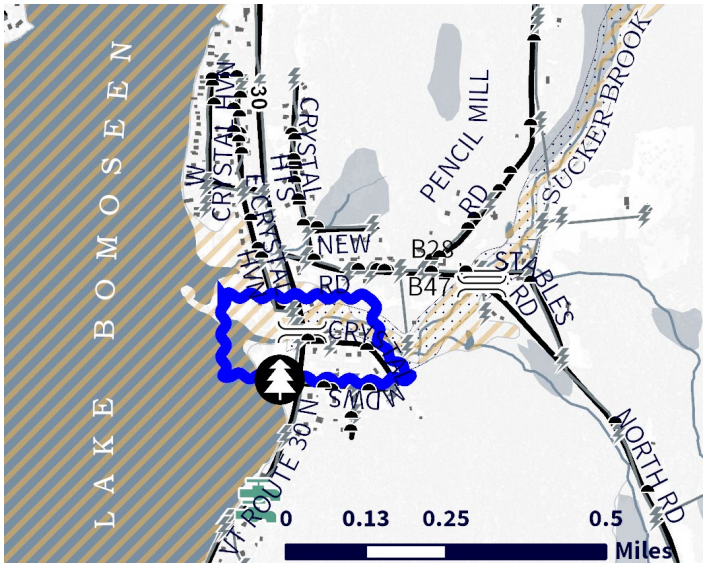
Piontek Road Plugged Culvert – April 2019

Sections of several roads have a history of flash flooding – Belgo Road, Grandpa's Knob, Bird's Eye Road, Piontek Road, Parkers Road, Pond Hill Road, and Eaton Hill (east and west).

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 4A, VT Route 30, North Road, Mill Street, East Hubbardton Road, South Street, Float Bridge Road, Blissville Road, W Castleton Road, Pond Hill Road, Piontek Road, Sand Hill Road, and Drake Road.

When roads are impacted by flooding, the Town coordinates with the Fire Department 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 Castleton. Ice jams on Sucker Brook in the vicinity of VT Route 30 are possible, with impacts to the road and Crystal Beach municipal park.



Area on Sucker Brook Vulnerable to Ice Jam Floods

There are eight (8) dams in Castleton 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). Four (4) are classified as low hazard potential and four (4) as significant. None of the dams are owned by the Town and there are no high hazard potential dams in Castleton.

Low hazard potential dams are on a Glen Lake tributary, Loves Marsh, Chizmar Dam on a Lake Bomoseen tributary, and Lake Bomoseen Dam (municipal sewer main crossing at this dam). An ice jam in the lake channel formed in January 2023 and severely complicated operation of the Lake Bomoseen Dam gates – this is a rare occurrence.

Significant hazard potential dams are on Glen Lake, Pine Pond, Brown Dam on a Sucker Brook tributary, and Castleton University Dam on Pond Hill Brook. According to the State Dam Inventory, the Glen Lake and Castleton University dams are publicly owned, and both listed in fair condition as of their last inspections in 2022 and 2013, respectively. Pine Pond and Brown dams are privately owned. Pine Pond is listed in poor condition per its last inspection in 2012. There is no condition or inspection information listed for the Brown Dam.

Community Survey respondents did not rank dam breaches as particularly important (7 out of 10) to 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 2008 Phase 2 Stream Geomorphic Assessment for the Castleton River watershed; the Lake Bomoseen Watershed Stormwater Master Plan completed in December 2016; and Castleton River Headwaters Stormwater Master Plan completed in January 2018.

Stream Geomorphic Assessments (SGAs) provide information about the physical condition of streams and factors that influence their stability. The 2008 Castleton River watershed 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.

The 2016 Lake Bomoseen Watershed SWMP recommended 48 projects to reduce environmental impacts of nutrient and sediment loading to Lake Bomoseen, as well as mitigate flood vulnerability to municipal or state road and drainage infrastructure.

The 2018 Castleton River Headwaters SWMP recommended 12 projects for site restoration design plan development to improve water quality and/or flood resiliency.

As demonstrated in the above referenced studies, environmental impacts from flooding can be significant, especially to the water quality in Lake Bomoseen. 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.

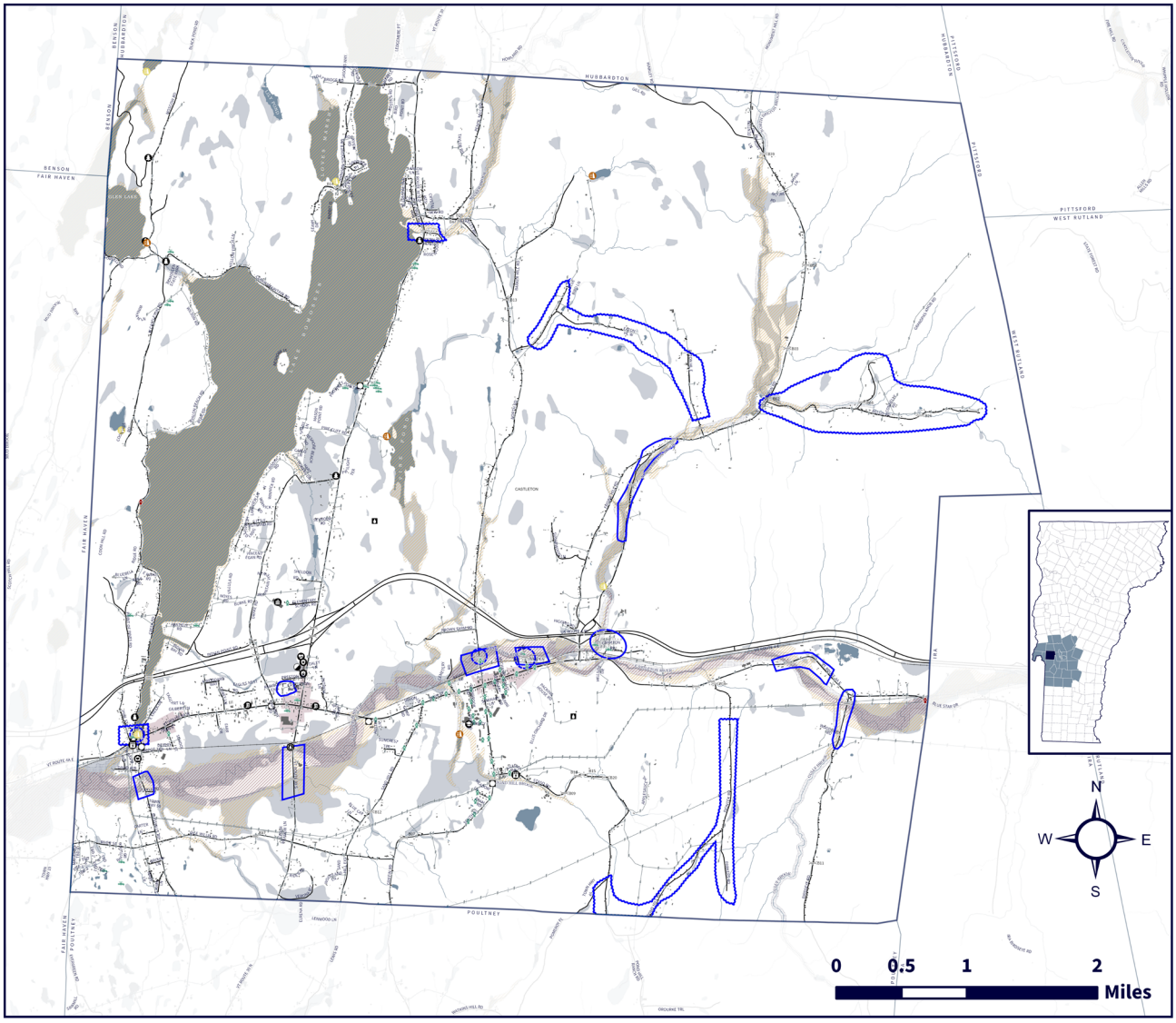
As weather patterns shift and we see larger storms and more frequent freeze-thaw cycles, the Town will monitor for signs that rivers that have historically been stable becoming less stable, with increased erosion, widening, trees falling in from its banks, etc.

Floods Hazard History

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

7/11/2023: DR4720 2" rain: no reported local damage
8/24/2020: 2-3" rain: $10,000 regional damage
4/15/2019: DR4445 1-2" rain with significant snow melt: $34,710 local damage; $1,000,000 regional damage
7/1/2017: DR4330 3-4" rain the previous 3-4 days with flash flooding on 7/1/17: no reported local damage; $700,000 regional damage
7/7/2013: 2-3" rain: $50,000 local damage
6/25-7/11/2013: DR4140 heavy rain over multiple days: $48,600 local damage; $420,000 regional damage
8/28/2011: DR4022 Tropical Storm Irene with ±5" rain: $172,500 local damage ($37,857 Individual / $115,262 Public / $19,369 NFIP)
3/6/2011: heavy rain with snow melt and ice jam: no reported local damage
7/29/2009: heavy rain: $75,000 regional damage
1/18/2006: 1.5-2.5" rain with significant snow melt: $50,000 regional damage
12/16/2000: DR1358 2-4" rain: $27,150 local damage
7/16/2000: DR1336 heavy rain: $9,665 local damage

CASTLETON FLOOD VULNERABILITIES



LEGEND

FLOOD AREA OF CONCERN
- Flash Flood
- Fluvial Erosion
- Inundation Flood

- Town Boundaries
- Designated Village Boundaries
- Buildings
- Roads
- Bridges
- Culverts
- Rail Lines
- Power Lines
- Electric Substations

NATURAL WATER
- Lakes & Ponds
- Wetlands

Rivers & Streams
- Perennial
- Intermittent
- River Corridors
- FEMA Floodplain
- FEMA Floodway

- Significant Hazard Potential Dam
- Low Hazard Potential Dam

PUBLIC WATER & WASTEWATER UTILITIES
- Public Water Sources
- Municipal Hydrants
- Dry Hydrants
- Public Waste Water Pump Stations
- Public Waste Water Facilities
- Water Tanks & Towers

- Local Emergency Operation Centers
- Shelter
- Law Enforcement
- Fire House
- Schools
- Higher Ed
- Hospitals & Health Clinics
- Nursing Homes
- Parks

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RUTLAND REGIONAL PLANNING COMMISSION

Vulnerability Summary

Extreme Cold, Snow, and Ice

Vulnerable Assets people (especially older adults, children, and sick); highway infrastructure; power lines; telecommunications systems; public water system; trees; local businesses

Location Town-wide; Lakewood Adult Family Home; Fort Warren Mobile Home Park; Windy Hollow Mobile Home Park; Float Bridge Rd, South St, W Castleton Rd, E Hubbardton Rd, North Rd, Bird's Eye Rd, Pond Hill Rd, Rice Willis Rd, Coon Hill, Belgo Rd; Fire District #1 water storage tank access road

Extent 15-20+ days below zero; up to 30" snow; ¼" ice

Past Occurrence $20,170 local / $1 million regional damage

Future Probability >75% probability in a year

Strong Wind

Vulnerable Assets people (especially older adults, children, and sick); highway infrastructure; buildings; power lines; telecommunications systems; public water system; trees; local businesses

Location Town-wide; Town Office, Village School, Fire District #1 North Road Well

Extent up to 64 mph wind

Past Occurrence 1 fatality; $50,000 local / $500,000 regional damage

Future Probability >75% probability in a year

Floods

Vulnerable Assets people (especially older adults, children, and sick); highway infrastructure; buildings; public water system; dams; municipal park; lakes; local businesses

Location *Inundation Flooding:* along Castleton River and North Breton Brook

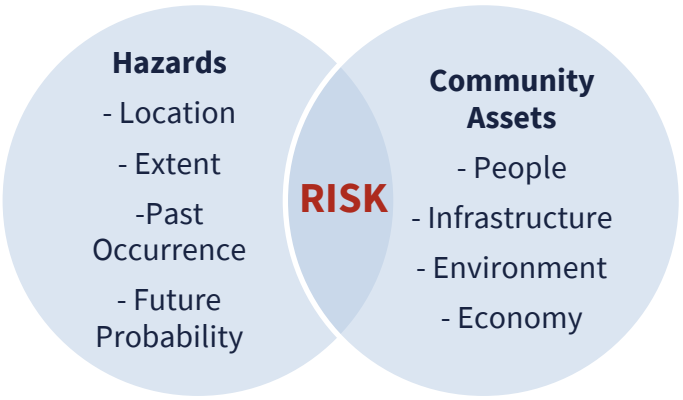
Flash Flooding: Belgo Rd, Grandpa's Knob, Bird's Eye Rd, Piontek Rd, Parkers Rd, Pond Hill Rd, Eaton Hill (east and west); Crystal Beach; Glen Lake dams, Pine Pond dam, Brown dam, Castleton University dam, Loves Marsh dam, Chizmar dam, Lake Bomoseen dam; Lake Bomoseen

Fluvial Erosion: Float Bridge Rd bridge (B38); Mill Street Well access bridge (B01)

Extent ±5" rain; extent data for fluvial erosion is unavailable

Past Occurrence $172,500 local / $1 million regional damage

Future Probability >75% probability in a year



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

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:

Increase the Town of Castleton'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 communications.

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

Community Lifelines

Community Lifelines enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security. The goal of the lifeline concept is to focus response efforts on stabilizing or re-establishing these most fundamental services during and after a disaster. Mitigating lifelines should reduce cascading impacts across government and business functions and lessen system-wide damage.

Community Lifelines are organized into seven categories:

1. Law Enforcement
2. Fire Service
3. Search & Rescue
4. Government Service
5. Community Safety

1. Food
2. Water
3. Shelter
4. Agriculture

1. Medical Care
2. Public Health
3. Patient Movement
4. Medical Supply Chain
5. Fatality Management

1. Power Grid
2. Fuel

1. Infrastructure
2. Responder Communications
3. Alerts, Warnings, & Messages
4. Finance
5. 911 & Dispatch

1. Highway/Road/Motor Vehicle
2. Mass Transit
3. Railway
4. Aviation
5. Maritime

1. Facilities HAZMAT, Pollutants, Contaminants

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. Castleton'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: Town Manager, Administrative Assistant, Town Treasurer, Accountant, Town Clerk, Assistant Town Clerk, Zoning Administrator, Director of Public Works, Police Chief, and Tree Warden.

In addition to paid staff, there is a 5-member Selectboard, 5-member Planning Commission, Fire Warden, Town Health Officer, Economic Development Committee, and Constable.

Castleton Fire District #1 staff includes a 5-member Prudential Committee and system operators.

To augment local resources, the Town has formal mutual aid agreements for emergency response – fire and public works. Technical support is available through the RRPC 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.

Strengths community with a family atmosphere ● committed small core of volunteers involved in several committees and groups ● strong interdepartmental communication and cooperation

Areas for Improvement create a paid staff economic development administrative position ● potential candidates for volunteering is limited ● small pool of volunteers creates burn out and limited time commitments

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 codes[3] that regulate how and where land is developed, and structures are built.

Town Plan: March 2023
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 and River Corridor Overlay District Requirements: June 2021
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 and River Corridor 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.

Road and Bridge Standards: July 2023
Description: Provide minimum codes and standards for construction, repair, maintenance of town roads and bridges.
Relationship to Natural Hazard Mitigation Planning: Standards include management practices and are designed to ensure travel safety, minimize damage to road infrastructure during flood events, and enhance water quality protections.

Road Erosion Inventory Report: 2017
Description: Prioritizes those infrastructure projects necessary to improve transportation network resiliency and water quality.
Relationship to Natural Hazard Mitigation Planning: Improvements are designed to minimize or eliminate flood impacts on hydrologically connected road segments.

Local Emergency Management Plan: April 2023
Description: Establishes lines of responsibility and procedures to be implemented during a disaster and identifies high risk populations, hazard sites, and available resources.
Relationship to Natural Hazard Mitigation Planning: Includes actions for tracking events and response actions including damage reports to facilitate funding requests during recovery. This type of information can be essential to preparing hazard mitigation project applications for FEMA funding.

Fire Department ISO Rating: Issued in June 2017
Description: Where municipal water is available, the rating is 5.5Y. This rating is a score from 1 to 10 that indicates how well-protected the community is by the local fire department.
Relationship to Natural Hazard Mitigation Planning: Everyone wants to keep family, home, and business safe from fires. The ISO rating is a measure of the effectiveness of a community's fire services.

Fire District #1 Water Ordinance: April 2014
Description: Establish minimum standards for design, construction, installation, control, operation of public drinking water system.
Relationship to Natural Hazard Mitigation Planning: Adopted standards that reduce risk, make the system more resilient, and conserve water.

Fire District #1 Source Protection Plan: July 2023
Description: Defines the area of land that likely recharges a public drinking water source and addresses actions a public water system will perform to minimize the contaminant risks to the source(s).
Relationship to Natural Hazard Mitigation Planning: Source water protection can complement a broad sweep of community objectives, including protection of water quality, open space, natural systems, and disaster resilience.

Sewer Ordinance: November 2015
Description: Establish minimum standards for design, construction, installation, control, operation of public sewage and sewage disposal systems.
Relationship to Natural Hazard Mitigation Planning: Adopted standards that reduce risk and make the system more resilient.

Lake Bomoseen Watershed and Castleton River Headwaters Stormwater Master Plans: 2016 and 2018
Description: Identify stormwater inputs and develop prioritized projects to mitigate stormwater water quality problems.
Relationship to Natural Hazard Mitigation Planning: Many projects accomplish multiple goals-water quality and mitigation.

[3] Castleton does not have any local building codes. Vermont has adopted statewide codes for commercial building fire safety and energy standards. The energy code also applies to residential buildings. Codes enforced by Vermont's Division of Fire Safety are the 2015 National Fire Protection Association (NFPA) 1 Fire Code; 2015 NFPA 101 Life Safety Code; the 2015 International Building Code (IBC); 2017 NFPA 70 National Electrical Code; 2021 International Code Council (ICC) International Plumbing Code; and the 2015 National Board Inspection Code from the National Board of Boiler and Pressure Vessel Inspectors.

Strengths plans and regulations in place are being executed ● keep plans and regulations up to date ● strong local partners in implementing plans

Areas for Improvement ISO ratings need to be present ● pressured water needs to be expanded ● zoning administrator needs to be a full-time position with increased enforcement efforts

Financial These capabilities are the resources that a community has access to or is eligible to use to fund mitigation actions.

Castleton's 2023-2024 town budget is $3,704,957, with $1,176,033 to fund the Highway Department. In addition to property tax revenues, the Town collects separate fees for sanitary sewer services.

Both Fire Districts collect fees for the provision of fire protection and drinking water. The annual budget for Castleton Fire District #1 is $456,318.

Strengths well-funded budgets

Areas for Improvement staffing increases in Highway Department ● some aging fleet vehicles ● capital reserves for equipment need to be increased

Outreach & Education Castleton has several outreach and education opportunities that could be used to implement mitigation activities and communicate hazard-related information:

- Lion's Club, American Legion Post #50, Community Senior Center, Masonic Lee Lodge #30, Town Recreation Department, Fire Department Association, Castleton Cares, Bridge Initiative, Lake Bomoseen Association, Lake Bomoseen Preservation and Trust, Historical Society, Lakes Region Chamber of Commerce
- Town website, Front Porch Forum, several Department Facebook pages, Hey Gov 311

Strengths multiple programs/organizations are already in place in the community ● particularly strong online and social media presence

Areas for Improvement better coordination needed to help implement future mitigation activities ● leverage communication tools available through Castleton University

National Flood Insurance Program Compliance

The Town joined the National Flood Insurance Program (NFIP) in 1984. The effective date of the current Flood Insurance Rate Map (FIRM) is August 28, 2008. The Zoning Administrator enforces NFIP compliance through permit review requirements in its Flood Hazard Area regulations. Castleton's regulations outline detailed minimum standards for development in flood hazard areas defined as FEMA Special Flood Hazard Areas and Floodway Areas. The regulations also require administering Substantial Improvement and Substantial Damage (SI/SD) requirements in accordance with FEMA P-758 SI/SD Desk Reference, May 2010:

"Substantial improvement or substantial damage determinations shall be made in accordance with current FEMA guidelines or procedure established by the DRB in accordance with 24 V.S.A. § 1972 and 24 V.S.A. § 4461 and shall be used to determine the appropriate development standards for repair and rebuilding." *Castleton Zoning Ordinance, June 2021*

The Town discussed the following as possible actions to continue NFIP compliance:

1) Prepare, distribute, or make available NFIP insurance explanatory pamphlets or booklets.
2) Participate in NFIP training offered by the State and/or FEMA.
3) Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm.

State Incentives for Flood Mitigation Vermont's Emergency Relief Assistance Funding (ERAF) provides state funding to match FEMA Public Assistance after federally declared disasters. Eligible public costs are generally reimbursed by FEMA at 75% with a 7.5% State match. The State will increase its match to 12.5% or 17.5% if communities take steps to reduce flood risk as described below.

12.5% funding for communities that have adopted four (4) mitigation measures:

1) NFIP participation;
2) Town Road and Bridge Standards;
3) Local Emergency Plan; and
4) Local Hazard Mitigation Plan.

17.5% funding for communities that also participate in FEMA's Community Rating System OR adopt Fluvial Erosion Hazard or other river corridor protection bylaw that meets or exceeds the Vermont ANR model regulations.

Castleton's current ERAF rate is 7.5%. Upon adoption of the 2023 Local Hazard Mitigation Plan, their ERAF rate will increase to 17.5% because the Town has adopted River Corridor Bylaws.

Mitigation Action Identification

The Hazard Mitigation Planning Team discussed the mitigation strategy, reviewed projects from the 2017 Plan, and identified possible new actions from the following categories for each of the highest risk natural hazards identified in Section 5.

Local Plans & Regulations These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.

Structure & Infrastructure Projects These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This applies to public or private structures as well as critical facilities.

Natural Systems Protection These actions minimize damage and losses and preserve or restore the functions of natural systems.

Outreach & Education Programs These actions inform and educate the public about hazards and potential ways to mitigate them. Although this type of action reduces risk less directly than structure projects or regulation, it is an important foundation. Greater awareness is more likely to lead to community support for direct actions.

Local Plans & Regulations Examples

Integrate Mitigation into Capital Improvement Programs: Incorporate risk assessment and hazard mitigation principles into capital planning.

Reduce Impacts to Roadways: The leading cause of death and injury during winter storms is automobile accidents, so it is important to plan for and maintain adequate road and debris clearing capabilities.

Develop a Road Right-of-Way Vegetation Management Plan: Identify community priorities and plan of action for site-specific tree and roadside forest management to increase roadside resilience.

Improve Flood Resilience with a Flood Study: The aim of a flood study is to define existing flood behavior for a particular catchment, river, or creek. The study helps inform building, land use planning, community awareness and disaster management.

Improve Stormwater Management Planning: Rain and snowmelt can cause flooding and erosion in developed areas. A community-wide stormwater management plan can address stormwater runoff-related flooding.

Manage Development in Erosion Hazard Areas: The intent of River Corridor Bylaws is to allow for wise use of property within river corridors that minimizes potential damage to existing structures and development from flood-related erosion.

Structure & Infrastructure Project Examples

Protect Power Lines: Protect power lines by 1) inspecting and maintaining hazardous trees in the road right-of-way and 2) burying power lines.

Protect Critical Roadways: Use snow fences or living snow fences (e.g., rows of trees) to limit blowing and drifting of snow.

Retrofit Critical Facilities: Critical facilities can be protected from the impacts of high winds and winter storms by 1) retrofitting them to strengthen structural frames to withstand wind and snow loads; 2) anchoring roof-mounted mechanical equipment; and 3) installing back-up generators or quick connect wiring for a portable generator.

Remove Existing Structures from Flood Hazard Areas: FEMA policy encourages the removal of structures from flood-prone areas to minimize future flood losses and preserve lands subject to repetitive flooding.

Improve Stormwater Drainage Capacity: Minimize flooding and fluvial erosion by 1) increasing drainage/absorption capacities with green stormwater management practices; 2) increasing dimensions of undersized drainage culverts in flood-prone areas; 3) stabilizing outfalls with riprap and other slope stabilization techniques; and 4) re-establishing roadside ditches.

Conduct Regular Maintenance for Drainage Systems: Help drainage systems and flood control structures function properly with 1) routine cleaning and repair; 2) cleaning debris from support bracing underneath low-lying bridges; and 3) inspecting bridges and identifying if any repairs are needed to maintain integrity or prevent scour.

Protect Infrastructure and Critical Facilities: Minimize infrastructure losses and protect critical facilities from flooding by 1) elevating roads above base flood elevation to maintain dry access; 2) armoring streambanks near roadways to prevent washouts; 3) rerouting a stream away from a vulnerable roadway; and 4) floodproofing facilities.

Natural Systems Protection Examples

Protect and Restore Natural Flood Mitigation Features: Natural conditions can provide floodplain protection, riparian buffers, groundwater infiltration, and other ecosystem services that mitigate flooding. Preserving such functionality is important. Examples include 1) adding riparian buffers; 2) stabilizing stream banks; 3) removing berms; 4) minimizing impervious area development; 5) restore floodplain; and 6) restore incision areas.

Outreach & Education Program Examples

Educate Residents about Extreme Winter Weather: Winter storms create a higher risk of car accidents, hypothermia, frostbite, carbon monoxide poisoning, and heart attacks from overexertion. Educational outreach can help minimize these risks.

Assist Vulnerable Populations: Measures can be taken to protect vulnerable populations from natural hazards, such as 1) organizing outreach and 2) establishing and promoting accessible heating or cooling centers in the community.

Mitigation Action Evaluation

For each mitigation action identified, the Planning Team evaluated its potential benefits and/or likelihood of successful implementation. Actions were evaluated against a range of criteria, including a planning level assessment of whether the costs are reasonable compared to the probable benefits. Results of this evaluation are presented in **Table 5**.

See Community Survey results in **Appendix D** for which category of mitigation actions survey respondents wanted the Town to prioritize.

Mitigation Action Plan for Implementation

After careful evaluation, the Planning Team agreed on a list of actions that support the Mitigation Goals of this Plan and are acceptable and practical for the community to implement.

Actions without overall public support/political will were not selected for implementation. Actions whose costs were not reasonable compared to probable benefits were also not selected.

For the selected actions, the Planning Team then 1) assigned a responsible party to lead the completion of each action; 2) identified potential grant funding; 3) defined a timeframe for implementation; and ranked each action's priority (high, medium, low).

Natural hazards pose a unique threat to the Town's vulnerable populations. Data has shown that underserved and marginalized populations tend to live in at-risk hazard-prone areas or in homes with substandard construction. The data also suggests that this segment of the community is less likely to fully recover after a disaster.[4] When ranking an action's priority, those that directly benefit a vulnerable population were ranked high.

The action plan is presented in **Table 6**.

[4] FEMA Hazard Mitigation Assistance Program and Policy Guide, March 23, 2023

Table 5: Mitigation Action Evaluation and Prioritization

Mitigation Action	Life Safety	Prop Protect	Tech	Political	Admin	Other Obj	Benefit Score	Est Cost	C/B
Local Plans & Regulations									
Recommended for Implementation									
Integrate Mitigation into Capital Improvement Programs and Planning	1	1	1	1	1	1	6	1	Yes
Plan for and Maintain Adequate Road and Debris Clearing Capabilities	1	1	1	1	1	1	6	1	Yes
Update Road Erosion and Culvert Inventories	1	1	1	1	1	1	6	1	Yes
Inspect Town Short-Structures and Review VTrans Bridge Inspection Reports [5] for Town Long-Structures and Plan for Repairs to Prevent Flood-related Impacts like Scour	1	1	1	1	1	1	6	1	Yes
Improve Stormwater Management by Completing a Stormwater Master Plan	1	1	1	1	1	1	6	1	Yes
Plan for Road Right-of-Way Vegetation Management	1	1	1	1	0	1	5	1	Yes
Update Zoning Ordinance to Require New Subdivision Development to Bury Power Lines	1	1	1	0	1	1	5	1	Yes
Improve Flood Resilience with a Flood Study	1	1	1	1	-1	1	4	1-2	Yes
Not Recommended for Implementation									
Adopt Local Building Codes for Roof Wind and Snow Loads	1	1	1	0	0	1	4	1	Yes
	The Town does not have the capacity to adopt local building codes but wants to explore expanding local capacity to enforce State building codes during the development review process.								
Adopt Flood Hazard Area and/or River Corridor Bylaws	Planning Team did not evaluate this action because the Town has already adopted both FHA and River Corridor bylaws.								
Adopt a Policy Requiring All Town Employees to be Fully Vaccinated Against Common Disease	1	0	1	-1	1	1	3	1	Yes
Structure & Infrastructure Projects									
Recommended for Implementation									
Protect Power Lines and Roads by Inspecting and Removing Hazardous Trees in Road ROW	1	1	1	1	1	1	6	1	Yes
Install Back-up Generators or Quick Connect Wiring at Critical Facilities	1	1	1	1	1	1	6	1	Yes
Increase Drainage/Absorption Capacities with Green Stormwater Management Practices	1	1	1	1	1	1	6	1	Yes
Stabilize Outfalls	1	1	1	1	1	1	6	1	Yes
Install/Re-establish Roadside Ditches	1	1	1	1	1	1	6	1	Yes
Routinely Clean and Repair Stormwater Infrastructure	1	1	1	1	1	1	6	1	Yes
Routine Clear Debris from Support Bracing Underneath Low-Lying Bridges	1	1	1	1	1	1	6	1	Yes
Increase Dimension of Drainage Culverts in Flood-Prone Areas	1	1	1	1	1	1	6	1-2	Yes
Remove Existing Structures from Flood-Prone Areas	1	1	1	0	1	1	5	3	Yes
Use Snow Fence on Critical Roads Prone to Drifting	1	1	1	1	1	0	5	1	Yes

[5] VTrans inspects all town-owned long structures under the State's Town Highway Bridge Program every two years. Inspection reports are available on the VTrans website.

Mitigation Action	Life Safety	Prop Protect	Tech	Political	Admin	Other Obj	Benefit Score	Est Cost	C/B
Structure & Infrastructure Projects (cont.)									
Not Recommended for Implementation									
Elevate Roads Above Base Flood Elevation to Maintain Dry Access	1	1	1	0	1	0	4	3	No
Bury Power Lines	Planning Team evaluated this infrastructure project and decided it was more appropriate to implement as a regulatory action by updating Zoning Ordinance to require new subdivision developments to bury power lines.								
Insulate Shallow Buried Utility Mains/Services	Planning Team did not evaluate this action because there are no known shallow buried utility mains or service lines.								
Retrofit Critical Facilities to Strengthen Structural Frames to Withstand Wind and Snow Loads	Planning Team did not evaluate this action because there are no critical facilities requiring retrofits to comply with building codes for wind or snow loads.								
Anchor Roof-Mounted Mechanical Equipment on Critical Facilities	Planning Team did not evaluate this action because there are no critical facilities with roof-mounted mechanical equipment.								
Floodproof Critical Facilities	Planning Team did not evaluate this action because there are no critical facilities requiring floodproofing – Castleton Fire District Well 1 and 2 have been floodproofed and no wastewater pump stations are vulnerable to flooding.								
Natural Systems Protection									
Recommended for Implementation									
Stabilize Stream Banks	1	1	1	1	1	1	6	1	Yes
Remove Berms and/or Accumulated Debris from Stream to Restore Flood Capacity	1	1	1	1	1	1	6	1	Yes
Not Recommended for Implementation									
Remove Significant Hazard Potential Dams	1	1	1	-1	1	1	4	2-3	Yes
Establish Vegetative Buffers in Riparian Areas	Planning Team did not evaluate these actions as there are no known project locations; however, the Town will collaborate with the Natural Resources Conservation District to identify and implement projects that meet the goals of this Plan.								
Restore Floodplain									
Restore Incision Areas									
Outreach & Education Programs									
Recommended for Implementation									
Educate the Public About the Risks of Infectious Disease and/or Invasive Species and How to Protect Against Them	1	1	1	1	1	1	6	1	Yes
Educate DPW Staff to Recognize the Presence of Large Mosquito Populations Around Standing Water and How to Report this Information to the VDH District Office to Improve Vector Control	1	0	1	1	1	1	5	1	Yes
Not Recommended for Implementation									
Educate the Public About How to Prepare for Extreme Winter Weather	Planning Team did not evaluate this action because the Town already does outreach/education on how to prepare for extreme winter weather.								
Assist Vulnerable Populations	Planning Team did not evaluate this action because the Town already has a procedure for assisting vulnerable populations in its Local Emergency Management Plan.								
Keep the Ditches Clean Campaign	Planning Team did not evaluate this action because the filling of ditches by adjacent property owners is not a problem in the community.								

Table 5 Evaluation Criteria:
Life Safety –Will the action be effective at protecting lives and preventing injuries?
Property Protection –Will the action be effective at eliminating or reducing damage to structures and infrastructure?
Technical – Is the action a long-term, technically feasible solution?
Political – Is there overall public support/political will for the action?
Administrative – Does the community have the administrative capacity to implement the action?
Other Community Objectives – Does the action advance other community objectives, such as capital improvements, economic development, benefit a vulnerable population, environmental quality, or open space preservation?

Rank each of the above criteria in Table 5 with a -1, 0, or 1 using the following table:
1 = Highly effective or feasible
0 = Neutral
-1 = Ineffective or not feasible

Estimated Cost – 1 = less than $50,000; 2 = $50,000 to $100,000; 3 = more than $100,000
C/B – Are the costs reasonable compared to the probable benefits? Yes or No

Table 6: Mitigation Action Plan

Plan for and Maintain Adequate Road and Debris Clearing Capabilities: A leading cause of death and injury during winter storms is from auto accidents so it is important to plan for and maintain adequate road and debris clearing capabilities. This includes capital planning and annual funding to support the facilities (garage and equipment) and an appropriate number of staff needed to maintain the transportation network in Castleton.

ADDRESSED HAZARDS

Extreme Cold, Snow, and Ice
Primary Hazard

Strong Wind

TYPE OF PROJECT

Local Plans & Regulations

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact
Town-wide; ±60 mile road network

LEAD PARTY
Town Manager

GRANT FUNDING SOURCES
- None

PARTNERSHIPS
- None

PROJECT TIMEFRAME
To coincide with preparing annual Town budget each Nov

PRIORITIZATION = HIGH

Update Road Erosion and Culvert Inventories: These inventories were completed in 2017 and 2022 and serve as the basis for asset management and should be kept up-to-date annually, with a full reassessment every 5 years.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Local Plans & Regulations

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact
Town-wide; ±60 mile road network and 674 culverts

LEAD PARTY
DPW Director

GRANT FUNDING SOURCES
- VTrans

PARTNERSHIPS
- Rutland RPC
- ANR Municipal Roads Program

PROJECT TIMEFRAME
2027 construction season

PRIORITIZATION = MEDIUM

Road Right-of-Way (ROW) Vegetation Management Plan: Hazard trees in the road ROW can contribute to power and communication outages as well as debris in the roadway during winter storms and wind events. This hazard is exacerbated by the possibility of Emerald Ash Borer infestation. To increase roadside resilience, Castleton will develop a plan to 1) identify community priorities and 2) define a plan of action for site-specific tree and roadside forest management.

ADDRESSED HAZARDS

Extreme Cold, Snow, and Ice
Primary Hazard

Strong Wind

Invasive Species

TYPE OF PROJECT

Local Plans & Regulations

COMMUNITY LIFELINES TARGETED

Energy
Primary Lifeline

Communications

Transportation

Area of Impact

Town-wide; ±60 mile road network

LEAD PARTY

Town Manager

GRANT FUNDING SOURCES

- None

PARTNERSHIPS

- Tree Warden
- VT Urban & Community Forestry
- VT Dept of Forests, Parks, & Rec

PROJECT TIMEFRAME

Partner outreach Jan 2024
Complete plan Nov 2026

PRIORITIZATION = MEDIUM

Plan for Bridge Repairs: Several town bridges are vulnerable to flooding. The Town will ensure short structures are inspected on a routine basis and long structure VTrans inspection reports are reviewed and used to plan for flood-related bridge repairs such as scour, as needed.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Local Plans & Regulations

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

Town-wide; 33 municipal bridges – 24 short structures and 9 long structures

LEAD PARTY

DPW Director

GRANT FUNDING SOURCES

- None

PARTNERSHIPS

- VTrans

PROJECT TIMEFRAME

Data Collection Jun 2024
Complete Plan Jun 2025

PRIORITIZATION = MEDIUM

Stormwater Master Plan: The Town has worked with Poultney Mettowee Natural Resources Conservation District on three stormwater master plans – 2016 Lake Bomoseen Watershed, 2018 Castleton River Headwaters, 2023 Main Street. The Town will 1) determine the status of the recommended projects and 2) develop a schedule for implementing those that remain incomplete.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Local Plans & Regulations

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

Lake Bomoseen, Castleton River

LEAD PARTY

Town Manager

GRANT FUNDING SOURCES

- S Lake Champlain Clean Water Service Provider (CWSP)

PARTNERSHIPS

- Poultney Mettowee NRCD
- Lake Bomoseen Association

PROJECT TIMEFRAME

Determine Project Status Jul 2024
Develop Project Schedule Dec 2024

PRIORITIZATION = HIGH

Flood Study: A flood study is a technical investigation of flood behavior for a river. The aim is to define existing flood behavior, including depths, extents, and velocities. The study can help inform building, land use planning, community awareness, and disaster management. The Town will explore the feasibility of completing a flood study of the Castleton River and North Breton Brook.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Local Plans & Regulations

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact
Castleton River, North Breton Brook

LEAD PARTY
Town Manager

GRANT FUNDING SOURCES
- FEMA/VEM Hazard Mitigation

PARTNERSHIPS
- VEM Recovery Section

PROJECT TIMEFRAME
Partner outreach Dec 2024

PRIORITIZATION = HIGH

Remove Hazard Trees in Road ROW: Castleton will remove hazard trees within their road ROW and/or request removal by Green Mountain Power if also within the power line ROW in accordance with their Road ROW Vegetation Management Plan.

ADDRESSED HAZARDS

Extreme Cold, Snow, and Ice
Primary Hazard

Strong Wind

Invasive Species

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Energy
Primary Lifeline

Communications

Transportation

Area of Impact
Town-wide; ±60 mile road network

LEAD PARTY
DPW Director

GRANT FUNDING SOURCES
- None

PARTNERSHIPS
- Tree Warden
- Green Mountain Power

PROJECT TIMEFRAME
See ROW Vegetation Management Plan

PRIORITIZATION = MEDIUM

Install Back-up Power at Critical Facilities: Generators (standby or portable) are emergency equipment that provide a secondary source of power to a facility. Castleton has identified two critical facilities needing back-up power – Town Office (generator install is in process) and Fire District #1 North Road Well.

ADDRESSED HAZARDS

All Hazards
Including Extreme Cold

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Energy
Primary Lifeline

Food, Water, Shelter

Area of Impact
Fire District #1 North Road Well

LEAD PARTY
Town Manager

GRANT FUNDING SOURCES
- None

PARTNERSHIPS
- Castleton Fire District #1

PROJECT TIMEFRAME
2028 construction season

PRIORITIZATION = MEDIUM

Install Green Stormwater Management Practices: Green infrastructure uses vegetation, soils, and other elements and practices to restore some of the natural processes required to manage stormwater. Castleton has identified the following projects.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

Main Street

LEAD PARTY

DPW Director

GRANT FUNDING SOURCES

- S Lake Champlain CWSP

PARTNERSHIPS

- Poultney Mettowee NRCD
- VT Youth Conservation Corp

PROJECT TIMEFRAME

See 2023 Stormwater Scoping Study

PRIORITIZATION = HIGH

Stabilize Culvert Outfalls: Erosion at culvert outlets is common and can cause structural failure with serious downstream consequences. Properly stabilized outfalls protect channel bank stability and reduce erosion. Castleton has identified the following locations where culvert outlet stabilization is needed.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

See Municipal Roads General Permit (MRGP) Outlet and Road Erosion Inventories for non-compliant culvert outfalls

LEAD PARTY

DPW Director

GRANT FUNDING SOURCES

- VTrans

PARTNERSHIPS

- VTrans District 3
- ANR Rivers Program
- ANR Municipal Roads Program

PROJECT TIMEFRAME

See MRGP Improvement Schedule

PRIORITIZATION = MEDIUM

Install/Re-work Roadside Ditches: Properly installed and stabilized roadside ditches are critical to protect the integrity of the road. Castleton has an extensive network of ditches, with 192 road segments (328 ft) with ditches that must be improved to current municipal Road Standards. Of these, 7 are very high priority, 24 high priority, and 161 moderate/low priority.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

See MRGP Road Erosion Inventory for non-compliant road segments

LEAD PARTY

DPW Director

GRANT FUNDING SOURCES

- VTrans

PARTNERSHIPS

- ANR Municipal Roads Program

PROJECT TIMEFRAME

See MRGP Improvement Schedule

PRIORITIZATION = HIGH

Routinely Clean and Repair Stormwater Infrastructure: Regular maintenance is one of the most effective ways to mitigate the impacts of floods. Routine cleaning and repairs of catch basins, ditches, and culverts will be done according to the Highway Department's maintenance schedule and the Municipal Roads General Permit (MRGP).

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

Town-wide; 12 catch basins, ±60 mile road network, 674 culverts

LEAD PARTY

DPW Director

GRANT FUNDING SOURCES

- None

PARTNERSHIPS

- ANR Municipal Roads Program

PROJECT TIMEFRAME

See Highway Department's Maintenance Schedule and MRGP

PRIORITIZATION = MEDIUM

Routinely Clear Debris from Low-Lying Bridge Support Bracing: Regular maintenance will help structures continue to function properly and not create a hazard during a flood. Castleton has identified one (1) low-lying bridge.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

Bridge #34 on North Road

LEAD PARTY

DPW Director

GRANT FUNDING SOURCES

- None

PARTNERSHIPS

- ANR Rivers Program
- US Army Corps of Engineers

PROJECT TIMEFRAME

As needed

PRIORITIZATION = HIGH

Adequately Size Culverts in Flood-Prone Areas: Undersized culverts can lead to road washouts and floods. Castleton has identified several locations where upsized culverts are needed.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

1) Belgo Road #29-05
2) South Street #04-21
3) See Culvert and MRGP Road Erosion Inventories for non-compliant culverts

LEAD PARTY

DPW Director

GRANT FUNDING SOURCES

- VTrans
- FEMA/VEM Hazard Mitigation

PARTNERSHIPS

- VTrans District 3
- ANR Rivers Program
- US Army Corps of Engineers

PROJECT TIMEFRAME

1) 2026 construction season
2) 2028 construction season

PRIORITIZATION = HIGH

Remove Structures from Flood-Prone Areas: Removing structures from flood-prone areas to minimize future flood losses by acquiring and demolishing or relocating structures from voluntary property owners and preserving the land is a highly recommended long-term flood mitigation measure. There are no NFIP repetitive loss properties in Castleton; however, there are 66 buildings in the Special Flood Hazard Area, with 14 of these in the floodway. Castleton will conduct outreach to property owners most at risk to determine interest in a property buyout.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Safety & Security

Food, Water, Shelter
Primary Lifeline

Area of Impact

66 buildings in Special Flood Hazard Area/Floodway

LEAD PARTY

Town Manager

GRANT FUNDING SOURCES

- FEMA/VEM Hazard Mitigation

PARTNERSHIPS

- Vermont Emergency Management

PROJECT TIMEFRAME

Conduct outreach in June 2024

PRIORITIZATION = HIGH

Install Live Snow Fence or Equivalent Technique on Critical Roadways: Using live snow fences or equivalent to limit blowing and drifting of snow over critical road segments can reduce the risks of auto or other transportation accidents.

ADDRESSED HAZARDS

Extreme Cold, Snow, and Ice
Primary Hazard

Strong Wind

TYPE OF PROJECT

Structure & Infrastructure

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

Bird's Eye Road, North Road, East Hubbardton Road

LEAD PARTY

DPW Director

GRANT FUNDING SOURCES

- None

PARTNERSHIPS

- Private Property Owners

PROJECT TIMEFRAME

2028 construction season

PRIORITIZATION = LOW

Stabilize Stream Banks: An eroding section of stream bank on Sucker Brook is encroaching on the municipal park – Crystal Beach and depositing sediment into Lake Bomoseen. Castleton will work with project partners to explore options to stabilize the stream bank.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Natural Systems Protection

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

Crystal Beach and Lake Bomoseen

LEAD PARTY

Town Manager

GRANT FUNDING SOURCES

- S Lake Champlain CWSP
- FEMA/VEM Hazard Mitigation

PARTNERSHIPS

- Poultney Mettowee NRCD
- ANR Rivers Program
- US Army Corps of Engineers

PROJECT TIMEFRAME

Analyze Options Jun-Dec 2025
2026 construction season

PRIORITIZATION = MEDIUM

Remove Accumulated Debris to Restore Flood Capacity: Castleton will work with project partners to explore options to restore flood capacity in a section of the Castleton River.

ADDRESSED HAZARDS

Floods

TYPE OF PROJECT

Natural Systems Protection

COMMUNITY LIFELINES TARGETED

Safety & Security

Transportation
Primary Lifeline

Area of Impact

Castleton River - ±350' upstream of Bridge #34 on North Road

LEAD PARTY

Town Manager

GRANT FUNDING SOURCES

- S Lake Champlain CWSP
- FEMA/VEM Hazard Mitigation

PARTNERSHIPS

- Poultney Mettowee NRCD
- ANR Rivers Program
- US Army Corps of Engineers

PROJECT TIMEFRAME

Analyze Options Jun-Dec 2025
2026 construction season

PRIORITIZATION = LOW

Infectious Disease and/or Invasive Species Awareness: Castleton will work with project partners to increasing awareness about the potential hazards and risks associated with specific infectious agents, like West Nile Virus, and invasives, like Emerald Ash Borer, due to cascading impacts associated with floods and storm-related tree damage.

ADDRESSED HAZARDS

Infectious Disease

Invasive Species

TYPE OF PROJECT

Outreach & Education Programs

COMMUNITY LIFELINES TARGETED

Safety & Security

Public Health
Primary Lifeline

Area of Impact

Town-wide

LEAD PARTY

Town Manager

GRANT FUNDING SOURCES

- None

PARTNERSHIPS

- Town Health Officer
- VT Department of Health
- VT Urban & Community Forestry
- VT Dept of Forests, Parks, & Rec
- VT Fish & Wildlife
- Ready.gov

PROJECT TIMEFRAME

Partner Outreach to Develop Materials and Schedule for Messaging in Jun 2024

PRIORITIZATION = LOW

Disease Vector Control Training: Castleton will work project partners to train municipal staff to report information on large mosquito populations around standing water to improve vector control to reduce the potential spread of disease like West Nile Virus.

ADDRESSED HAZARDS

Infectious Disease

TYPE OF PROJECT

Outreach & Education Programs

COMMUNITY LIFELINES TARGETED

Safety & Security

Public Health
Primary Lifeline

Area of Impact

Town-wide

LEAD PARTY

Town Manager

GRANT FUNDING SOURCES

- None

PARTNERSHIPS

- Town Health Officer
- VT Department of Health

PROJECT TIMEFRAME

Training in Mar 2024

PRIORITIZATION = LOW

Integrating Into Existing Plans and Procedures

For Castleton to succeed in reducing long-term risk, information from this Plan should be integrated throughout government operations. When activities are connected, they can not only reduce risk and increase resilience, but also accomplish other objectives such as environmental protection, economic development, financial stability, and land use planning.

There are several ways the Town can achieve integration into existing plans and procedures to support risk-informed community planning. They can include the community's primary mitigation goal as stated on page 18, information from the risk assessment, and mitigation actions as follows:

- Castleton has recently purchased a software tool (Brightly) for asset management and capital planning. The mitigation goal and risk assessment information can be considered when prioritizing capital improvements. Mitigation actions listed in this Plan can be included in the capital improvement plan.
- Funding for mitigation actions can be prioritized in the annual budget process.
- The mitigation goal and risk assessment information can support the Town's interest in expanding local capacity to enforce State building codes as part of the development review process.
- The mitigation goal and risk assessment information can be incorporated into the next Town Plan update (Land Use and Flood Resilience chapters in particular) to help steer growth and redevelopment away from high-risk locations.
- The mitigation goal and risk assessment information can be incorporated into future zoning ordinance updates. Of interest is exploring the possibility of requiring new subdivision development to bury power lines.
- The mitigation goal and risk assessment information can be incorporated into any plans to expand public water and sewer utilities to ensure they are not expanded into high-hazard areas.
- Several flood-related mitigation actions for increasing road resiliency can be implemented under the existing Municipal Road General Permit (8273-9040) for controlling stormwater discharges from town roads.
- Several flood-related mitigation actions can be implemented under the existing stormwater management plans for the Lake Bomoseen watershed, Castleton River headwaters, and Main Street.

The Town will make every effort to maximize use of future Public Assistance Section 406 Mitigation opportunities when available during federally declared disasters.

7 PLAN MAINTENANCE

This Plan is dynamic. To ensure it remains current and relevant, it should be annually evaluated and monitored and updated every five years, in accordance with FEMA guidelines in effect at the time.

Annual Evaluation and Monitoring

Within 12 months of FEMA Final Approval, the Plan will be annually evaluated and monitored as follows:

1. The Town Manager and Selectboard will evaluate the effectiveness of the Plan in meeting the stated goals. Things to consider during this evaluation:

   - What disasters has the town (or region) experienced?
   - Should the list of highest risk natural hazard impacts be modified?
   - Are new data sources, maps, plans, or reports available? If so, what have they revealed, and should the information be incorporated into this plan?
   - Has development in the region occurred and could it create or reduce risk?
   - Has the town adopted new policies or regulations that could be incorporated into this plan?
   - Have elements of this plan been incorporated into new plans, reports, policies, or regulations?
   - Are there different or additional community capabilities available for mitigation implementation?

2. Next, the Town Manager and Selectboard will monitor mitigation action progress. Things to consider:

   - Is the mitigation strategy being implemented as anticipated?
   - Were the cost and timeline estimates accurate?
   - Should new mitigation actions be added?
   - Should proposed actions be revised or removed?
   - Are there new funding sources to consider?

   The status (e.g., in progress, complete) of each action should be recorded in **Table 7**. If the status is "in progress" note whether the action is on schedule. If not, describe any problems, delays, or adverse conditions that will impair the ability to complete the action.

3. The Town Manager and Selectboard will seek public comment from the Whole Community on plan implementation. Things to consider:

   - Are there any new stakeholders to include?
   - What public outreach activities have occurred?
   - How can public involvement be improved?

4. Based on input received, the mitigation strategy and/or actions will be modified, if needed.

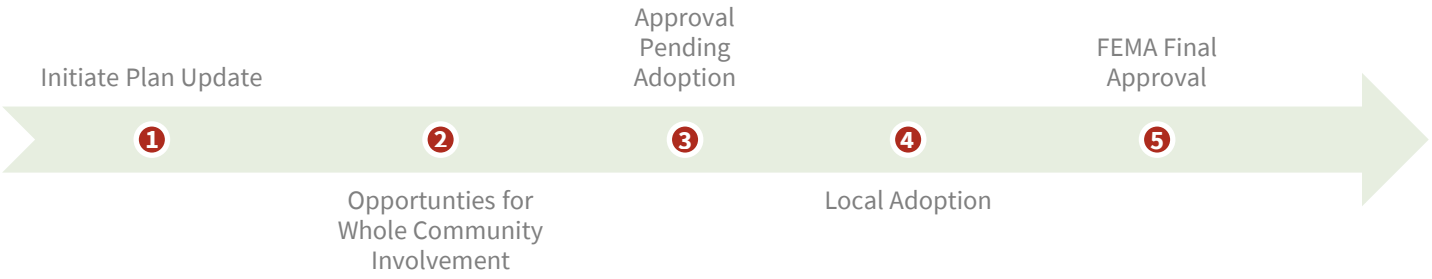
5. A report (or record in the form of meeting minutes) of the annual evaluation and monitoring will be made available to the public.

Table 7: Mitigation Action Status

Mitigation Action	2024	2025	2026	2027	2028
Local Plans & Regulations					
Plan for and Maintain Adequate Road and Debris Clearing Capabilities					
Update Road Erosion and Culvert Inventories					
Road Right-of-Way Vegetation Management Plan					
Plan for Bridge Repairs					
Stormwater Master Plan					
Flood Study					
Structure & Infrastructure Projects					
Remove Hazard Trees in Road Right-of-Way					
Install Back-up Power at Critical Facilities					
Install Green Stormwater Management Practices					
Stabilize Culvert Outfalls					
Install/Re-work Roadside Ditches					
Routinely Clean and Repair Stormwater Infrastructure					
Routinely Clear Debris from Low-Lying Bridge Support Bracing					
Adequately Size Culverts in Flood-Prone Areas					
Remove Structures from Flood-Prone Areas					
Install Live Snow Fence or Equivalent Technique on Critical Roadways					
Natural Systems Protection					
Stabilize Stream Banks					
Remove Accumulated Debris to Restore Flood Capacity					
Outreach & Education Programs					
Infectious Disease and/or Invasive Species Awareness					
Disease Vector Control Training					

5-Year Updates

This Plan will be updated at a minimum every five (5) years as follows:



1. Currently, funding to assist municipalities in paying for planning services to update the Local Hazard Mitigation Plan is available through FEMA's Building Resilient Infrastructure and Communities grant program. If using this grant, Castleton should contact Vermont Emergency Management (VEM) to apply for funding in 2026 – approximately 2 years before the Plan expires.

   Once funding is secured and the grant agreement between the Town and State is in place, the Town Manager can issue a request for proposals (RFP) to procure planning services in accordance with the grant agreement. The RFP should be issued approximately 14 months before the Plan expires.

   Once a consultant is procured, the Plan update can begin with a kick-off meeting including the consultant and local hazard mitigation planning team. The kick-off meeting should be scheduled approximately 12 months before the Plan expires. The Town should allot approximately 8 months for the Plan update process.

2. Opportunities for Whole Community involvement throughout the Plan update process need to be factored into the schedule. These opportunities may include a community survey, planning workshop, and public meetings at critical milestones agreed to at the project kick-off meeting.

3. Once the local hazard mitigation planning team has prepared a final draft, they can seek authorization from the Selectboard to submit the Plan for VEM/FEMA approval. Plan approval is accomplished in two steps – the first is Approval Pending Adoption. The Town should submit for Approval Pending Adoption approximately 4 months before the Plan expires to allow for time to respond to any review comments received from VEM/FEMA.

4. Once the Town receives Approval Pending Adoption, the Selectboard should adopt the Plan as soon as their next regular meeting.

5. Once adopted, the Town can submit the Plan for VEM/FEMA Final Approval. The Town should submit for Final Approval approximately 1 month before the Plan expires to ensure there is no gap in coverage between updates. The FEMA Final Approval date starts the clock on the effective dates of the 5-year Plan.

CERTIFICATE OF ADOPTION
Town of Castleton, Vermont Selectboard
A Resolution Adopting the Castleton, Vermont 2023 Local Hazard Mitigation Plan

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

WHEREAS the Castleton Selectboard has prepared a natural hazard mitigation plan, hereby known as the Castleton, Vermont 2023 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 Castleton, Vermont 2023 Local Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the Town of Castleton from the impacts of future hazards and disasters; and

WHEREAS adoption by the Castleton Selectboard demonstrates its commitment to hazard mitigation and achieving the goals outlined in the Castleton, Vermont 2023 Local Hazard Mitigation Plan.

NOW THEREFORE, BE IT RESOLVED BY THE TOWN OF CASTLETON, VERMONT, THAT:

Section 1. In accordance with 24 VSA §872, the Castleton Selectboard adopts the Castleton, Vermont 2023 Local Hazard Mitigation Plan. While content related to the Town of Castleton may require revisions to meet the plan approval requirements, changes occurring after adoption will not require the Town of Castleton 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 _____ in favor and ____ against, and ____ abstaining, this _____ day of _____, 2023.

By: _____ (print name)
Selectboard Chair

ATTEST: By: _____ (print name)

MITIGATION ACTIONS FROM 2017 PLAN

Vulnerability: Flooding of Bridges and Low-Lying Areas

Stream Bank Stabilization, Culvert Replacement and Road Fortification along Creek Road. Creek Road is wedged along steep slopes alongside Lake Bomoseen. Water flowing down the steep slopes in rainstorms erode the bank that the road rests on, and also contributes to the washing out of the road.

Stabilizing and upgrading the road will significantly increase the road's ability to handle storm flows and decrease the likelihood of infrastructure failure/collapse, the upgrade will create a more resilient infrastructure, thereby improving long-term flood resilience.

Who: Select Board, Road Commissioner, Town Manager When: May 2017-September 2018
How: VTrans Structures Grant, HMGP Priority: High

2023 Update: Complete; achieved the intended results.

Rice Willis Road. Rice Willis Road connects Blissville Road with Rt 30. Water flowing down the steep slopes in rainstorms erode the bank that the road rests on, and also contributes to the washing out of the road.

Stabilizing and upgrading the road will significantly increase the road's ability to handle storm flows and decrease the likelihood of infrastructure failure/collapse, the upgrade will create a more resilient infrastructure, thereby improving long-term flood resilience.

Who: Select Board, ANR When: May 2016-September 2018 How: HMGP Priority: High

2023 Update: Complete; achieved the intended results.

Revise Zoning to Ensure New Development will not be Vulnerable to Flooding or Erosion. This includes adopting State River Corridor Protection Language

Who: Planning Commission, Select Board When: 2018 How: HMGP, MPG Priority: High

2023 Update: Complete; achieved the goals outlined in the plan.

Seminary Road. Correct the Drainage issues along Seminary Road, to mitigate the flooding that occurs during rain storms. This will prevent future flooding damage to houses along Seminary.

Who: Select Board, Road Commissioner, VTRANS, Town Manager When: 2021-2023 How: HMGP
Priority: Moderate

2023 Update: Partially Complete – Scoping Study in process; remains a priority to complete.

Elevation of Water Treatment Plant. The water treatment plant is in a low-lying area, and in TS Irene, the water went into the plant instead of out. The water treatment plant is highly susceptible to flooding

Who: Select Board, Town Manager, Water Treatment When: 2020-2024 How: HMGP Priority:
Moderate

2023 Update: There is no "water" treatment plant in Castleton. If this action applies to the primary public drinking water system - Fire District #1 well pump houses have been floodproofed since Tropical Storm Irene. If this action applies to the wastewater treatment plant - as previously stated, although the plant lies along the Castleton River, it is not vulnerable to flooding so this action is no longer a priority.

Vulnerability: Power Outages to Homes and Critical Facilities

Generator for the Town Office. At present, the town does not have an Emergency Operations Center, and the town needs an EOC in the event of a flooding or power outage incident. Having an EOC will allow the Town to provide shelter and electricity (and all the accommodation that comes with electricity) to vulnerable residents and anyone else in need.

In order to create an EOC, the town would need a generator in one of its critical facilities. At present, the critical facility in which it would make the most sense to place a generator is the town office.

Who: Select Board, Town Manager, Public Safety Director When: 2018-2019 How: HMGP Priority: High

2023 Update: Complete – the new Public Safety Building is the location for the primary local EOC; achieved the goals outlined in the plan.

Generator for Secondary Shelter. The Town's American Legion has agreed to be an emergency shelter. Having a secondary shelter will increase the Town's ability to provide shelter and electricity (and all the accommodation that comes with electricity) to vulnerable residents and anyone else in need in the event of a flood or power outage.

Who: Select Board, Town Manager, Public Safety Director When: 2021-2023 How: HMGP Priority: Medium-High

2023 Update: Complete; achieved the goals outlined in the plan.

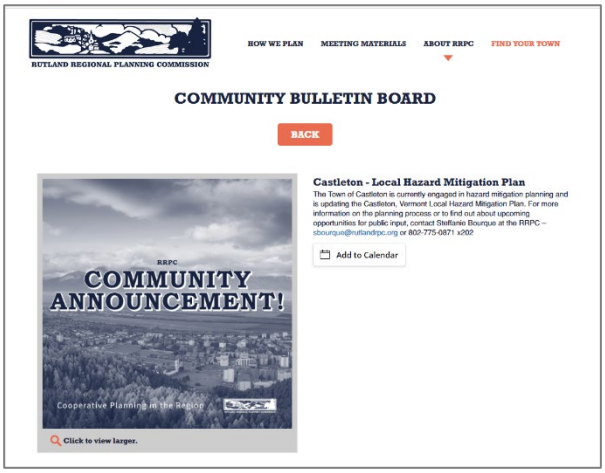
Generators for Pump Stations at Sucker Brook and RT 4 A. The pump stations keep wastewater and sewage pumping through the system. If there is a power outage, the pumps need to stay online, in order to prevent a hazard materials or human health issue in town.

Who: Select Board, Town Manager, Water Treatment Operator When: 2018-2021 How: HMGP Priority: Medium-High

2023 Update: Complete; achieved the goals outlined in the plan.

SUMMARY OF PUBLIC COMMENTS ON DRAFT PLAN

Public comments received throughout the plan development process are summarized here. For detailed information about how the Whole Community was invited to participate reference **Table 2**.

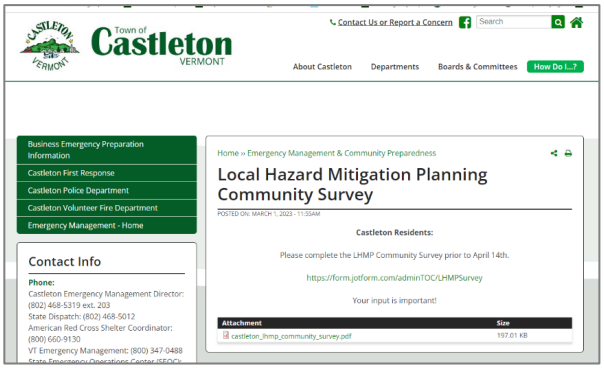


Example Plan update kick-off public notice from Rutland Regional Planning Commission website.

No inquiries received in response to the kick-off notice.

Example email to Key Partners announcing Plan update kick-off – dated January 31, 2023.

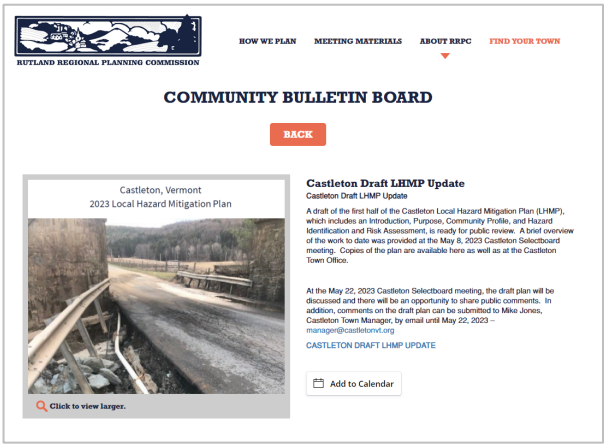
Follow-up discussion with Lake Bomoseen Association representative regarding planning process and opportunities for participation in the plan development.



Example Local Hazard Mitigation Planning Community Survey notice on Town website, posted on March 1, 2023.

See **Appendix D** for copy of survey and results.

Example Castleton Hazard Mitigation Planning Workshop advertisement on Town website, posted on March 10, 2023.



RUTLAND REGIONAL PLANNING COMMISSION

HOW WE PLAN MEETING MATERIALS ABOUT RRPC FIND YOUR TOWN

COMMUNITY BULLETIN BOARD

BACK

Castleton, Vermont
2023 Local Hazard Mitigation Plan

Castleton Draft LHMP Update

Castleton Draft LHMP Update

A draft of the first half of the Castleton Local Hazard Mitigation Plan (LHMP), which includes an Introduction, Purpose, Community Profile, and Hazard Identification and Risk Assessment, is ready for public review. A brief overview of the work to date was provided at the May 8, 2023 Castleton Selectboard meeting. Copies of the plan are available here as well as at the Castleton Town Office.

At the May 22, 2023 Castleton Selectboard meeting, the draft plan will be discussed and there will be an opportunity to share public comments. In addition, comments on the draft plan can be submitted to Mike Jones, Castleton Town Manager, by email until May 22, 2023 – manager@castletonvt.org

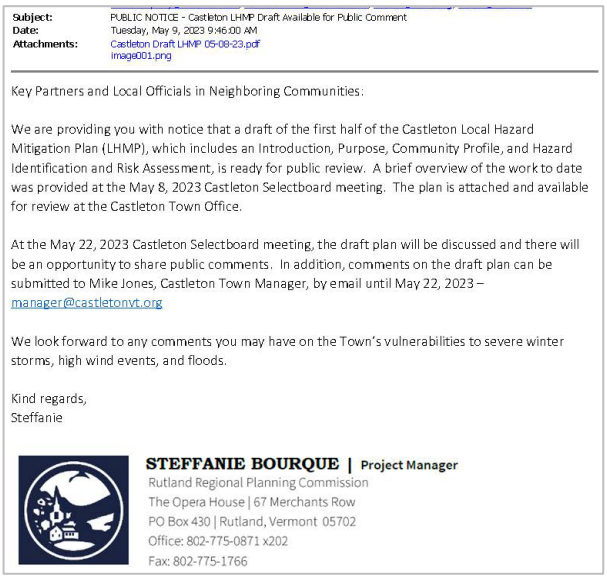
CASTLETON DRAFT LHMP UPDATE

Add to Calendar

Click to view larger.

Example notice of draft plan available for public comment at mid-point in plan development process from Rutland Regional Planning Commission website, including link to draft plan, posted on May 9, 2023.

Minor editorial comments received from the Castleton Planning Commission were incorporated into the Plan.



Subject: PUBLIC NOTICE - Castleton LHMP Draft Available for Public Comment
Date: Tuesday, May 9, 2023 9:46:00 AM
Attachments: Castleton Draft LHMP 05-08-23.pdf
image001.png

Key Partners and Local Officials in Neighboring Communities:

We are providing you with notice that a draft of the first half of the Castleton Local Hazard Mitigation Plan (LHMP), which includes an Introduction, Purpose, Community Profile, and Hazard Identification and Risk Assessment, is ready for public review. A brief overview of the work to date was provided at the May 8, 2023 Castleton Selectboard meeting. The plan is attached and available for review at the Castleton Town Office.

At the May 22, 2023 Castleton Selectboard meeting, the draft plan will be discussed and there will be an opportunity to share public comments. In addition, comments on the draft plan can be submitted to Mike Jones, Castleton Town Manager, by email until May 22, 2023 – manager@castletonvt.org

We look forward to any comments you may have on the Town's vulnerabilities to severe winter storms, high wind events, and floods.

Kind regards,
Steffanie

STEFFANIE BOURQUE | Project Manager
Rutland Regional Planning Commission
The Opera House | 67 Merchants Row
PO Box 430 | Rutland, Vermont 05702
Office: 802-775-0871 x202
Fax: 802-775-1766

Example email to Key Partners and local officials in neighboring towns seeking comments on draft plan at mid-point in plan development process – dated May 9, 2023.

The draft plan was also emailed to Vermont Emergency Management seeking informal review at the mid-point in the plan development process to ensure compliance with the new FEMA requirements that became effective in April 2023.

Informal review comments received from VEM were incorporated into the Plan.

[placeholder for example outreach seeking comments on final draft plan]

[placeholder for any public comments received on final draft plan and how they were addressed]

COMMUNITY SURVEY RESULTS

The Town of Castleton utilized a survey to solicit public input on 1) potential natural hazard impacts and 2) mitigation strategies to reduce these impacts in the future. The survey was made available online as well as hard copy over the course of 6 weeks in March and April 2023. The Town received 58 responses and a summary of the input received is provided below, followed by a copy of the actual survey.

1) How long have you lived in or owned a business or property in Castleton?

Less than a year – 5% of respondents
One to five years – 5% of respondents
More than five years – 90% of respondents

2) Have you experienced damage during a past severe weather event?

No – 43% of respondents
Yes – 57% of respondents

The most common type of damage reported was property damage and power outages from downed trees, typically from strong wind. Few reports of flood damage on private roads and basement flooding.

3) Is your home or business property located in a FEMA designated floodplain? If yes, do you have insurance through the National Flood Insurance Program (NFIP)?

I don't know – 19% of respondents
No – 79% of respondents
Yes – 2% of respondents; 2% respondents reported having flood insurance through the National Flood Insurance Program (NFIP)

4) Have you seen areas in the community damaged during a past severe weather event?

No – 31% of respondents
Yes – 66% of respondents
Did Not Answer – 3% of respondents

Again, the most common type of damage reported was downed trees with associated property damage, power outages, and blocking of road and driveways. Other noteworthy reports:

- Flooding of Route 30 by Crystal Beach
- Blizzard in the 1990's prevented Visiting Nurses from being able to make house calls, so first responders conducted welfare checks
- Flooding around E Hubbardton Road and Route 4
- One fatality in December 2022 due to falling tree limb during a high wind event

5) In your opinion, which of the following are most important to protect against potential future severe weather impacts in Castleton? Please rank with 1 being the most important and 10 being the least.

Ranking results listed in priority order:

1 - Loss of life or injuries
2 - Damage or loss of roads, bridges, public utilities (e.g., water, sewer)
3 - Protection of vulnerable populations

4 - Business closure or loss
5 - Damage to schools and other public properties (e.g., parks, buildings)
6 - Loss or damage to agricultural operations
7 - Protection against dam breaches
8 - Damage to environmental resources (e.g., wetlands, lakes, ponds, rivers, forests)
9 - Damage or loss of cultural/historic properties
10 - Protection of wildlife

6) In this context, hazard mitigation is a sustained measure that reduces or eliminates long-term risk to people and property from the effects of natural hazards (defined as severe weather events). What types of hazard mitigation measures would you like to see the community prioritize?

Structure & Infrastructure Projects – 76% of respondents
(e.g., culvert upsizing, bridge replacement, property buyouts)

Natural Systems Protection – 48% of respondents
(e.g., streambank restoration)

Local Plans & Regulations – 41% of respondents
(e.g., adoption of River Corridor Bylaws, updating the Town Plan to better integrate with the Local Hazard Mitigation Plan)

Outreach & Education Programs – 34% of respondents
(e.g., mailing information on flood mitigation options for homeowners with their tax bills, posting information on the Town website)

7) Anything else you would like to provide for consideration and incorporation into the Castleton Local Hazard Mitigation Plan?

Comments received:

- Incorporate a plan of action with the state of Vermont and the Dam operator in case the dam at Lake Bomoseen fails. Heavy winds out of the north this past January caused significant ice to build up in the channel against the dam resulting in the dam operator to be unable to close the gates. When they were finally able to get them closed, they were unable to open them. Upon talking with the dam operator, I learned that there are no measures in place should the dam fail. Should we get severe weather and the dam is unable to be operated flooding could occur. Should the dam be structurally damaged the properties downstream could be significantly damaged and a possibility of bodily harm.
- Castleton needs to focus on the basics before focusing on the stuff in this survey. The guard rails on creek road are nonexistent or broken. I often have to plow our public road myself due to a lack of snow plowing by the town just to get home.
- While not a natural hazard, it would be a good plan to publicize and educate the public to a train derailment that may contain hazardous chemicals
- Manage trees in power lines - cut more away from potentially falling on wires or roads; upgrade washouts on dirt roads and resurface where mud accumulates making slippery driving hazards
- Effects of winter storms would be minimized if proper action was taken to trim dead trees over power lines. Maybe the town could get involved in hiring maintenance for this so we do not end up in the same boat as this year, losing power for days in freezing
- I worry that a train carrying hazardous material will dump toxic matter into our river or, worse yet, the aquifer that provides much of the town's drinking water.

- Keep up the good work & thank you.
- Many local power outages occur due to our roads and the nature of trees failing in wires, does the town have the responsibility to remove trees within the 10-15 ft off of roadways? Example: drake rd
- I would like all trees to be removed or trimmed back from the power lines, and rivers and streams should have debris removed to allow free flow of water. Beaver dams need to be monitored and/or removed.
- Better roadside brush and tree removal on town roads. Also should be cleared back to town ROW minimum.
- Do not install solar projects near water ways or property that will be impacted by runoff during heavy rains which will cause water damage to abutting properties.

Community Survey for Castleton's Local Hazard Mitigation Plan

The Town of Castleton is updating its Local Hazard Mitigation Plan. The goal of this Plan is to develop a strategy that makes Castleton more resistant to severe weather events and more resilient after a disaster. We are seeking your input to help 1) identify potential natural hazard impacts and 2) develop mitigation strategies to reduce these impacts in the future.

1. How long have you lived in or owned a business or property in Castleton?
   - ☐ Less than a year
   - ☐ One to five years
   - ☐ More than five years

2. Have you experienced damage during a past severe weather event?
   - ☐ No
   - ☐ Yes - if Yes, please provide a brief description of the damage and when it occurred.

3. Is your home or business property located in a FEMA designated floodplain?
   - ☐ I don't know
   - ☐ No
   - ☐ Yes – if Yes, do you have insurance through the National Flood Insurance Program (NFIP)?
     _____ Yes _____ No

4. Have you seen areas in the community damaged during a past severe weather event?
   - ☐ No
   - ☐ Yes - if Yes, please provide a brief description of the damage and when it occurred.

5. In your opinion, which of the following are most important to protect against potential future severe weather impacts in Castleton? Please rank with 1 being the most important and 10 being the least.

   _____ Loss of life or injuries
   _____ Business closure or loss
   _____ Damage or loss of roads, bridges, public utilities (e.g., water, sewer)
   _____ Protection against dam breaches
   _____ Damage to schools and other public properties (e.g., parks, buildings)
   _____ Damage or loss of cultural/historic properties
   _____ Loss or damage to agricultural operations
   _____ Damage to environmental resources (e.g., wetlands, lakes, ponds, rivers, forests)
   _____ Protection of vulnerable populations
   _____ Protection of wildlife

Community Survey for Castleton's Local Hazard Mitigation Plan

6. In this context, hazard mitigation is a sustained measure that reduces or eliminates long-term risk to people and property from the effects of natural hazards (defined as severe weather events).

   What types of hazard mitigation measures would you like to see the community prioritize?

   - ☐ Structure & Infrastructure Projects
     (e.g., culvert upsizing, bridge replacement, property buyouts)
   - ☐ Natural Systems Protection
     (e.g., streambank restoration)
   - ☐ Local Plans & Regulations
     (e.g., adoption of River Corridor bylaws, updating the Town Plan to better integrate with the Local Hazard Mitigation Plan)
   - ☐ Outreach & Education Programs
     (e.g., mailing information on flood mitigation options for homeowners with their tax bills, posting information on the Town website)

7. Anything else you would like to provide for consideration and incorporation into the Castleton Local Hazard Mitigation Plan?

Return completed surveys by April 14, 2023 to: Mike Jones, Town Manager
Town Office, 263 Route 30 North, Bomoseen, VT 05732

or

Drop off the survey or place in the drop box at the Town Office Building by April 14, 2023

Thank you for taking the time to share your input!

Town of Castleton VERMONT