MULTI-JURISDICTION HAZARD MITIGATION PLAN UPDATE

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

DECEMBER 2020

Protect life, property, natural resources and the quality of life in the Towns of Burke, Sheffield, Sutton and Wheelock by reducing their vulnerability to climate change and natural hazards.

MULTI-JURISDICTION HAZARD MITIGATION PLAN UPDATE

TOWNS OF BURKE, SHEFFIELD, SUTTON, AND WHEELOCK, VERMONT

December 2020

Prepared by:

Northeastern Vermont Development Association
36 Eastern Avenue, Suite 1
St. Johnsbury, VT 05819
Phone: 802-424-1423
Web: www.nvda.net

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

351 Pleasant Street, Suite B # 208 · Northampton, MA 01060
Phone: 413-586-0867 · Fax: 413-727-8282 · www.jamiecaplan.com

PUNCHARD CONSULTING

Phone: 617-777-2001 Web: www.punchardconsulting.com

Cover Photo by John Rowe Photography https://johnrowephotos.com

Participating Jurisdictions

Town of Burke

212 School Street

West Burke, VT 05871

Phone: 802-467-3717

Web: burkevermont.org

Town of Sheffield

37 Dan Road, P.O. Box 165

Sheffield, VT 05866

Phone: 802-626-8862

Web: sheffieldvt.org

Town of Sutton

167 Underpass Road

Sutton, VT 05867

Phone: 802-467-3377

Web: suttonvt.org

Town of Wheelock

1192 VT-122

PO Box 1328

Lyndonville, VT 05851

Phone: (802) 626-9094

Web: townofwheelockvt.org

Acknowledgements

The Northeastern Vermont Development Association would like to thank the following people and organizations for supporting the development of this plan. The Hazard Mitigation Committee was the lead group developing this Hazard Mitigation Plan Update.

Project Manager

- Alison Low, Senior Planner Northeastern Vermont Development Association

Hazard Mitigation Committee Leaders

- Paul Brouha, Sutton Planning Committee & Development Review Board
- Linda Corey, Burke Town Clerk
- Michael Harris, Burke Administrative Officer/Zoning Administrator
- Ann Lawless, Wheelock Selectperson
- Wendy Scofield, Sheffield Assistant Town Clerk
- William St. Peter, Sheffield Town Clerk/Treasurer

Consulting Team

- Jamie Caplan, Principal, Jamie Caplan Consulting LLC
- Darrin Punchard, Principal, Punchard Consulting LLC

Certificates of Local Adoption

E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))

CERTIFICATE OF LOCAL ADOPTION

A Resolution Adopting the Town of Burke,Vermont
2020 Multi-Jurisdiction Hazard Mitigation Plan Update

WHEREAS, the Town of Burke has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the 2020 Multi-Jurisdiction Hazard Mitigation Plan Update, which result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Burke has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its 2020 Multi-Jurisdiction Hazard Mitigation Plan Update (Plan) under the requirements of 44 CFR 201.6; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies, and Plan maintenance procedures for the Town of Burke; and

WHEREAS, the Plan recommends several hazard mitigation actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Burke with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Burke eligible for funding to alleviate the impacts of future hazards; now therefore be it RESOLVED by Town of Burke Select Board:

1. The 2020 Multi-Jurisdiction Hazard Mitigation Plan Update is hereby adopted as an official plan of the Town of Burke;
2. The respective officials identified in the mitigation action plan of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the process of the implementation elements of the Plan will be presented to the Select Board by the Emergency Management Director or Coordinator.

IN WITHNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Burke on this ____ day of _____ 2020.

Christine Emmons_____
Select Board Member

Joseph Allard_____
Select Board Member

Ford Hubbard_____
Select Board Member

_____
Select Board Member

CERTIFICATE OF LOCAL ADOPTION

A Resolution Adopting the Town of Sheffield Vermont
2020 Multi-Jurisdiction Hazard Mitigation Plan Update

WHEREAS, the Town of Sheffield has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the 2020 Multi-Jurisdiction Hazard Mitigation Plan Update, which result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Sheffield has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its 2020 Multi-Jurisdiction Hazard Mitigation Plan Update (Plan) under the requirements of 44 CFR 201.6; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies, and Plan maintenance procedures for the Town of Sheffield; and

WHEREAS, the Plan recommends several hazard mitigation actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Sheffield with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Sheffield eligible for funding to alleviate the impacts of future hazards; now therefore be it RESOLVED by Town of Sheffield Select Board:

1. The 2020 Multi-Jurisdiction Hazard Mitigation Plan Update is hereby adopted as an official plan of the Town of Sheffield;
2. The respective officials identified in the mitigation action plan of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the process of the implementation elements of the Plan will be presented to the Select Board by the Emergency Management Director or Coordinator.

IN WITHNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Sheffield on this ____ day of _____ 2020.

_____
Walter Smith
Select Board Chair

_____
Cindy Roy
Select Board Member

_____
Maxwell Aldrich
Select Board Member

CERTIFICATE OF LOCAL ADOPTION

A Resolution Adopting the Town of Sutton, Vermont
2020 Multi-Jurisdiction Hazard Mitigation Plan Update

WHEREAS, the Town of Sutton has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the 2020 Multi-Jurisdiction Hazard Mitigation Plan Update, which result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Sutton has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its 2020 Multi-Jurisdiction Hazard Mitigation Plan Update (Plan) under the requirements of 44 CFR 201.6; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies, and Plan maintenance procedures for the Town of Sutton; and

WHEREAS, the Plan recommends several hazard mitigation actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Sutton with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Sutton eligible for funding to alleviate the impacts of future hazards; now therefore be it RESOLVED by Town of Sutton Select Board:

1. The 2020 Multi-Jurisdiction Hazard Mitigation Plan Update is hereby adopted as an official plan of the Town of Sutton;
2. The respective officials identified in the mitigation action plan of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the process of the implementation elements of the Plan will be presented to the Select Board by the Emergency Management Director or Coordinator.

IN WITHNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Sutton on this ____ day of _____ 2020.

_Tim Simpson_____
Select Board Member

_Denis Royer_____
Select Board Member

_Jeffrey J. Solinsky_____
Select Board Member

_____
Select Board Member

Town of Wheelock

CERTIFICATE OF LOCAL ADOPTION

A Resolution Adopted by the Town of Wheelock, Vermont
2020 Multi-Jurisdiction Hazard Mitigation Plan Update

WHEREAS, the Town of Wheelock has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the 2020 Multi-Jurisdiction Hazard Mitigation Plan Update, which result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Wheelock has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its 2020 Multi-Jurisdiction Hazard Mitigation Plan Update (Plan) under the requirements of 44 CFR 201.6; and

WHEREAS, the Plan specifically addresses hazard mitigation strategies, and Plan maintenance procedures for the Town of Wheelock; and

WHEREAS, the Plan recommends several hazard mitigation actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Wheelock with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this Plan will make the Town of Wheelock eligible for funding to alleviate the impacts of future hazards; now therefore be it RESOLVED by Town of Wheelock Select Board:

1. The 2020 Multi-Jurisdiction Hazard Mitigation Plan Update is hereby adopted as an official plan of the Town of Wheelock;
2. The respective officials identified in the mitigation action plan of the Plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and Plan maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the process of the implementation elements of the Plan will be presented to the Select Board by the Emergency Management Director or Coordinator.

IN WITHNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Wheelock on this ____ day of _____ 2021.

_____
Ann Lawless, Chair, Select Board Chair

_____
Jim Blackbird, Select Board Member

_____
Bobbie Jo Norcross, Select Board Member

Record of Changes

This Multi-Jurisdiction Hazard Mitigation Plan Update, including Appendices, will be reviewed and approved on an annual basis by the Hazard Mitigation Committee, the Northeastern Vermont Development Association (NVDA), and following any major disasters. All updates and revisions to the Plan will be tracked and recorded in the following table. This process will ensure the most recent version of the Plan is disseminated and implemented by the NVDA and the participating jurisdictions.

Table 1. Summary of changes.

Date of Change	Entered By	Summary of Changes

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Chapter 1. Introduction

The Federal Emergency Management Agency (FEMA) defines mitigation as "the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking actions now – before the next disaster – to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk.)"[1]

"The purpose of mitigation planning is to identify policies and actions that can be implemented over the long term to reduce risk and future losses. Mitigation plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters."[2]

"DMA 2000 (Public Law 106-390)[3] provides the legal basis for FEMA mitigation planning requirements for State, local and Indian Tribal governments as a condition of mitigation grant assistance. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for State, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts."[4]

The Towns of Burke, Sheffield, Sutton, and Wheelock, Vermont created this Plan as part of an ongoing effort to reduce the negative impacts and costs from damages associated with natural hazards, such as snow storms, high winds and flood. This Plan meets the requirements of the Disaster Mitigation Act 2000. More importantly, the plan was created to reduce loss of life, land, and property due to natural hazards that affect the planning area. It is difficult to predict when natural hazards will impact the planning area, but it is accurate to say that they will. By implementing the mitigation actions listed in this Plan, the impact of natural hazards will be lessened.

Local Mitigation Plans must be updated at least once every five years to continue to be eligible for FEMA hazard mitigation project grant funding. Specifically, the regulation at 44 CFR §201.6(d)(3) reads:

> *Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards (44 CFR 201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most*

[1] What is Mitigation? (2014). Federal Emergency Management Agency. Retrieved January 2014 from http://www.fema.gov/what-mitigation
[2] Multi-Hazard Mitigation Planning. (2014). Federal Emergency Management Agency. Retrieved January 2014 from http://www.fema.gov/multi-hazard-mitigation-planning
[3] Disaster Mitigation Act of 2000, Pub. L. 106-390, as amended
[4] Disaster Mitigation Act of 2000. (2014). Federal Emergency Management Agency. Retrieved January 2014 from http://www.fema.gov/media-library/assets/documents/4596?id=1935

> *effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.*[5]

Guiding Principles for Plan Development

The Hazard Mitigation Committee adhered to the following guiding principles in the plan's development.

Guiding Principles for Plan Development:[6]

- Focus on the mitigation strategy. The mitigation strategy is the plan's primary purpose. All other sections contribute to and inform the mitigation strategy and specific hazard mitigation actions.
- Process is as important as the plan itself. In mitigation planning, as with most other planning efforts, the plan is only as good as the process and people involved in its development. The plan should also serve as the written record, or documentation, of the planning process.
- This is your community's plan. To have value, the plan must represent the current needs and values of the community and be useful for local officials and stakeholders. Develop the mitigation plan in a way that best serves your community's purpose and people.

Purpose of the Plan

The purpose of the Multi-jurisdiction Hazard Mitigation Plan Update is to provide the Towns of Burke, Sheffield, Sutton and Wheelock (known throughout this document as the planning area) with a comprehensive examination of all natural hazards affecting the Planning Area, as well as a framework for informed decision-making regarding the selection of cost-effective mitigation actions. When implemented, these mitigation actions will reduce each town's risk and vulnerability to natural hazards.

This Plan is a result of a collaborative effort between the Towns of Burke, Sheffield, Sutton and Wheelock and the Northeastern Vermont Development Association (NVDA). Throughout the development of the Plan, the Hazard Mitigation Committee consulted the public for input regarding identified goals, mitigation actions, risk assessment, and mitigation implementation strategy.

Northeastern Vermont Development Association

This 2020 Multi-jurisdiction Hazard Mitigation Plan Update was funded by a FEMA Hazard Mitigation Planning Grant, administered by the Vermont Department of Emergency Management and Homeland Security (DEMHS). Support was provided by the NVDA. NVDA serves the 55 municipalities in Caledonia, Essex and Orleans Counties as both the Regional Planning Commission and the Regional Economic Development Corporation.

[5] Federal Emergency Management Agency. (2011). *Local Plan Review Guide.*
[6] Federal Emergency Management Agency. (2013). *Local Mitigation Planning Handbook,* I-2.

Changes Since the Previous Plan

Each of the four town's has a previous Local Hazard Mitigation Plan from 2005. The Federal Emergency Management Agency approved the Town of Burke Hazard Mitigation Plan. It is unclear if FEMA approved the other town's Hazard Mitigation Plans. The Towns of Burke and Sutton participate in the National Flood Insurance Program. The Town of Burke joined in 1975 and the Town of Sutton joined in 2017. The development of a Multi-Jurisdiction Hazard Mitigation Plan Update is seen as an opportunity for these adjacent communities to share their limited resources in an effort to mitigate risk.

> *D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))*

This Plan reflects the current built environment in each town and is consistent with each town's Town Plan. For instance, Burke made significant zoning changes to allow for lower density building. In 2017 the Town of Sutton adopted lower density regulations through their agricultural forest regulations. This regulation allows for enforcement of lower density by creating smaller building lots and encouraging open space. Both the Towns of Wheelock and Sheffield have considered land use regulations and National Flood Insurance Program protection. In addition, Burke has a new hotel and a new 120' wind tower on Burke Mountain. Beyond that, there has been very little development in the four towns and none that has significantly impacted hazard vulnerability. Chapter 4 Hazard Analysis and Risk Assessment includes a current list of critical facilities for each town. These lists reflect current town owned facilities, and the Mitigation Strategy focuses on mitigating risk to these facilities. Land use decisions vary between the towns which is reflected with only Burke and Sutton participating in the NFIP.

> *D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))*

The mitigation actions listed in each of the 2005 plans were reviewed by the Hazard Mitigation Committee and their current status is included in Chapter 6 Mitigation Strategy. The Capability Assessment was entirely re-done to reflect current pre-and post-disaster capabilities of each town. The towns continue to have limited full-time staff and rely heavily on the work of resident volunteers. This Plan includes mitigation actions for each town as well as a handful of supporting actions that NVDA plans to take to support the region.

> *D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))*

This Plan reflects current priorities for each town and for the region. The previous plan's mitigation goal statements were reviewed and revised to reflect current priorities. This Plan is consistent with the State Hazard Mitigation Plan and with each town's Town Plan. The list of hazards was updated to reflect

current needs as well as the hazards addressed in the State Hazard Mitigation Plan. The current Covid-19 pandemic influenced the risk ranking of infectious disease and the level of concern experienced by the towns. Also, the influence of climate change shifted the breadth and scope of the mitigation actions. Finally, the plan implementation and maintenance were revised to include a system for each town to take an active role in hazard mitigation and for the NVDA to continue supporting the region's mitigation efforts.

Authority and Assurances

The Towns of Burke, Sheffield, Sutton and Wheelock will continue to comply with all applicable Federal laws and regulations during the periods for which it receives grant funding, in compliance with 44 CFR 201.6. It will amend its plan whenever necessary to reflect changes in each town, as well as changes to State or Federal laws and regulations, as required in 44 CFR 201.6.

The Hazard Mitigation Committee recognizes the following FEMA publications:

- *Local Mitigation Planning Handbook* (March 2013)
- *Local Mitigation Plan Review Guide* (October 2011)
- *Demonstrating Good Practices Within Local Hazard Mitigation Plans* (January 2017, FEMA Region 1)

Plan Adoption

> *E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))*

Each town will adopt this Plan when it has received "approved pending adoption" approval from the Vermont Emergency Management Agency. The Certificate of Adoption for each town begins on p.4.

Document Overview

Below is a summary of the Multi-Jurisdiction Hazard Mitigation Plan Update chapters, including appendices. The FEMA guidelines and requirements for each portion of this Plan are included in their respective chapters. The planning process closely adhered to FEMA guidelines and to the intent of those guidelines.

Chapter 2: Planning Area Profile

The Planning Area Profile chapter describes the Towns of Burke, Sheffield, Sutton and Wheelock completely, including geography, the built environment, the local economy, and utilities.

Chapter 3: Planning Process

The Planning Process chapter documents the methods and approach of the hazard mitigation planning process. The chapter summarizes the Hazard Mitigation Committee meetings, the public outreach process (including public meetings), and the Public Preparedness Survey. This chapter guides the reader through the process of generating this Plan and reflects its open and inclusive public involvement process.

Chapter 4: Risk Assessment

The Risk Assessment identifies the natural hazard risks to the towns of Burke, Sheffield, Sutton and Wheelock and its citizens. The risk assessment looks at current and future vulnerabilities based on development of structures and infrastructure. Included in this chapter is a list of critical facilities identified by the Hazard Mitigation Committee.

Chapter 5: Capability Assessment

The Capability Assessment looks at the towns of Burke, Sheffield, Sutton and Wheelock and each town's ability to mitigate risk prior to and following disaster.

Chapter 6: Mitigation Strategy

This chapter provides a blueprint for reducing losses identified in the Risk Assessment. The chapter presents the overall hazard mitigation goals for the planning area and identifies mitigation actions in priority order for each town. Where applicable, funding sources are identified, as are responsible town departments and potential partners. Also included are actions NVDA will take to support the towns.

Chapter 7: Plan Implementation and Maintenance

The Plan Implementation and Maintenance chapter establishes a system and mechanism for periodically monitoring, evaluating, and updating the 2020 Multi-Jurisdiction Hazard Mitigation Plan Update. It also includes a plan for continuing public outreach and monitoring the implementation of the identified mitigation actions. A digital Mitigation Action Tracker was developed to facilitate tracking plan implementation.

Appendices

The Appendices includes documentation regarding the planning process, such as Hazard Mitigation Committee and public meeting sign-in sheets and the Public Preparedness Survey results.

Chapter 2. Planning Area Profile

The Towns of Burke, Sheffield, Sutton and Wheelock are rural communities located in Caledonia County Vermont. The Northeastern Vermont Development Association (NVDA) supports these towns with land use planning, transportation planning, economic development and emergency management. This chapter of the hazard mitigation plan aims to paint a detailed picture of each of the four towns in terms of their demographics, land use, infrastructure and government structure. The map in Figure 1 shows the location of the planning area in Vermont.

These towns are approximately twenty-five miles south of the Canadian border. They are rural communities with vast natural resources and farmland. The Towns of Sheffield and Sutton each contain some of Willoughby State Forest. Willoughby State Forest is 1600 acres and includes Mount Hor and Mount Pisgah as well as Lake Willoughby. Wheelock contains part of Mathewson State Forest, a 788-acre forest. The Town of Burke includes Burke Mountain, a major ski destination that raises to a height of 3,271 feet. Darling State Park, gifted by Emler Darling in the mid-1900s, encompasses Burke Mountain in the lower portion of the municipality. Sheffield contains Holbrook State Park in the north, which contains 2 small ponds and is a popular recreation site.

The main rivers through the planning area are the Passumpsic River, the West Passumpsic River, the Sutton River, the Millers Run, and the Lamoille River. Each town also has multiple smaller streams. Both the Passumpsic River and its western branch run through the Town of Burke from north to south. The Passumpsic River, and its tributaries, run from north to south through the Town of Sheffield, and there are several small ponds as well. Sutton also contains stretches of the West Passumpsic River, Sutton River and Calendar Brook, all running east to west across the municipality. Additionally, Sutton contains several small bonds and streams. Wheelock contains parts of the Lamoille River in the northwest, and the South Wheelock Branch of the Passumpsic River in the southeast. Additionally, several smaller streams and ponds can be found within the borders of Wheelock.

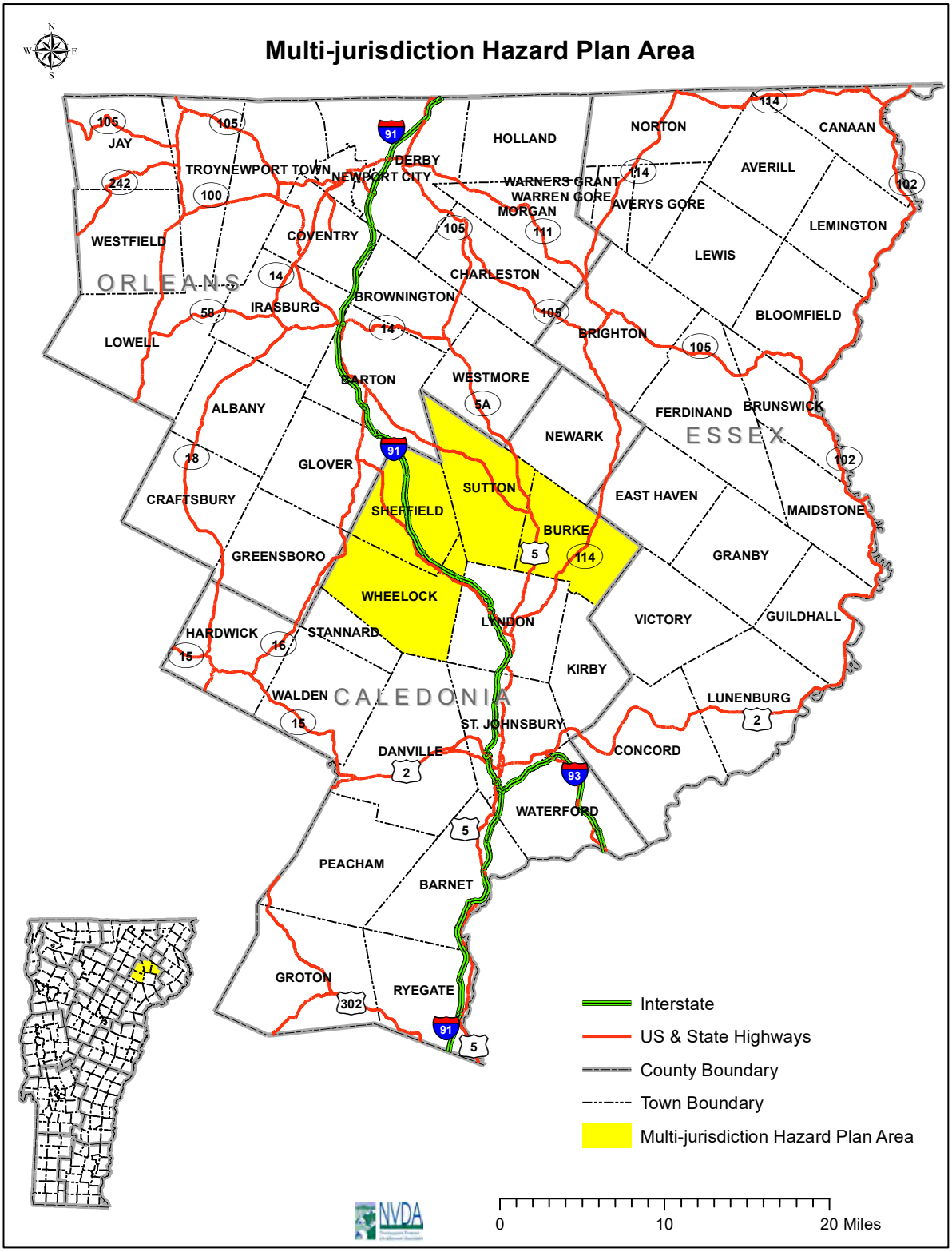


Figure 1. Planning Area Location.

History

The Town of Burke was first chartered in 1782, organized in 1796 in the home of Lemuel Walter. Named for Sir Edmund Burke of British Parliament, the Town of Burke was settled with immigrants from Connecticut. The economy was first based on the sawmill industry due to the waterpower available, and farming and the lumber industry grew steadily thereafter. In the early 1900s, Burke became more focused on tourism, and in 1953 they developed the Burke Mountain ski area to promote the town. Today, the Town of Burke has a rich history, beautiful nature in all seasons, strong tourism and is run by a Select Board.

The Town of Sheffield was chartered in 1793. Though originally 24,000 acres, different tracks of Sheffield land were sold off to neighboring towns (including Wheelock), and today Sheffield is 20,900 acres. Settled as a farming community, today Sheffield mainly serves as a bedroom community, a residential area for workers in nearby towns. Sheffield is home to a 16-turbine commercial wind energy operation. The town is governed by a three-member Board of Selectmen.

The Town of Sutton contains "extensive farmland, scenic vistas and wooded beauty, wetlands and wildlife." Sutton, originally called Billymead, was granted to Jonathan Arnold in 1782, and formally organized in 1794. The town relied mostly on agriculture and forest products for economic support. Though Sutton has become a bedroom community for nearby towns, it still continues to support and encourage family farms. Willoughby State forest was developed by the Conservation Corps in the 1930s and remains a great source of natural beauty for Sutton. The town is governed by a three-person Select Board.

The Town of Wheelock was chartered in 1785. Named for Eleazar Wheelock, the founder of Dartmouth College, the college offers free tuition to any person who is accepted into the college and a full-time resident of Wheelock. Though the small town was originally a farming and forestry community, it is now primarily a bedroom community for nearby cities. The municipality contains Mathewson State Forest, which is managed for timber and wildlife habitat. Wheelock is governed by a Select Board.

Historic Features and Resources

All of the towns have some historic properties which may include buildings, cemeteries or landmarks. Below is a list of each town's historic properties, although this list does not include privately owned properties. Each town's Plan was reviewed to gather the lists below.

Burke

- Darling Farm
- Burklyn Hall
- Old White School House
- West Burke Methodist Church
- West Burke Library

- East Burke Congregational Church
- Union Meeting House in Burke Hollow
- Burke Mountain Club House
- East Burke Dam
- Town Clerk's Office
- Cemeteries
- Barns - Many barns are no longer actively used for agricultural purposes; however, barns help
- culturally and visually define the town's agrarian heritage.

Sheffield

- Freewill Baptist Church, Berry Hill Road
- Town House Museum
- Town Hall
- 7 cemeteries

Sutton

- Freewill Baptist Church
- Sutton School
- Town Office
- Four Cemeteries
- Town Garage
- Fire Station
- Town Hall

Wheelock

- Wheelock Historic District – includes Town Hall, Village Green, Old Village Cemetery
- South Wheelock Baptist Church

Transportation

Transportation in the planning area is served primarily by private vehicles. The condition of roads in the region is vitally important to residents and their ability to access employment, medical care, food and other necessities. The Town of Burke is primarily served by Route US 5, running North to South, and VT Highways 114 and 5A, also running north to south. The town is connected by 61 miles of roadway, 51 of which are maintained by the town itself. The Town of Sheffield is served by Interstate 91 although there is not an entrance or exit to the Interstate in Sheffield, and Vermont Route 122, both of which run north to south through the municipality. In total, Sheffield maintains 28.43 miles of roads. The Town of Sutton is served by state Route 5 (Lynburke Rd), which runs from east to west along the Sutton River, and Route

5A in the northeast part of the municipality. Sutton maintains 57.5 miles of roads. Interstate 91 and Vermont State Route 122 are the major roads through the Town of Wheelock, passing through the northeastern portion of the town. In total, the Town of Wheelock maintains about 40 miles of public highways.

According to the 2018 American Community Survey for the Town of Burke, 85% of the town drives to work, 12% works from home and no residents use public transportation or bicycles to commute. The closest train service in the planning area is in Montpelier and bus service does not exist in the region. The Rural Community transportation Inc. does provide limited door to door services. It is anticipated that these statistics are nearly identical for the Towns of Sheffield, Sutton, and Wheelock.

Demographics

As of 2018, the Town of Burke which includes 34 square miles, and has 1517 residents has a population density of 44 people per square mile. Burke has 638 housing units, with the majority owner occupied (78.1%) and single unit homes (80.8%). The median household income is $49,677, with 15.9% holding bachelor's degrees or higher. The unemployment rate in Burke in 2018 was 6.1%, and most jobs are in management, production or construction/extraction.

Sheffield has a population of 604 people over 32.8 square miles (with a population density of 18.4 people per square mile). The town has 261 occupied housing units, the majority of which are owner occupied (93%). Unemployment in Sheffield is at 2.1%, with the primary occupations in the fields of management, sales and service providing. The median household income in Sheffield is $63,875, and approximately 27% of the population has a bachelor's degree or higher.

Sutton has a population of 1,074 over 38.4 square miles (population density of 27.9 people per square mile). The median household income in Sutton is $62,500 with employment primarily in the sectors of management, business, science or arts (37% of workers). The unemployment rate was 4.7% in 2018, according to the American Community Survey. There are 360 occupied household units in Sutton, the majority of which are owner occupied (83%). Approximately 16% of the population holds a bachelor's degree or higher.

Wheelock has 850 people, over 39.8 square miles (population density of 20 people per square mile). The median household income for residents of Wheelock is $65,417, with most jobs in the sectors of management, business, science or art (37% of workers). The unemployment rate in Wheelock is 2.8%, according to the 2018 American Community Survey. Wheelock has 341 occupied housing units, the majority of which are owner occupied (87%). Table 2 below summarizes the demographic statistics for the planning area.

Table 2. Planning Area Statistics.

Town	Population	Square Miles	Population Density (per square mile)	Median Household Income
Burke	1,517	34	44	$49,677
Sheffield	604	32.8	18.4	$63,875
Sutton	1,074	38.4	27.9	$62,500
Wheelock	850	39.8	20	$65,417

Government Structure

Each town is governed by a Selectboard who the voters elect. The Selectboard is responsible for preparing a budget, setting policy and administering finances. Each town relies heavily on volunteers for governmental duties. Many of these volunteers are elected or appointed to Town boards or committees. They frequently represent their town on regional projects. Each town has a Planning Commission which makes land use decisions.

Town Properties

The lists below indicate town properties, owned and managed by town governments. These lists were developed by referencing each town's Plan.

Burke

- Burke Community Building T
- Darling Memorial Park
- Town Garage
- Town Office
- Union Meeting House in Burke Hollow
- West Burke Fire House
- West Burke Village Park

Sheffield

- Miller's Run School
- Municipal Building

- Town Hall
- Town House
- Wheelock-Sheffield Transfer Station

Sutton

- Fire Station
- Grange Hall
- Sutton Baptist Church
- Sutton School
- Town Clerk's Office
- Town Garage

Wheelock

- Hearse House
- Sheffield/Wheelock Fire Department Sub-Station
- Sheffield/Wheelock Transfer Station
- Town Garage
- Town Hall

Infrastructure

Infrastructure throughout the planning area varies slightly. Residents in the Towns of Burke, Sheffield and Wheelock are served by individually owned septic systems. Water supply is 100% groundwater, provided through private water wells/springs. The Town of Sutton is served by the Sutton Municipal Water System (owned and governed by the town), though many individuals own wells and have their own septic systems. The Sutton water system serves 28 customers and was upgraded in 2016 to serve more customers if needed.

Electricity throughout the planning area is supplied by Lyndonville Electric Department. The Town of Sheffield also receives electricity from the Vermont Electric Cooperative. The Towns of Sutton and Wheelock also receive electricity from Vermont Electric Cooperative, Washington Electric, and the Central Vermont Public Service.

The Towns of Burke and Sutton each have their own volunteer fire departments. Fire protection services are provided by two volunteer fire brigades for Burke, one in East Burke and one in West Burke Village. The brigades periodically receive training in fire-fighting techniques and fire safety. The departments cover East and West Burke and Burke Hollow and maintain a mutual assistance agreement with surrounding towns. The Town of Burke appropriates funds annually to both fire brigades based upon their request and approval by Burke registered voters. This appropriation represents the single largest source of funding, but other sources include state and federal grants, fund raisers, and private

donations. The Towns of Sheffield and Wheelock share a volunteer fire department originally formed in 1950.

None of the towns have local police departments. The closest hospital to the planning area is the Northeastern Vermont Regional Hospital in St. Johnsbury. Emergency medical services and transportation are provided by Lyndon Rescue and the Caledonia Essex Ambulance Service (CALEX). Helicopter transport via DART to Dartmouth Hitchcock Medical Center in Dartmouth, New Hampshire is also available.

Act 148, Vermont's Universal Recycling Law, was passed in 2012. The purpose of this law was to increase recycling, reduce greenhouse gas emissions, decrease the dependence on landfilling, and reduce municipal expense by diverting recyclables and compostable materials from the waste stream. This law enforced the practice of unit-based pricing for trash disposal (sometimes called "Pay as You Throw") by July 2015. It also banned the disposal of recyclable materials (glass, metal, plastics #1 and #2, cardboard and paper) in July 2015. The law banned the disposal of leaves, yard debris and clean wood in July 2016 and food scraps in July 2020. All solid waste facilities (transfer stations, drop-offs, and landfills) that collect trash were required to offer collection of baseline recyclables by July 2014. (Commercial haulers were exempted from this requirement.) Solid waste facilities -- including commercial haulers – must offer collection of leaf and yard debris by July 2015 and food scraps by July 2017. Facilities cannot charge an additional fee for the collection of recyclables, but they can charge for the collection of yard debris and food scraps.

Trash is managed in several ways in the region. The Town of Burke maintains a recycling center and offers curbside collection and landfill services. Sutton residents can use the recycling center in Lyndonville and must make their own arrangements for trash pick-up through Casella or Meyer's Waste Management. The Towns of Sheffield and Wheelock share a Transfer Station located along Route 122. Residents are required to bring their own waste to the Transfer Station.

Land Use and Development Trends

There has always been strong local support in preserving Burke's "rural character, including its traditional settlement patterns, and historic, scenic and recreational resources." According to the 2017 Burke Town Plan, the town was working to "protect forested lands and open space from fragmentation and development," "Encourage commercial/residential development in specifically designated areas," and "Encourage village center growth" for both East and West Burke, among other goals. The Town of Burke has a strong interest in preserving its rich history, and with the help of the Burke Historical Society (founded in 1895), has preserved records of Burke's historical sites and structures.

Though the Town of Sheffield was once an agricultural community, post-civil war the town lost many farming families and now the town is completely forested except for a few fields, and tillable acres along Millers Run. Most land is suitable for pasture and forests, including Mathewson State Forest and Holbrook State Park (conserved lands). There is some small-scale commercial development along Route 122, but much of the land remains undeveloped. According to the 2016 Town Plan, Sheffield wishes to

“continue its responsible stewardship of lands,” to “protect wildlife” and “protect and preserve our natural beauty.” The Town Clerk keeps records of Sheffield's critical facilities, which include the Town House Museum, the Town Hall, and the Freewill Baptist Church.

The Town of Sutton is rural, with farmland, forest and wetland surrounding the town. Farming continues to hold importance to the town and Sutton works to protect and support its farmland. Additionally, Sutton works to ensure the sustainability of its forestry, and make sure wetlands and flood lands are protected during logging. Preserving the natural beauty of the land in Sutton is key to the region's tourism and hospitality industries, and Sutton hopes to build bike trails as an expansion of the Kingdom Trails. There is little industrial land, and small amounts of land are used for commerce in Sutton Village. In the future, Sutton wants to expand and protect farmland, ensure sustainable forestry, protect and preserve floodplain and wetland, and limit commercial and industrial development to defined areas.

The Town of Wheelock is divided by a chain of intermittent mountains from north to south. To the east, Wheelock is mostly agricultural, and to the west the land remains forested for lumber and recreation. Wheelock is working to preserve the rural character of the town and natural beauty, “revitalize the village center,” and prevent development from straining its limited municipal facilities.

Chapter 3. Planning Process

> *A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))*

The planning process was developed in full compliance with the current planning requirements of the Federal Emergency Management Agency (FEMA) per the following rules and regulations:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000
- Code of Federal Regulations – Title 44, Chapter 1, Part 201 (§201.6: Local Mitigation Plans)
- Federal Emergency Management Agency *Local Mitigation Plan Review Guide* (dated October 1, 2011)

In addition, the Plan was prepared with the suggestions found in the *Demonstrating Good Practices Within Local Hazard Mitigation Plans*, FEMA Region 1, January 2017.

Hazard Mitigation Committee Leaders

Alison Low, Senior Planner for the Northeastern Vermont Development Association (NVDA) managed the project on behalf of the four towns. She met with each town's Selectboard prior to the project beginning to make sure they were interested in participating and had a full understanding of the commitment and process required of plan development. Ms. Low formed the Hazard Mitigation Committee with one or two representatives from each town. The list of Hazard Mitigation Committee members is shown in the table below.

Table 3. Hazard Mitigation Committee

Name	Town/Organization	Title	Email
Alison Low	Northeastern Vermont Development Association	Senior Planner	alow@nvda.net
Linda Corey	Town of Burke	Town Clerk	burke@burkevermont.org
Mike Harris	Town of Burke	Administrative Officer	Harris37@yahoo.com

Name	Town/Organization	Title	Email
William St. Peter	Town of Sheffield	Town Clerk/Treasurer	sheffieldvttownclerk@gmail.com or townclerk@sheffieldvt.org
Paul Brouha	Town of Sutton	Planning Committee & Development Review Board	paul.brouha@gmail.com
Wendy Scofield	Town of Sutton	Assistant Town Clerk	assttownclerk@sheffieldvt.org
Ann Lawless	Town of Wheelock	Selectperson	alawless@vtlink.net

The Hazard Mitigation Committee met five times as a full committee. All of the meetings were held via Zoom due to the Covid-19 pandemic. The table below indicates the date of each meeting and the primary items of discussion. The meeting on October 20, 2020 was with Stephanie Smith, State Hazard Mitigation Officer with the Vermont Emergency Management Agency. The purpose of this meeting was to provide the Hazard Mitigation Committee and town representatives with an understanding of FEMA's new Building Resilient Infrastructure and Communities (BRIC) grant funding program that replaced the Hazard Mitigation Grant Program. Throughout the planning process, the Hazard Mitigation Committee shared documents on the Google Drive. Materials related to each meeting are included in this Plan's Appendix.

Table 4. Hazard Mitigation Committee Meetings.

Meeting Date	Meeting Purpose
1. March 13, 2020	Kick-off Meeting detailing the Scope of Work, the role of the Hazard Mitigation Committee and how to implement outreach and public engagement. Unique qualities of each town were discussed as well as previous hazard mitigation actions.
2. July 6, 2020	Hazard identification and critical facility identification as well as capability assessment data gathering were the focus of this meeting.
3. September 23, 2020	This meeting included Risk Assessment results and early Public Survey results. Conversation centered around mitigation actions.

Meeting Date	Meeting Purpose
4. October 20, 2020	This meeting had the sole purpose of reviewing mitigation grant funding options through FEMA's BRIC program outlined by Stephanie Smith, State Hazard Mitigation Officer, Vermont Emergency Management Agency.
5. November 17, 2020	This was a combined Hazard Mitigation Committee and public meeting to review the Mitigation Strategy, specifically the mission and goal statements and mitigation actions common to all towns.

In addition, the Consulting Team held a meeting with each town. These meetings were an opportunity for the Consulting Team to ask some questions specific to each town and to discuss mitigation actions for each town. The Consulting Team encouraged Hazard Mitigation Committee members to invite as many town leaders as possible to these meetings. The meetings were held on the following dates:

- Burke October 7, 2020
- Sheffield October 9, 2020
- Sutton October 8, 2020
- Wheelock October 9, 2020

The Hazard Mitigation Committee would like to extend thanks to the following members of their communities who supported this Plan's development.

Sheffield

Sheffield Planning Commission members:

- Alan (Al) Robertson pfalz@kingcon.com
- Annie McLean anniegeratowski@gmail.com
- Bobbie Bristol bkbristol1218@gmail.com
- Keith Ballek
- Jessica Brinkerhoff dawnfulpeace@yahoo.com
- Linda Kozak-Lyman kozak_linda@yahoo.com
- Sally Wood-Simons swoodsimons@gmail.com

Select Board Members:

- Walter Smith waltersmith36@gmail.com
- Max Aldrich maxaldrich2@gmail.com
- Cindy Roy cindyroy1@hotmail.com

Wheelock

- Shane Lanpher, Chief, Sheffield-Wheelock Volunteer Fire Department
- Marc Brown, Wheelock Emergency Management Officer
- Eileen Boland
- Enid Ellis
- Carol Rossi, Assistant Clerk
- Steve Amos, Chair, Town of Wheelock Planning Commission

Stakeholder Engagement

> *A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))*

Developing a multi-jurisdictional plan facilitated the involvement of multiple agencies and communities. The development of this multi-jurisdiction Plan included a regional perspective as it was led by Alison Low and NVDA. NVDA is involved in land use planning, emergency management, transportation and economic and community development throughout northeastern Vermont. Ms. Low brought this perspective to all meetings. She also sought feedback and shared the planning process with her co-workers and with other regional organizations.

NVDA worked with the Department of Environmental Conservation (DEC) and with each of the towns regarding river management and National Flood Insurance Program coordination. The Town of Burke amended their bylaws for river corridors. The Towns of Sheffield, Sutton and Wheelock each met with the DEC but have yet to adopt bylaws. They also collaborated with DEC on Tactical Basin Plans. These plans focus on issues where cooperation among municipalities, private organizations, and branches of state government can be effective in protecting, restoring or enhancing water quality. The basin plans are updated every five years. The Towns of Sheffield and Wheelock have multiple basins.

The Hazard Mitigation Committee and the volunteers and staff they brought to the planning process represented multiple of organizations. For instance, Ann Lawless represented Wheelock on the Hazard Mitigation Committee and she works for HEAT Squad which provides energy audits to homeowners in the Northeast Kingdom. The Hazard Mitigation Committee focused on the risk of extreme cold and the need for renewable energy. They also worked closely with the following fire departments who all have Memorandums of Understanding with adjacent communities, Sheffield Wheelock Fire Department, Sutton Fire Department, Burke Volunteer Fire Departments.

The public outreach conducted throughout the planning process included social media and other web-based sources such as Front Porch Forum which were not limited to the four-town planning area. The Front Porch Forum includes 198,000 members which includes individual homeowners and organizations.

Messages posted to the forum by NVDA, and the Hazard Mitigation Committee were received throughout Caledonia County. NVDA also posted announcements to their website.

Due to the Covid-19 Pandemic, in-person meetings were not held, and the Hazard Mitigation Committee did not tour the planning area or meet with multiple stakeholders in-person. In the future, the Hazard Mitigation Committee would like to expand stakeholder engagement. They may consider expanding the Plan to include additional municipalities.

Public Outreach Strategy

> *A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))*

Public outreach and engagement included public meetings, a survey, and review of the draft Multi-Hazard Mitigation Plan Update. The opportunities to participate in each of these activities were advertised to the public through postings to the NVDA website and individual town websites, through Front Porch Forum (free community-building service in Vermont), and through email announcements to lists maintained by the participating town governments.

Public Survey

A survey was developed as an integral part of the Public Outreach Strategy. The survey gave the public an opportunity to comment on their level of interest, knowledge, and readiness toward hazards in the planning area. The Hazard Mitigation Committee took the lead getting the word out about the survey.

A copy of the survey with complete results is included in Appendix A. Below are some of the key findings. The findings from the survey informed multiple parts of this Plan's development. The perceived levels of concern contributed to the qualitative ranking of the hazards. The public identified specific road areas and other projects that were included in the Mitigation Strategy as mitigation actions. Finally, the survey answered the question regarding how the public likes to receive information from their local government and this informed the development of the implementation plan and future public outreach efforts the towns may undertake.

The main survey included 16 questions and was available from August 2020 through November 2020. An additional six questions were asked of residents of Wheelock regarding the use of the Wheelock Town Hall. The future of the Wheelock Town Hall is a contentious issue in Wheelock and inspired lots of participation in the survey. Ann Lawless, the Wheelock Hazard Mitigation Committee representative did a phenomenal job distributing hard copies of the survey. Of the 90 surveys collected, 88% of them were from the Town of Wheelock. One person from Burke and one from Sheffield completed the survey and nine surveys were collected from residents of other towns. No one who lives in the Town of Sutton completed a survey.

The survey results indicate that the hazards of biggest concern are infectious disease, snow storm/ice storm, invasive species, extreme cold, and wind in that order. It can be assumed that due to the Covid-19 pandemic impacting the nation infectious disease ranked first among the list of hazards of concern. It is slightly surprising that flood was near the bottom of the list because is one of the hazards the Hazard Mitigation Committee is most concerned about mitigating.

When considering town assets, protecting schools, fire stations, food shelves, and town roads ranked the highest. When considering priorities for mitigation, protecting emergency services, utilities, and private property were named in that order. Sixty-eight percent of respondents reported the experience of being unable to travel due to severe weather impacting roads. When asked which roads presented the greatest challenge South Wheelock Road was mentioned most frequently followed by Peak Road, Sutton Road, Route 122 and Stannard Mountain Road. Eighty-eight percent of respondents reported going without power for a day or longer, and sixty-three percent went without running water. In terms of preparing for a disaster sixty-eight percent have a generator attached to their home for back-up power. Complete results are included in Appendix A.

Public Meetings

The Hazard Mitigation Committee, with the support of the NVDA, held two Public Meetings during the planning process via Zoom. These public meetings were each advertised via press release, Front Porch Forum (a free community-building service in Vermont), email invitation, and website announcement. Copies of the sign-in sheets from each meeting, the press releases and Front Porch Forum announcements are included in Appendix A. All residents and stakeholders in the planning area were encouraged to participate.

The first public meeting was held on October 29, 2020. The presentation was focused on introducing the audience to hazard mitigation and to the planning process for developing this Multi-Jurisdiction Hazard Mitigation Plan Update. The presentation also included three poll questions aimed at furthering the understanding of the audience. Nine people attended this meeting.

The second public meeting was held on November 17, 2020 via Zoom. Ten people participated plus the Consulting Team. The meeting was an opportunity to review the layout of the Plan with emphasis on how to review the Plan. The group approved the mission and goal statements of this Plan and were pleased to see the activities that NVDA intends to take to support the implementation of the Plan and hazard mitigation in the region. The group discussed possible ways to improve the likelihood of successfully implementing the Plan. These ideas included using Town Meeting to expand the visibility of the Plan to all town residents and developing a Committee within each town to keep the Plan relevant and identify possible grant opportunities. These ideas have been included in Chapter 7 Plan Implementation and Maintenance.

Reviewing and Commenting on the Draft Mitigation Plan

The public was made aware of the availability to review the draft Mitigation Plan by way of several digital forums and through meeting announcements. NVDA posted an announcement regarding the Plan's availability for review on their website with a link to download the Plan. A link to a comment form was also provided. The availability of the Plan for review was announced on the town websites, Front Porch Forum, and via email blasts. The Plan was also distributed to the Fire Departments representing each town. The Plan was available for review for two weeks in early December 2020.

Review and Incorporation of Existing Studies

> *A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))*

Alison Low and the Consulting Team reviewed a number of existing plans and studies for the development of the Hazard Mitigation Plan. A complete list of these plans is below.

- 2018 Vermont State Hazard Mitigation Plan
- Burke Local Emergency Operations Plan, 2018
- Sheffield Town Plan, 2016
- Town of Burke, All-Hazards Mitigation Plan, June 9, 2005
- Town of Sheffield, All-Hazards Mitigation Plan, July 24, 2005
- Town of Sutton, All-Hazards Mitigation Plan, July 24, 2005
- Town of Wheelock, All-Hazard Mitigation Plan, August 6, 2005
- Burke Town Plan, November 6, 2017
- Town of Sutton, Unified Development Bylaws, April 26, 2018
- Sutton Town Plan, March 28, 2019
- Town of Wheelock, Local Emergency Management Plan, April 8, 2019
- Sheffield Local Emergency Operations Plan, April 13, 2019
- Town of Sutton, Local Emergency Operations Plan, July 15, 2019
- Passumpsic River Tactical Basin Plan, October 2019
- Wheelock Town Plan, December 9, 2019

Most important to the planning process was review of the 2018 Vermont State Hazard Mitigation Plan, the Town Plans and the previous mitigation plans. The State Plan was reviewed specifically for the list of hazards studied and for the list of mitigation goals and actions included. This Plan includes a review of all hazards named in the State Plan. In terms of mitigation strategy development, the goal statements for this Plan were developed to be consistent with the State's Plan. The previous All-Hazards Mitigation Plans were developed in 2005. They were each reviewed for previous mitigation actions and risks identified. Information regarding the status of each of these actions is included in Chapter 6 Mitigation Strategy. The Town Plans were found to be current and included information regarding town assets, flood risk, historic properties and most importantly town priorities and strategies. Many of these

priorities became mitigation actions for inclusion in this Plan. This Plan is consistent with the priorities in the State Hazard Mitigation Plan and in each Town's Plan.

Chapter 4. Hazard Analysis and Risk Assessment

The Hazard Analysis and Risk Assessment provides an in-depth study of natural hazard risks for the planning area. It is presented in the following distinct subsections:

1. Overview
2. Hazard Identification
3. Hazard Profiles
4. Vulnerability Assessment
5. Summary Findings and Conclusions

Overview

The purpose of the Hazard Analysis and Risk Assessment is to identify, analyze, and assess each participating jurisdiction's overall risk and vulnerability to natural hazards. It helps determine the potential impacts of hazards to the people, economy, and built and natural environments of each community as well as specific vulnerabilities or problem areas. It is a foundational element to the entire mitigation planning process which is focused on identifying and prioritizing actions to reduce risk to hazards. In addition to informing the Mitigation Strategy included in this plan, the Hazard Analysis and Risk Assessment can also be used to establish local emergency preparedness and response priorities, for future land use and community development planning, and for decision making by elected officials, town staff, residents, businesses, and other stakeholders in the community.

The Hazard Analysis and Risk Assessment builds on available historical data and information on past hazard occurrences in addition to projections for anticipated future occurrences. It includes hazard-by-hazard profiles for those hazards deemed to pose significant risk, a summary description of each jurisdiction's vulnerability to these hazards and culminates in a hazard risk ranking based on the findings and conclusions about the location, probability, potential impact, warning time, and duration of each hazard. The process is designed to assist the Northeastern Vermont Development Association (NVDA) and participating jurisdictions in the pursuit of the most appropriate mitigation actions to pursue and implement—focusing their efforts on those hazards of greatest concern and those community assets facing the greatest risk.

Specific information on the methods and data sources used to complete the Hazard Analysis and Risk Assessment are incorporated throughout this section and will be refined as necessary through future updates to this Plan.

Hazard Identification

The first step in completing a comprehensive risk assessment for mitigation planning purposes is the identification of all hazards that can affect the people, economy, and built and natural environments in the planning area. The primary purpose of this step is to ensure that any potential hazard threats are

considered for inclusion in the plan and to determine which are significant enough to carry forward for more detailed hazard analysis and risk assessment tasks.

The hazard identification process completed for this Plan began with capturing early input from the Hazard Mitigation Committee. During these initial discussions it was determined that the planning area is vulnerable to a wide range of hazards that threaten life and property which can be defined or categorized in a variety of ways. It was also noted that while previous local hazard mitigation plans for participating jurisdictions identified human-caused hazards[7] as potential threats, the new Multi-Jurisdiction Hazard Mitigation Plan Update should focus on natural hazards only as prescribed by FEMA and in alignment with the Vermont State Hazard Mitigation Plan.

These discussions were then followed by an extensive review and evaluation of all potential natural hazards based on the previous local hazard mitigation plans, the 2018 Vermont State Hazard Mitigation Plan, past major disaster and emergency declarations for Caledonia County, and other historical and anecdotal data on previous hazard events. Readily available information from other official and reputable data sources was also evaluated to supplement information provided through these primary sources. Based on this review it was determined that the classification of natural hazards for the planning area should follow the same classification scheme as recently updated for the State Hazard Mitigation Plan. This meant that instead of continuing to view hazards as separate events (e.g., hurricanes), the plan would identify hazards based on the *impacts* of events (e.g., inundation flooding, fluvial erosion, and wind as impacts of a hurricane event), as it is the impacts, not the events, that can be mitigated.

Table 5 identifies the 12 types of natural hazards considered for this Plan (listed in alphabetical order), identifies those determined to be a significant risk for the planning area, and summarizes the rationale for why each was or was not recommended for further study in the risk assessment. Note that all of the natural hazards identified as potential threats in the previous local hazard mitigation plans have been carried over to the new multi-jurisdiction plan.[8] Lastly, while comprehensive assessments and detailed profiles were completed for only the 11 hazards identified as posing a significant risk for the planning area, participating jurisdictions are not precluded from considering mitigation actions for others if deemed appropriate. In addition, hazards not currently included in the risk assessment may still be further studied and/or included with more detailed hazard profiles during future Plan updates.

[7] Human-caused hazards identified in previous (2005) hazard mitigation plans but excluded from this plan update include the following: hazardous materials, radiological incident, structure fire, power failure, air crash, water supply contamination, chemical or biological incident, highway incidents, school safety issues, and terrorism.
[8] Natural hazards identified in previous hazard mitigation plans include the following: dam failures, drought earthquake, flood, flash flood, high wind, hurricane, landslide, tornado, wildfire/forest fire, and winter storm/ice.

Table 5. Hazard Identification and Screening Summary.

Natural Hazard	Significant Risk for Planning Area?	Rationale for Inclusion/Exclusion from Risk Assessment
Drought	Yes	• History of previous occurrences. • Potential for increased frequency, duration, and severity of drought events due to climate change. • Potential impacts to public water supplies, individual/private wells, and sources for firefighting.
Earthquake	Yes	• Vermont is classified as an area with low to moderate seismic activity. • History of relatively minor and infrequent events, however the potential for larger events exists. • Expected probability of ground shaking at damaging levels is very low but older, unreinforced masonry buildings or other structures/infrastructure assets not built to modern codes could still be at risk.
Extreme Cold	Yes	• High frequency of previous occurrences. • Potential life/safety impacts to populations in the planning area with underlying vulnerabilities that could be disproportionately affected (seniors, low-moderate income households, older housing stock with no home heating fuel, etc.).
Extreme Heat	Yes	• History of previous occurrences, though days with temperatures above 90°F are uncommon. • Potential for increased frequency, duration, and severity of extreme heat events due to climate change. • Potential life/safety impacts to populations in the planning area with underlying vulnerabilities that could be disproportionately affected (seniors, low-moderate income households, older housing stock with no air conditioning, etc.).
Hail	Yes	• History of previous occurrences. • Significant property damages reported for the planning area.
Infectious Disease *(includes epidemic/pandemic and vector-borne diseases)*	Yes	• Significant impacts from COVID-19 have been experienced in all participating jurisdictions. • Vector-borne and other infectious diseases are a current threat for the planning area and may be exacerbated by climate change.

Natural Hazard	Significant Risk for Planning Area?	Rationale for Inclusion/Exclusion from Risk Assessment
Inundation Flooding & Fluvial Erosion *(includes flash flooding, ice jams, and dam failures)*	Yes	• Priority concern for the Hazard Mitigation Committee. • Frequency and severity of previous occurrences in planning area, including numerous major disaster and emergency declarations. • High probability of future events with potential to cause extensive damage, loss, and disruption to the entire planning area.
Invasive Species	Yes	• History of previous/ongoing occurrences. • Vermont has a long history of infestation at the aquatic, terrestrial, and forest pest levels. • Native forests and ecosystems are projected to experience worsening impacts due to climate change.
Landslides *(includes rock falls, rockslides, debris flows or other mass failures)*	No	• No record of significant previous occurrences in the planning area. • Localized areas of slope instability are limited to remote mountainous areas outside of the four participating jurisdictions. • No indication of risk for planning area per information included in the State Hazard Mitigation Plan and through Vermont Geological Survey and USGS. • Low probability of future events.
Snow storm & Ice Storm *(includes blizzards and nor'easters)*	Yes	• A priority concern for the Hazard Mitigation Committee. • Frequency and severity of previous occurrences in planning area, including multiple major disaster and emergency declarations. • High probability of future events, with potential to cause extensive disruption to the entire planning area.
Wildfire	Yes	• Remains a concern for the Hazard Mitigation Committee, especially during drier periods and droughts. • High potential for devastating fires due to heavily forested areas throughout the planning area, coupled with logging activities and presence of high fuel loads. • Potential for increased frequency and severity of wildfire events due to climate change.
Wind *(includes wind storms, severe thunderstorms,*	Yes	• Priority concern for the Hazard Mitigation Committee. • History of previous occurrences in planning area. • Planning area is susceptible to high winds from numerous types of hazard events.

Natural Hazard	Significant Risk for Planning Area?	Rationale for Inclusion/Exclusion from Risk Assessment
tornadoes, nor'easters, hurricanes, and tropical storms)		• High probability of future events, with potential to cause extensive disruption to the entire planning area (i.e., power outages, road closures, etc.).

Hazard Profiles

The next step in the risk assessment process was to develop comprehensive profiles for each hazard identified as a significant risk for the planning area. These profiles were developed to be consistent with the requirements of Element B, Hazard Identification and Risk Assessment, from 44 CFR 201.6:

> *B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))*
>
> *B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))*
>
> *B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))*

Hazard profiles provide summary information and data on the characteristics of each hazard including a general description and details on the location, severity/extent, previous occurrences, probability of future occurrences, and potential impact on the community and its vulnerability. The primary sources of information and data for hazard profiles include the Vermont State Hazard Mitigation Plan, the National Oceanic and Atmospheric Administration (NOAA), and other official State or Federal sources as cited throughout this section. The anticipated effects of climate change on each hazard have been integrated into the profiles as appropriate and is specifically addressed in the narrative on the probability of future occurrences. Table 6 provides more information on the sub-sections included with each profile.

Table 6. Categories for Hazard Profiles.

Sub-Section	Description
General Description	A basic description of each hazard, its characteristics, and potential effects.

Sub-Section	Description
Location	Describes the geographic areas within the planning area that are affected by the hazard. Some hazards affect the entire planning area universally, while others apply to a specific portion, such as a floodplain or area that is susceptible to wildfires.
Severity/Extent	Describes the potential strength or magnitude of a hazard. Where appropriate, extent is described using an established scientific scale or measurement system.
Previous Occurrences	Provides information on the history of previous hazard events in the planning area, including their impacts on people and property. Events listed may have occurred on a local or regional level.
Probability of Future Occurrences	Describes the likelihood of future hazard occurrences in the planning area, including a qualitative classification (Unlikely, Possible, Likely, or Highly Likely) as defined in the Priority Risk Index provided at the conclusion of this section. This section also includes a brief summary of any anticipated effects that climate change may have on the frequency, duration, or intensity of future hazard events.
Impact on the Community and Vulnerability	Describes the hazard's potential impact on the community and its assets (i.e., people, economy, built environment, natural environment) as well as an overall summary of the community's vulnerability to the hazard.

Drought

General Description

Drought is defined as a water shortage with reference to a specified need for water in a conceptual supply and demand relationship. It is a complex phenomenon that is difficult to monitor and assess because it develops slowly and covers extensive areas, as opposed to other disasters that have rapid onsets and obvious destruction. Also, unlike most disasters, the effects of drought can linger long after the drought has ended. Drought is an inherent, cyclical component of natural climatic variability and can occur at any place at any time. It is difficult to determine the onset, duration, intensity, and severity of a drought, all of which affect the consequences and corresponding mitigation techniques. High winds, low humidity, and extreme temperatures can all amplify the severity of the drought.

Types of Drought:[9]

[9] National Drought Mitigation Center: https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx

- Meteorological: a reduction in rainfall from a normal precipitation pattern in regard to the amount, intensity, or timing of the event as well as changes in the temperature, humidity, and wind patterns. The strict threshold differs for every nation; the United States defines meteorological drought as receiving less than 2.5mm of rainfall in 48 hours. Meteorological drought is the first drought stage detected.
- Agricultural: deficient moisture conditions that cause a lasting effect on crops and non-natural vegetation. It is dependent on rainfall, temperature, topography, evapotranspiration, permeability, and porosity of soils, precipitation effectiveness, and vegetative demand. Agricultural drought begins when the available soil moisture supports the actual evapotranspiration rate at only a fraction of the potential evapotranspiration rate.
- Hydrological: related to the effects of decreased precipitation on surface or subsurface water supply. It is the last stage of drought and is lagged behind meteorological and agricultural drought because water infiltrates down to the groundwater during the latter portion of the hydrological cycle. Subsurface water supply is the last drought component to return to normal when meteorological conditions and aquifer recharge return.
- Socioeconomic: what happens when the consequences of the drought start to affect the socioeconomic sector. It occurs when the demand for an economic good is greater than the available supply due to weather-related drought. Examples of such goods include water, hydroelectric power, food grains, meat, dairy, and much more. Socioeconomic drought affects the associated population both individually and collectively.
- Ecological: defined as "a prolonged and widespread deficit in naturally available water supplies including changes in natural and managed hydrology — that create multiple stresses across ecosystems."[10]

Location

Droughts are often spread over a larger geographic area than other natural hazards. The entire planning area is vulnerable to the occurrence of droughts, though the areas of greatest concern to participating jurisdictions in terms of potential local impacts are agricultural lands, in addition to individual groundwater wells and water supplies for fire services throughout the area.

Based on past events, southern Vermont is generally considered to be more susceptible to severe drought conditions than northern areas including the planning area. According to the U.S. Drought Monitor's archived data, the southeastern portion of the state is more likely to experience prolonged periods of more significant drought, likely due to its lower elevation and landlocked location. However, many factors such as population, water supply sources, economic factors, and infrastructure may affect the susceptibility, severity, and length of a drought event.

[10] For more information on Ecological drought: https://snappartnership.net/teams/ecological-drought/

Severity/Extent

The severity of a drought depends on the duration, intensity, and geographic extent of the water shortage, as well as the demands on the area's water supply. The US Department of Agriculture (USDA) rates droughts from D0–D4, depending on the severity of the drought, the amount of time it will take for vegetation to return to normal levels, and the possible effects of the drought on vegetation and water supply. Table 7 provides more descriptive information on the classification of these various drought severities and extents.

Table 7. Drought Severity Classifications.

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

Source: National Drought Mitigation Center, US Drought Monitor[11]

Previous Occurrences

Even though Vermont usually has adequate rainfall, droughts occasionally occur. Several severe droughts have been recorded during the last century, while moderate and mild droughts are much more common. There were two declared statewide droughts in June and July 1995. These droughts were due to a lack of rainfall, which required officials to put restrictions on water usage. Lack of rain combined with some of the highest temperatures led to the loss of crops in some areas. The drought persisted through the summer of 1995, and a third, more severe drought affected Southern Vermont in August of that year.

Since 2000, there have been two significant droughts in Vermont. In 2001-2002, Vermont was affected by a Severe Drought (D2), which peaked at over 14% of the State at the D2 level between November and

[11] US Drought Monitor: https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx

December of 2001 and nearly 100% of the State in at least Moderate Drought (D1). Portions of Vermont were in Severe Drought (D2) from October 2016 through April 2017, peaking at 29% of Vermont in October and November 2016 and 80% of the State was in at least Moderate Drought (D1), though this most recent event largely spared the planning area which was only classified as Abnormally Dry (D0).[12]

According to NOAA records,[13] there have been no reported physical damages or economic losses (including crop losses) reported in Caledonia County due to drought conditions. According to town officials, the planning area has experienced minimal impacts from drought conditions in the past.

Probability of Future Occurrences

Vermont has a highly variable, unpredictable climate. Relative to other regions of the country, severe droughts are not frequent occurrences in the state. However, based on historical records droughts should continue to be considered a ***possible*** occurrence in the planning area (between 1-10 percent annual probability). It is anticipated that the effects of climate change could result in an increase in the frequency, duration, and intensity of short-term droughts. Vermont is already seeing an increase in average annual maximum and minimum temperature, and climate scientists point to the likelihood of more episodic droughts in Vermont as a result of these warming trends.[14]

Impact on the Community and Vulnerability

Structural impacts of drought are very uncommon, making the risk to buildings, facilities, infrastructure, or governmental functions in community low. The potential economic impact of a significant drought event is often considered to be greater than the risk to life or property. Localized impacts of greatest concern to the planning area include deficiencies that may leave groundwater wells dry, cause damage to crops, or cause restrictions on water usages. Droughts can cause the loss of potable water when wells run dry, but also the loss of water supplies that are used for firefighting, which in turn may increase community vulnerability to wildfires since drought events also lead to conditions that increase the likelihood of wildfire occurrences.

The planning area has experienced minimal impacts from drought conditions in the past, and town officials generally expect it will not be a problem in the future. However, an increasing concern for the area is the potential future impacts of droughts on local agriculture and agri-businesses, as well as those residents who rely on wells for their local water supply – and particularly for lower income residents who may not be able to afford the drilling of deeper wells if/when required and would therefore be more adversely affected.

[12] Vermont State Hazard Mitigation Plan. October 2018. PP. 112-114.
[13] NOAA, National Centers for Environmental Information, Storm Events Database. Accessed August 4, 2020 at: https://www.ncdc.noaa.gov/stormevents/
[14] Vermont's Climate Dashboard: https://climatechange.vermont.gov/

Earthquake

General Description

An earthquake is the sudden motion or trembling of ground caused by an abrupt release of accumulated strain on tectonic plates that comprise the Earth's crust. While these thick plates move slowly and continuously over the interior of the earth, they collide, slide, catch, and hold – but eventually, when the mounting stress exceeds the elastic limit of the rock, faults along or near plate boundaries rupture or slip abruptly and an earthquake occurs. The ensuing seismic hazard effects on the Earth's surface include ground shaking, surface fault ruptures, and ground failures, which have the potential to cause widespread damage to buildings and infrastructure. Earthquakes may also provoke secondary hazards such as landslides, dam failures, or large fires ignited by ruptured gas lines.

The underground point of initial rupture is known as an earthquake's focus or hypocenter, and the point at ground level directly above the hypocenter is known as its epicenter. In general, the severity of the resulting ground motion increases with the amount of energy released and decreases with distance from the epicenter. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks and are followed by vibrations of gradually diminishing force called aftershocks. While the great majority of earthquakes strike near continental margins or in areas where large plates collide or move past each other, some, including those in the Northeast United States, can occur within plate boundaries.

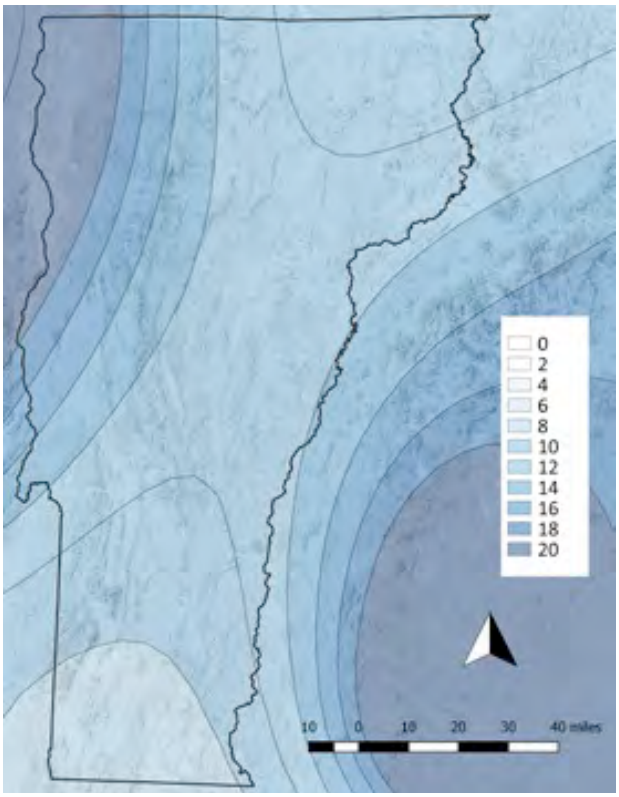
Location

The entire planning area is uniformly susceptible to the occurrence of earthquakes. Unlike other areas of the country where earthquakes occur along known fault lines, earthquakes in the Northeast do not correlate with the many known faults that exist in the region. They occur in the middle of plates, far from the plate boundaries.

Figure 2 includes a statewide earthquake hazard map for Vermont as included in the State Hazard Mitigation Plan.[15] The figure shows seismic risk zones according to peak ground acceleration (PGA), which is expressed as a percentage of the force of gravity (%g). Peak ground acceleration is the amount of earthquake generated ground shaking that, over a specified period, is predicted to have a specified chance of being exceeded. Though Vermont sits intraplate, there are areas of the Northeast region that record higher rates of peak ground accelerations. The Adirondack region of New York and the geographical region of Canada between Ottawa and Montreal have higher PGAs, which have had recorded earthquakes that caused ground movement in Vermont. Because of this PGA distribution, the northwest region is more vulnerable to earthquake than the rest of the state. The planning area falls within a zone with a peak ground acceleration value of 6-8%g which is considered a low-risk zone in terms of potential ground shaking and damage from such an event.

[15] Vermont State Hazard Mitigation Plan. October 2018. P. 130.

Figure 2. Peak Ground Acceleration in Vermont.



Source: United States Geological Survey

Severity/Extent

The magnitude of an earthquake is a measure of the amount of energy released as seismic waves at the hypocenter. The Richter Scale classifies earthquake magnitude as determined from measurements recorded by seismographs, and according to a single number on an open-ended logarithmic scale. Each unit increase in magnitude on the Richter Scale corresponds to a ten-fold increase in wave amplitude, or a 32-fold increase in energy.

The intensity of an earthquake is a measure of the strength of ground shaking and its effects on the Earth's surface at a certain location. Intensity is most commonly measured using the Modified Mercalli Intensity Scale, which is based on observed seismic effects versus any mathematical basis. The Scale is composed of 12 increasing levels of intensity (designated by Roman numerals) that range from imperceptible shaking to catastrophic destruction.

Table 8 summarizes the range of magnitudes and related intensities for earthquakes according to the Richter and Modified Mercalli Intensity (MMI) scales, along with abbreviated descriptions of effects on people, human structures, and the natural environment near the epicenter.

Table 8. Classification of Earthquake Magnitude and Intensity.

Magnitude (Richter Scale)		Typical Maximum Intensity (MMI Scale)	Abbreviated Description of Effects (Near Epicenter)
1.0 to 3.0		I	Not felt except by a very few under especially favorable conditions.
3.0 to 3.9		II	Felt only by a few persons at rest, especially on upper floors of buildings.
		III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0 to 4.9		IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.
		V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 to 5.9		VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
	6.0 to 6.9	VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
7.0 and higher		VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned.
		IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
		X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
		XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
		XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: United States Geological Survey

Previous Occurrences

Vermont is classified as an area with low to moderate seismic activity. Since 1900, Vermont has only experienced three earthquakes registering 2.5 or greater on the Richter Scale. The two strongest recorded earthquakes measured in Vermont were of a magnitude 4.1 on the Richter Scale. One was centered in Swanton and occurred on July 6, 1943, and the second occurred in 1962 in Middlebury. The

1962 earthquake was felt throughout New England and resulted in broken windows and cracked plaster, while the Swanton earthquake caused little damage.

In addition, earthquakes centered outside the State have been felt in Vermont. Twin earthquakes of 5.5 occurred in New Hampshire in 1940. In 1988, an earthquake with a magnitude 6.2 on the Richter Scale took place in Saguenay, Quebec and caused shaking in the northern two-thirds of Vermont. On April 20, 2002, a 5.1 magnitude event in Plattsburgh caused shaking in Vermont with damage near the epicenter in New York.[16] In 2011, the Mineral Springs, VA earthquake was felt throughout the Northeast.

More recent seismic events in Vermont have been mild. In the last five years, there have been only five earthquakes in the New England/Northern New York and Southeast Ontario/Southwest Quebec region that recorded 3.0 magnitude or higher on the Richter Scale. According to the Vermont Geological Survey, 15 earthquakes with epicenters in Vermont occurred between January 1, 2016 and August 4, 2020. A 2.3 magnitude earthquake occurred December 20, 2017 and was felt by people in the White River Junction area. A small earthquake was also felt in western Vermont on June 30, 2017.[17] The New England Seismic Network reports two recent events within proximity to the planning area, including 0.7 magnitude event 8 kilometers southeast of Burke on October 28, 2016 and 1.6 magnitude event 15 kilometers east-northeast of Burke on June 17, 2014.[18]

Probability of Future Occurrences

It is likely that small earthquakes as described above will continue to occur throughout the region in the coming years with no discernable impacts. Larger earthquakes with a magnitude of 3.0 and greater on the Richter Scale will remain a ***possible*** occurrence for being felt in the planning area, though based on historical data and existing seismic hazard maps, the four participating jurisdictions are considered susceptible to only minor ground shaking and light damages (if any). Moderately damaging earthquakes are only expected to strike somewhere in the New England region every few decades.

A computer earthquake damage simulation (HAZUS program) conducted by the Vermont State Geologist's Office in 2012 suggests that there is little earthquake risk in Vermont at 100-year and 250-year recurrence intervals; however, there is a potential risk at the 500-year recurrence level.[19] The effects of climate change will have no relation to the probability or magnitude of future earthquake events.

Impact on the Community and Vulnerability

The entire planning area is potentially exposed to direct and indirect impacts from earthquakes. The degree of exposure depends on many factors, including the age and construction type of the structures where people live, work, and go to school, and the soil type these buildings are constructed on. Older buildings in the four towns, including some historic properties, are also likely more vulnerable to

[16] Vermont State Hazard Mitigation Plan. October 2018. P. 129.
[17] Vermont Geological Survey: https://dec.vermont.gov/geological-survey/hazards/earthquakes/recentquake
[18] New England Seismic Network. Accessed August 4, 2020 at: http://aki.bc.edu/cgi-bin/NESN/recent_events.pl
[19] Vermont State Hazard Mitigation Plan. October 2018. P. 127.

earthquakes. If bridges or other key infrastructure assets were damaged by an earthquake, that could lead to travel challenges. Underground infrastructure, such as water, gas, or electric lines, may also be negatively impacted by an earthquake.

Earthquakes can also impact the economy, including loss of business functions, damage to inventories, relocation costs, wage losses, and rental losses due to the repair or replacement of buildings. Local residents may be displaced by earthquakes and some of those residents may require sheltering. Vulnerable populations tend to be the most susceptible to displacement; this may include those living at or below the poverty line and the elderly.

Given the low probability of a significant event in Vermont, earthquake mitigation is not a high priority at the State, regional or local level; however, it is well understood by the Hazard Mitigation Committee that a low probability/high consequence earthquake event could have substantial impacts to unreinforced masonry buildings, critical facilities, infrastructure lifelines, and human life as described above.

Extreme Cold

General Description

Extreme cold may be generally defined as prolonged periods of time with freezing temperatures, often made worse by the impact of wind chill factors (the combined elements of air temperature and wind on exposed skin). At certain levels, the human body may suffer from frostbite or hypothermia, making extreme cold a potential severe and life-threatening hazard to people left unprotected from the elements. Freezing temperatures may also cause severe damage to croplands and other vegetation, resulting in economic losses for commercial and agricultural businesses, and pipes may freeze and burst in structures that are poorly insulated or without heat. Long cold spells may cause rivers and lakes to freeze and lead to ice jams that can act as a dam, resulting in severe flooding.

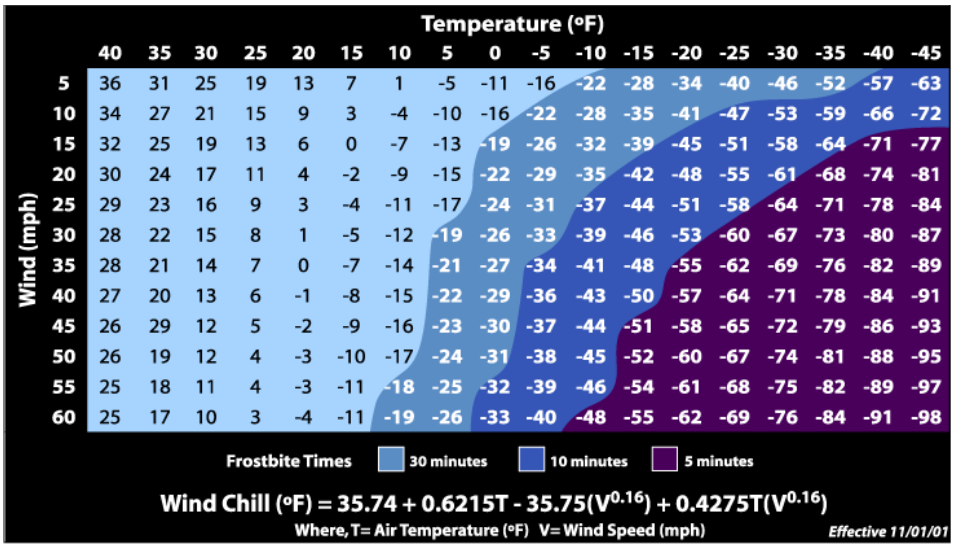
Location

The entire planning area is uniformly susceptible to the occurrence of extreme cold. However, in general the region's mountainous areas are more susceptible to wind chill factors than lower-lying areas.

Severity/Extent

What constitutes "extreme cold" can vary across different areas of the country based on what the population is accustomed to in their respective climates. The National Weather Service's Wind Chill Temperature Index is used to measure the dangers of frostbite caused by the combined elements of freezing temperatures and wind. Figure 3 summarizes the extent of these effects.

Figure 3. Wind Chill Temperature Index.



Source: National Oceanic and Atmospheric Administration, National Weather Service

Previous Occurrences

Extreme cold events are a very frequent occurrence in the planning area. As summarized in Table 9, NOAA historical records indicate 21 reported extreme cold/wind chill events in Caledonia County since 1996, causing $75,000 in fruit crop damages/losses but no recorded human casualties. According to town officials, the planning area has experienced minimal impacts from extreme cold conditions in the past.

Table 9. Previous Occurrences for Extreme Cold (January 1996 - August 2020).

Date	Event Type	Description	Casualties (Deaths/Injuries)	Damage/ Losses
2/1/2015	Cold/Wind Chill	Record Cold February 2015 for much of Vermont. Many communities witnessed the coldest month since December 1989 or January 1994. The average departure was 13 to 17 degrees below normal.	0/0	$0
1/7/2015	Extreme Cold/Wind Chill	Temperatures were between 0°F and 10°F with winds of 15 to 30 mph that created wind chills colder than -30°F through the overnight into the morning hours of January 8th. Actual morning low temperatures on January 8th were between -20°F and 30°F in Caledonia County, including 31 degrees below zero in Sutton and Sheffield.	0/0	$0

Date	Event Type	Description	Casualties (Deaths/Injuries)	Damage/ Losses
4/28/2012	Frost/Freeze	Minimum temperatures into the lower to mid-20s for three consecutive nights.	0/0	$75,000
1/14/2009	Extreme Cold/Wind Chill	An arctic cold front moved across Vermont during the early morning hours of January 14th which delivered some of the coldest temperatures across the region in several years. Temperatures averaged 20 to 25 degrees below normal values, which were already at climatological winter minimums. Temperatures ranged from -10°F to -30°F with isolated readings colder than -40°F. These extremely cold temperatures led to numerous cold weather-related problems including numerous dead vehicle batteries and broken home/business water pipes.	0/0	$0
12/8/2008	Cold/Wind Chill	A surface low and associated arctic cold front moved across New England on the night of December 7th. This delivered the season's first arctic air mass with temperatures of 0°F to -10°F by the morning of December 8th along with brisk northwest winds of 10 to 20 mph with higher gusts at times. Wind chill readings during the early to mid-morning hours of December 8th were -15°F to -25°F across Vermont.	0/0	$0
3/9/2007	Extreme Cold/Wind Chill	Arctic high pressure settled across New England during the night of the 8th and morning of the 9th with more frigid temperatures, similar to a few days earlier across Vermont. Morning lows on the 9th were -10°F to -34°F.	0/0	$0
3/6/2007	Extreme Cold/Wind Chill	An arctic cold front swept across Vermont during the afternoon and evening of the 5th and delivered frigid temperatures along with blustery winds. Temperatures plummeted to below zero just after midnight on the 6th and were -5°F to -20°F by dawn. These frigid temperatures, accompanied by winds of 15	0/0	$0

Date	Event Type	Description	Casualties (Deaths/Injuries)	Damage/ Losses
		to 30 mph created dangerously cold wind chills of -20°F to -40°F.		
1/25/2007	Extreme Cold/Wind Chill	An arctic cold front moved across Vermont and delivered very cold temperatures of 0°F to -25°F. On the night of the 25th into the morning of the 26th, a secondary cold front combined with a strengthening area of low pressure near New Brunswick, accounted for the combination of brisk northwest winds of 10 to 15 mph and temperatures -5°F to -20°F for wind chill readings of -25°F to -40°F.	0/0	$0
2/27/2006	Cold/Wind Chill	An arctic airmass was entrenched across Vermont during the early morning hours. The combination of brisk winds and very cold temperatures produced wind chills of -15°F to -30°F.	0/0	$0
2/18/2006	Cold/Wind Chill	An arctic airmass moved into Vermont during the night of the 17th and delivered colder air through the 18th. Meanwhile, a strong pressure gradient was creating brisk winds of 10 to 20 mph with higher gusts. The combination resulted in wind chills of -15°F to -25°F in northern Vermont.	0/0	$0
1/15/2006	Cold/Wind Chill	Blustery winds of 20 to 30 mph with gusts to 40 mph created wind chills of -10°F to -25°F.	0/0	$0
10/20/2005	Frost/Freeze	Clear skies and calm winds resulted in at or below freezing temperatures in most areas overnight. This cold snap ended any growing season after a mild fall season.	0/0	$0
1/23/2005	Cold/Wind Chill	A storm system east of New England combined with high pressure over the Midwestern US resulted in a flow of very cold air and gusty winds.	0/0	$0
1/20/2005	Cold/Wind Chill	High pressure extended from south central Canada into northern New York State, and	0/0	$0

Date	Event Type	Description	Casualties (Deaths/Injuries)	Damage/ Losses
		this resulted in a northerly flow of very cold air with gusty winds.		
1/18/2005	Cold/Wind Chill	High pressure over the Great Lakes moved slowly east and resulted in a northerly flow of very cold temperatures and gusty winds.	0/0	$0
1/15/2004	Cold/Wind Chill	Arctic high pressure built southeast from Canada. Wind chills were generally between -25°F to -45°F. Some sprinkler systems froze and burst in several area locations.	0/0	$0
1/13/2004	Cold/Wind Chill	Weak low pressure moved across northern New England with 2 to 4 inches of snow. Colder air followed this storm, then an arctic front moved through the area. Wind chills were generally between -25°F to -45°F.	0/0	$0
12/30/1998	Cold/Wind Chill	Low pressure moved into the Canadian Maritimes and the associated arctic front moved across the area. Very cold air was ushered in on strong winds. Snow squalls occurred across the area with between 3 and 5 inches falling in the mountains.	0/0	$0
1/19/1997	Cold/Wind Chill	An arctic airmass centered over the Northeast resulted in bitterly cold temperatures. One of the coldest locations was recorded at West Burke at -35°F.	0/0	$0
1/17/1997	Cold/Wind Chill	An outbreak of arctic air resulted in extreme wind chills across much of Vermont, ranging from between -30°F and -60°F.	0/0	$0
1/6/1996	Cold/Wind Chill	Record low temperature of -25°F set at St. Johnsbury.	0/0	$0
		Total	**0/0**	**$75,000**

Source: National Oceanic and Atmospheric Administration[20]

[20] NOAA, National Centers for Environmental Information, Storm Events Database. Accessed August 5, 2020 at: https://www.ncdc.noaa.gov/stormevents/

Other notable occurrences of extreme cold for Vermont include the following historic events as summarized in the State Hazard Mitigation Plan:[21]

- The winter of 1933–1934 was particularly cold, and the lowest temperature ever recorded for the state (-50°F) occurred at Bloomfield on December 30, 1933.
- Extreme cold temperatures were widespread on January 4 and December 18, 1835, with -40°F at Montpelier and White River, -38°F at Bradford, -30°F at Rutland and -26°F at Burlington.
- One of the most prolonged cold episodes lasted from January 18 to February 3, 1969. Maximum temperatures were below 0°F. Water mains and other connections froze and burst in record numbers across the State.
- Extreme cold was recorded in February 1993 and again on January 19, 1997. In both cases, cold dense air moving out from an Arctic high-pressure system caused temperatures to plummet. Daytime highs in 1993 were 10°F, while the minimums were -5°F. The winter of 1997 holds the record for longest streak of consecutive days below freezing, without a thaw, at 51 days.
- The winter of 2015 maintained below freezing temperatures for 27 days, while the period between December 24, 2017 and January 8, 2018 (or 16 consecutive days) did not exceed 32°F.
- Between the winters of 2000 and 2018, the number of recorded days per year with a daily temperature low of less than or equal to 0°F peaked during the 2015 winter at 31 days in Burlington, 44 days in Montpelier, 55 days in Island Pond and 32 days in Bennington.

Probability of Future Occurrences

Extreme cold will continue to be a ***highly likely*** occurrence in the planning area. Vermont remains vulnerable to extreme cold temperatures and periods of prolonged cold temperatures, especially in the northeastern portion of the state, which can see temperatures as low as -35°F. It is anticipated that the effects of climate change will result in a decrease in the frequency of extreme cold events, including a reduction in the number of extreme cold days, while daily and average minimum winter temperatures for the area will likely see increases throughout the 21st century.[22] These trends coupled with data provided in the State Hazard Mitigation Plan suggest that the probability of extreme cold temperatures in Vermont will decrease in the future.[23]

Impact on the Community and Vulnerability

The greatest impacts and vulnerabilities related to extreme cold are associated with the potential effects on human health and safety, followed then by the direct and indirect impacts to infrastructure and the economy (e.g., burst pipes from ice expansion, power failure, commercial/agricultural losses). Exposure to cold temperatures can cause frostbite or hypothermia and even lead to heart attacks during physically demanding outdoor activities like snow shoveling or winter hiking. When temperatures dip below freezing, incidents of icy conditions increase, which can lead to dangerous driving conditions and

[21] Vermont State Hazard Mitigation Plan. October 2018. PP. 99-100.
[22] Vermont's Climate Dashboard: https://climatechange.vermont.gov/
[23] Vermont State Hazard Mitigation Plan. October 2018. P. 101.

pedestrian-related slipping hazards. The planning area is considered to be particularly vulnerable to these types of impacts because it frequently experiences heavy snowfall, is the most rural region in the state, includes housing that lacks sufficient home heating and insulation, and has the oldest average resident age.[24]

Extreme Heat

General Description

Extreme heat may be generally defined as temperatures that hover 10 degrees or more above the average high temperature for the region, last for prolonged periods of time, and are often accompanied by high humidity. At certain levels, the human body cannot maintain proper internal temperatures and may experience heat related illness including heat cramps, heat exhaustion, or heat stroke (a life-threatening condition). According to the National Weather Service, excessive heat is the number one weather-related killer in the United States.[25] Although less common, extreme heat may also cause primary and secondary effects on infrastructure (e.g., damage to asphalt roadways from softening).

Extremely high temperatures can occur when a high-pressure system (under which air is descending toward the Earth's surface) develops and intensifies. Under such conditions, the potential for a heat wave exists. A heat wave is a period of three or more consecutive days during which the maximum temperature meets or exceeds 90°F.

Location

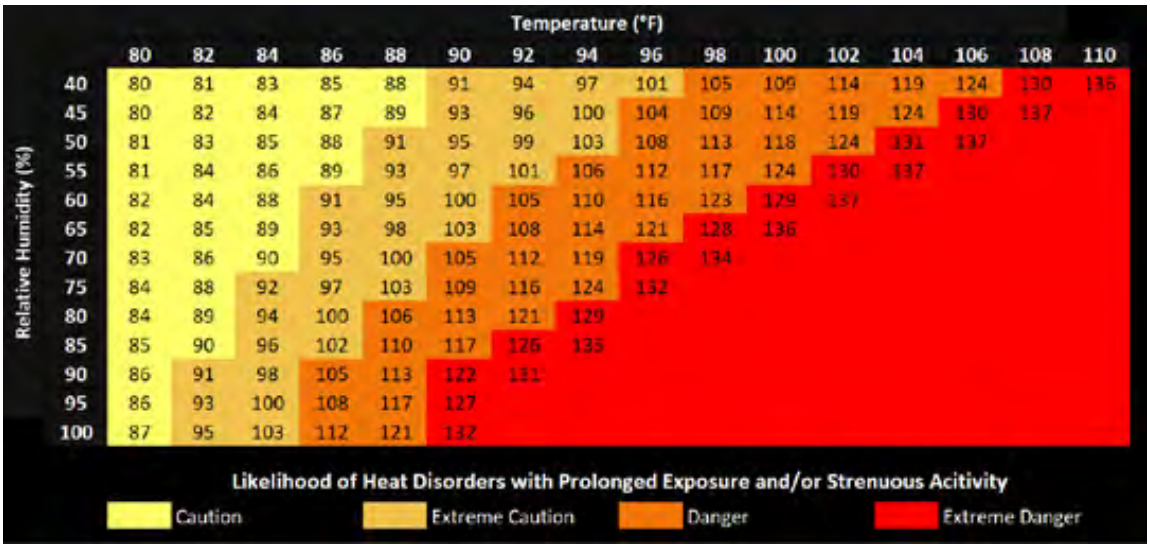
The entire planning area is uniformly susceptible to the occurrence of extreme heat. However, in general the region's valleys and lower-lying areas are often more susceptible to excessive heat than higher elevations in mountainous areas due to the moderating and cooling effect of upper-level winds.

Severity/Extent

What constitutes "extreme heat" can vary across different areas of the country based on what the population is accustomed to in their respective climates. A combination of high heat and humidity can lead to heat related illness, including heat cramps, heat exhaustion, and heat stroke. Heat-related illnesses increase as the combination of temperature and relative humidity increase, but there are other factors involved as well. The National Weather Service's Heat Index is a measure of the effects of the combined elements of air temperature and relative humidity on the human body, particularly for people in higher risk groups (elderly persons, young children, persons with respiratory difficulties, and those who are sick or overweight). Figure 4 summarizes the extent of these effects.

[24] Vermont State Hazard Mitigation Plan. October 2018. PP. 97-102.
[25] National Weather Service: https://www.weather.gov/phi/heatcond

Figure 4. Heat Index.



Source: National Oceanic and Atmospheric Administration, National Weather Service

Previous Occurrences

Extreme heat events are not a common occurrence in the planning area. As summarized in Table 10, NOAA historical records indicate 3 reported heat events in Caledonia County since 1996, causing no recorded human casualties or damages/losses. According to town officials, the planning area has experienced minimal impacts from extreme heat in the past and they generally expect it will not be a problem in the near future.

Table 10. Previous Occurrences for Extreme Heat (January 1996 - August 2020).

Date	Event Type	Description	Casualties (Deaths/Injuries)	Damage/ Losses
7/1/2018	Heat	A dangerous heat wave, one of which that likely had not impacted the North Country in decades, occurred between June 30th and July 5th. High temperatures exceeded 90°F for at least 5 of the six days. Heat indices were recorded in the 100°F to 110°F range and considered excessive and very dangerous. Increased hospitalization visits were reported due to the dangerous heat.	0/0	$0
7/21/2011	Heat	A portion of the heat ridge that brought record setting heat across much of the country, delivered record heat as well as oppressive dew points to portions of Vermont. This was the 2nd day of a three-to-	0/0	$0

Date	Event Type	Description	Casualties (Deaths/Injuries)	Damage/ Losses
		four-day heat wave across a large portion of the state. Maximum temperatures in the mid to upper 90s with dew points in the lower to mid-70s created heat index values of 100°F to 105°F across the region.		
8/1/2006	Heat	A "heat ridge" moved into Vermont during the early morning hours of the 1st. This was part of a strong, upper-level area of high pressure that brought record heat to a large majority of the country since mid-July. On the 1st, afternoon temperatures soared into the 90s, but significantly more important were dewpoints that reached the middle to upper 70s to produce excessive heat index values of 100°F to 105°F, some of the highest values in nearly a decade.	0/0	$0
		Total	**0/0**	**$0**

Source: National Oceanic and Atmospheric Administration[26]

Probability of Future Occurrences

Extreme heat will continue to be a ***possible*** occurrence in the planning area. Fortunately, Vermont has historically experienced a climate where extreme heat is less likely than other regions in the country. However, heat-related events do occur and are beginning to occur in much greater frequency. Extreme maximum temperatures are often observed during drought years, and in many cases, the records that are broken were long-standing and set during previous droughts.[27]

It is anticipated that the effects of climate change will result in an increase in the frequency, duration, and intensity of extreme heat events. Heat waves are projected to become much more commonplace in a warmer future with potentially major implications for human health, particularly as it relates it more vulnerable populations such as children, seniors, lower income residents, and those already dealing with respiratory or other health problems. Considering the already-observed increase in average annual temperature, the projected rise between 3°F and 10°F by the 2080s, and the impacts of extreme heat or prolonged hot weather[28], the Hazard Mitigation Committee considered the probability of a significant

[26] NOAA, National Centers for Environmental Information, Storm Events Database. Accessed August 5, 2020 at: https://www.ncdc.noaa.gov/stormevents/
[27] Vermont State Hazard Mitigation Plan. October 2018. P. 104.
[28] Vermont State Hazard Mitigation Plan. October 2018. P. 109.

extreme heat or prolonged hot weather event to be even more likely under future climate conditions, with the most significant impacts felt by people, followed then by the direct and indirect impacts to the environment and the economy (such as longer-term concerns related to climate change and potentially significant losses of ski industry revenue due to a projected reduction in snow loading).

Impact on the Community and Vulnerability

The primary impact of extreme heat or prolonged periods of hot weather is to human life. Hot conditions, especially when combined with sun and high humidity, can limit the body's ability to thermoregulate properly. Prolonged exposure to hot conditions can lead to heat cramps, heat exhaustion, heat stroke, or exacerbate other pre-existing medical conditions. Some of these impacts require medical attention and can be fatal if left untreated.

In general, those at higher risk during hot weather include older adults and children, people with chronic medical conditions, people active outdoors, and people without air conditioning. Historically, according to the State Hazard Mitigation Plan, relatively high rates of heat illnesses have been experienced in some of the cooler counties in Vermont, which may be a result of underlying population vulnerabilities (e.g., an older population with more pre-existing health conditions) or a lack of acclimation to hotter conditions.[29]

In addition to the direct health impacts associated with extreme heat, data suggest that other health impacts are associated with prolonged hot weather and increasing average temperatures. For example, increases in the incidence of vector-borne diseases (e.g. Lyme, West Nile, and Eastern equine encephalitis) in Vermont and New England at-large have been observed and are attributed to warming conditions. The increase in average annual temperatures and shortened winters have allowed mosquitos and ticks to become more active earlier in the spring and remain active later in the fall.[30] More information on the impacts of vector-borne diseases is covered under the Infection Disease hazard.

Hail

General Description

Hail is a form of precipitation composed of spherical lumps of ice. Known as hailstones, these ice balls typically range from 5-50 millimeters in diameter on average, with much larger hailstones forming in severe thunderstorms. The size of hailstones is a direct function of the severity and size of the thunderstorm by which it is produced. No matter the size, hail can damage property, young and tender plants, and cause bodily harm to those people caught outside without shelter.

Hailstorms usually occur in Vermont during the summer months and generally accompany passing thunderstorms. While local in nature, these storms can be significant to area farmers, who can lose entire fields of crops in a single hailstorm. Large hail is also capable of property damage, to include both

[29] Vermont State Hazard Mitigation Plan. October 2018. P. 107.
[30] Vermont State Hazard Mitigation Plan. October 2018. P. 108.

structures and vehicles. Hailstone size can range from the size of a pea to the size of a melon as further described under *Severity/Extent*.

Location

The entire planning area is uniformly susceptible to the occurrence of hail.

Severity/Extent

The severity of hailstorms can be determined by the TORRO Hailstorm Intensity Scale. As illustrated in Table 11, the scale extends from H0 to H10 with its increments of intensity or damage potential related to hail size (distribution and maximum), texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind. Table 12 shows hail size and diameter in relation to the TORRO Scale.

Table 11. TORRO Hailstorm Intensity Scale.

	Intensity Category	Typical Hail Diameter (mm)	Probable Kinetic Energy (J/m2)	Typical Damage Impacts
H0	Hard Hail	5	0-20	No damage
H1	Potentially Damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented; brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

	Intensity Category	Typical Hail Diameter (mm)	Probable Kinetic Energy (J/m2)	Typical Damage Impacts
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: The Tornado & Storm Research Organization[31]

Table 12. Hail Size and Diameter in Relation to TORRO Scale.

Size Code	Maximum Diameter (mm)	Description
0	5-9	Pea
1	10-15	Mothball
2	16-20	Marble, grape
3	21-30	Walnut
4	31-40	Pigeon's egg > squash ball
5	41-50	Golf ball > Pullet's egg
6	51-60	Hen's egg
7	61-75	Tennis ball > cricket ball
8	76-90	Large orange > Soft ball
9	91-100	Grapefruit
10	>100	Melon

Source: The Tornado & Storm Research Organization[32]

Previous Occurrences

Hail events are an occasional occurrence in the planning area, and those events that do occur tend to be highly localized and limited to a relatively small area. NOAA historical records indicate 62 reported events in Caledonia County since 1950, causing $87,000 in property damage but no recorded human

[31] The Tornado & Storm Research Organization: http://www.torro.org.uk/hscale.php
[32] Ibid.

casualties. These notable events which caused damage are summarized in Table 13. According to town officials, the planning area has experienced minimal impacts from hail conditions in the past.

Table 13. Notable Previous Occurrences for Hail (January 1996 - August 2020).

Date	Diameter	Description	Casualties (Deaths/Injuries)	Damages/ Losses
5/26/2011	1.75 in.	Golf ball size hail on Duck Pond road with some minor damage to vehicles, outdoor furniture, and siding. Some 25,000+ customers lost power during these storms.	0/0	$10,000
5/26/2011	1.75 in.	Golf ball size hail and cloud to ground lightning. Some vehicle and outdoor furniture damage.	0/0	$5,000
5/26/2011	1.75 in.	Golf ball size hail and vehicle damage throughout southern St. Johnsbury.	0/0	$50,000
6/5/2010	1.75 in.	Golf ball size hail with damage to several vehicles and roof shingles.	0/0	$15,000
6/5/2010	1.5 in.	Severe thunderstorms resulted in numerous reports of wind damage and large hail, up to golf ball size.	0/0	$5,000
5/30/2005	Unknown	A cold upper-level trough across the northeast US resulted in reports of pea size hail. Heavy downpours of rain were also reported in East Burke.	0/0	$1,000
5/29/2005	Unknown	A cold upper-level trough over the northeast US resulted in reports of pea size hail in East Burke.	0/0	$1,000
		Total	**0/0**	**$87,000**

Source: National Oceanic and Atmospheric Administration[33]

Probability of Future Occurrences

Hail will continue to be a ***likely*** occurrence in the planning area, given the frequency with which Caledonia County has experienced some form of hail event. However, relative to the area's other hazards, the potential impact from hail is considered to be very low. According to the 2014 National

[33] NOAA, National Centers for Environmental Information, Storm Events Database. Accessed August 5, 2020 at: https://www.ncdc.noaa.gov/stormevents/

Climate Assessment, though there is an observable increase in severity of winter storms, changes in the frequency or severity of hail events are still uncertain but are being extensively studied.[34]

Impact on the Community and Vulnerability

Although significant hailstorms occur relatively infrequently, they are still important to consider in Vermont given the state's primarily agrarian economy. As mentioned above, significant hail events can lead to extensive crop damage, which can negatively impact local farms. While hail can directly damage these crops, other aspects of the local economy may be indirectly affected. There have been reports of hailstorms completely destroying entire hay fields and cornfields. These crops are usually used to feed animals, so dairy farms and other farms that breed livestock can also be affected. This can cause a domino effect increasing prices of feed for livestock, which in turn increases the price of milk and other dairy products, further impacting the economy.

Infectious Disease

General Description

Public health risks, such as those presented by infectious diseases and vector-borne illnesses, are present within every community. The Vermont Department of Health defines an infectious disease as one that is caused by micro-organisms, such as bacteria, viruses, and parasites. A vector-borne illness is an infectious disease that is transmitted to humans by blood-feeding arthropods, including ticks, mosquitoes, and fleas, or in some cases by mammals (e.g., rabies).

Most infectious diseases are caused by pathogens that can be spread, directly or indirectly, from person to person. Such diseases may be seasonal (seasonal influenza) or result, in the case of new diseases, result in a global pandemic. According to the Vermont Department of Health, infectious disease dynamics depend on a range of factors, including land use, human behavior, climate, efficacy of healthcare services, population dynamics of vectors, population dynamics of intermediate hosts and the evolution of the pathogens themselves.

Many of these diseases require continuous monitoring, as they present seasonal threats to the general population. An ***epidemic*** emerges when an infectious disease occurs suddenly in numbers that are in excess of normal expectancy. Infectious disease outbreaks put a strain on the healthcare system and may cause continuity issues for local businesses. These outbreak incidents are a danger to emergency responders, healthcare providers, schools, and the public. This can include influenza (e.g., H1N1), pertussis, West Nile virus, and many other diseases. A ***pandemic*** is an epidemic that has spread over a large area, that is, it is prevalent throughout an entire country, continent, or the whole world. On March 11, 2020, the World Health Organization (WHO) officially declared the Coronavirus disease 2019 (COVID-19) outbreak a pandemic due to the global spread and severity of the disease. COVID-19 is a respiratory

[34] National Climate Assessment: https://nca2014.globalchange.gov/report/our-changing-climate/changes-storms

illness that can spread rapidly from person to person and is further described below under *Previous Occurrences*.

While major disease outbreaks are uncommon, public health emergencies can become stand-alone disasters that compound the threat of other natural hazards and exceed local and state capacity. There is precedent for federal assistance due to public health emergencies including West Nile Virus (2000), a mosquito-borne disease, for which a Federal emergency declaration was made in New York and New Jersey, and the COVID-19 pandemic, which resulted in a major disaster declaration in all states, territories, and the District of Columbia.

Location

The entire planning area is uniformly exposed to various types of infectious diseases with the most significant impacts felt by people (depending on specific characteristics of the disease), and potentially followed by direct or indirect impacts to the economy. According to the State Hazard Mitigation Plan, the southern and western halves of Vermont are more vulnerable to Lyme disease, as the warmer climate contributes to longer period of vector activity. However, as further described below under *Previous Occurrences*, Lyme disease is among the most prevalent public health risk in the state.

Severity/Extent

The severity and extent of infectious disease is dependent on many various types and therefore difficult to classify given the range of potential impacts. COVID-19 has likely had the most significant impact on the planning area in recent history in terms of societal impacts and disruptions, however the severity and extent of infectious diseases will continue to vary widely.

Upon consideration of five climate and health reviews, the Vermont Department of Health separated vector-borne and other infectious diseases into five threat categories as shown in Table 14. While not a comprehensive list of potential infectious diseases for the planning area, the table provides a brief overview of risks as classified by threat categories identified in the State Hazard Mitigation Plan.[35] More details on this classification system and the diseases can be found in the 2016 Vermont Climate Health Report.[36]

Table 14. Threat Categories of Vector-Borne and Other Infectious Disease.

Threat Classification	Disease
Diseases already present in Vermont that may be exacerbated by climate change	• West Nile Virus • Eastern Equine Encephalitis • Lyme Disease • Anaplasmosis • Babesiosis

[35] Vermont State Hazard Mitigation Plan. October 2018. P. 137.
[36] Vermont Climate and Health Profile Report. Vermont Department of Health. 2016. Available at: https://www.healthvermont.gov/sites/default/files/documents/pdf/ENV_CH_ProfileReport.pdf

Threat Classification	Disease
	• Tularemia • Powassan
Diseases that may spread to Vermont even without contribution of climate change, whose spread to and transmission of Vermont could be exacerbated by climate change	• St. Louis Encephalitis • Western Equine Encephalitis • La Crosse Encephalitis • Ehrilichiosis • Rocky Mountain Spotted Fever
Diseases with vectors that may spread to Vermont by the end of the century under a higher emission scenario	• Dengue • Chikungunya
Disease that has competent vectors or may in the future have competent vectors in Vermont, but are unlikely to become established in Vermont despite a vector presence	• Yellow Fever • Malaria • Chagas Disease • Rift Valley Fever
Diseases that may be present in Vermont or may spread to Vermont in the future but whose link with climate changes expected in Vermont is tenuous	• Batonellosis • Rabies • Hanta Virus • Leptospiriosis • Plague • Valley Fever • Anthrax • Q Fever

Source: Vermont Department of Health

Previous Occurrences

The most significant occurrence of infectious disease vulnerability for the planning area (and currently most of the United States and the world) is that of COVID-19. COVID-19 is a highly contagious, viral upper-respiratory illness that was first detected in China in late 2019. The virus quickly spread throughout the world and has resulted in a global pandemic ongoing at the time of this Plan. COVID-19 symptoms include cough, difficulty breathing, fever, muscle pain, and loss of taste or smell. Severe cases may result in death, especially in individuals over the age of 65 or with underlying medical conditions, such as diabetes, lung disease, asthma, obesity, or those who are immunocompromised. COVID-19 spreads from person to person through respiratory droplets in the air or on surfaces.[37]

[37] Centers for Disease Control and Prevention: https://www.cdc.gov/coronavirus/2019-ncov/faq.html

As of September 16, 2020, there were over 6.6 million cases of COVID-19 reported in the US, resulting in nearly 200,000 deaths.[38] In Vermont the total case count was 1,706 with 58 deaths, with a total of 28 cases and no deaths reported in Caledonia County. One to five cases were reported for Burke and no cases were reported for Sheffield, Sutton, or Wheelock.[39] As further described in the next section, the COVID-19 pandemic has the potential to continue to some degree over the next several years, or until a vaccine is developed.

Pandemic influenza, considered to be a global outbreak, spread quickly around the world, and was observed in 1918, 1957, 1968 and in 2009 with the novel H1N1 strain. The 2009 H1N1 outbreak, though not considered a serious threat to Vermont, still affected some Vermonters. The great influenza epidemic of 1918 killed millions worldwide and would likely cause hundreds to thousands of deaths in Vermont should a similar outbreak occur today. It is anticipated that a more serious strain of the usual flu will occur some year and that vaccines might not be ready in time to combat rapid spread.

Lyme disease continues to pose a significant threat to Vermonters, as cases (both probable and confirmed) have been tracked by the Vermont Department of health for several decades and the state currently ranks second in highest rate of disease incidence in the nation. The Vermont Department of Health reports that the number of reported cases of Lyme disease have increased dramatically over the last decade.[40]

Vermont is typically not vulnerable to diseases such as HIV/AIDS, SARS, cholera, malaria, and resistant tuberculosis, though they are considered to be major disasters in some parts of the world. However, an incident that causes water supplies to become contaminated or result in people eating spoiled food could have significant health implications.

Probability of Future Occurrences

Probability of infectious disease in the planning area is extremely variable. Many public health risks occur seasonally and are ongoing, such as the common cold and influenza. Major disease outbreaks, such as the current COVID-19 pandemic, are much less common. Based on the information available regarding occurrences of greatest concern, the infectious disease hazard has been assigned a probability of ***likely*** (10% to 90% annual chance) for the planning area.

The COVID-19 pandemic has the potential to continue to some degree over the next several years, or until a vaccine is developed. To prevent the continued spread of COVID-19, many communities around the world have used stay-at-home orders, in which residents must remain home except to utilize essential services, such as grocery stores and health care services. Many schools have closed, and workers have switched to teleworking. Business closures have also caused major economic losses in

[38] Centers for Disease Control and Prevention: https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html
[39] Vermont Department of Health, COVID-19 Dashboard on Activity in Vermont. Accessed on September 16, 2020: https://www.healthvermont.gov/response/coronavirus-covid-19/current-activity-vermont
[40] Vermont State Hazard Mitigation Plan. October 2018. PP. 138-139.

states and communities. In Vermont, Governor Scott has issued a Stay Home, Stay Safe order recommending that Vermonters should stay home whenever possible and practice social distancing (staying about 6 feet apart) and good hygiene with frequent hand washing and cleaning – all strategies to help slow the spread of the virus and protect our vulnerable populations. The State is continually updating community mitigation measures and guidance in close consultation with the Vermont Department of Health and based on new information from the Centers for Disease Control (CDC).

It is anticipated that the effects of climate change will result in an increase in the probability and/or frequency of some infectious diseases. Those infectious diseases that fall into the first threat classification category identified in Table 14 (i.e., currently present in Vermont and which may be exacerbated by climate change) are already exhibiting increased prevalence in New England. For example, with both temperature and precipitation expected to increase in Vermont, West Nile Virus mosquito vector activity will likely increase, as well as the vector's period of activity. Similarly, between 1964 and 2010, counts of Eastern Equine Encephalitis (EEE) have continued to rise in New England, though they remain constant in the southeastern states.

The United States is already seeing a significant increase in vector-borne infectious diseases. According to the CDC, the number of reported disease cases from mosquito, tick, and flea bites tripled from 2004 to 2016, and mosquito-borne disease epidemics are happening more frequently.[41] As noted earlier in this section, the yearly cases of Lyme disease in Vermont have increased dramatically over the last decade, and with shrinking winters, the potential for infection through tick bite continues to grow.

Given increasing trends for global travel, several other diseases not typically observed in Vermont could continue to make their way back to the state through infected travelers. COVID-19 is the most recent and severe example of this threat. Another example is the Zika virus, transmitted from infected mosquitoes to humans, which received international attention during an outbreak in 2015 and persists today.

Impact on the Community and Vulnerability

All current and future populations in the planning area are considered at risk to infectious disease, though individual vulnerabilities will vary based on the type of disease as well as underlying health or exposure issues. For example, outdoor laborers and recreationalists are especially vulnerable to Lyme disease, as exposure to ticks is greater. Buildings and infrastructure assets are not typically impacted by disease outbreaks but may need to be sterilized or decontaminated in some cases. Economic impacts will also vary widely depending on the specific type of infectious disease. For example, the potential for large-scale infection of Vermont's commercial animal population with foot and mouth disease, bovine spongiform encephalopathy (i.e., Mad Cow Disease), or any number of poultry viruses, while unlikely, could cause economic problems for the planning area. Also, as most recently demonstrated by COVID-19, health risks associated with epidemics or pandemics may result in quarantining, stay-at-home

[41] Centers for Disease Control and Prevention: https://www.cdc.gov/vitalsigns/pdf/vs-0518-vector-borne-H.pdf

orders, mandatory closures, or social distancing measures that cause business interruptions, lost tourism, job losses, and a variety of other social or economic impacts.

The degree to which communities are susceptible to or actively experience infectious diseases can also impact a community's vulnerability to natural hazards, as well as its ability to respond to disasters. For example, an infectious disease outbreak may complicate evacuations or/and mass sheltering required due to a natural hazard. Similarly, high incidents of chronic diseases may decrease mobility within a community, and natural hazards may reduce access to vital healthcare services needed by the ill.

Inundation Flooding & Fluvial Erosion

General Description

Flooding is the most frequent and costly natural hazard in the United States. Nearly 90 percent of presidential disaster declarations result from natural events where flooding was a major cause of human casualties and property damages. Flooding may be generally defined as the partial or complete inundation of normally dry land by the overflow and accumulation of excess water.

Flooding is also the most common recurring hazard event in Vermont, and in recent years, flood intensity and severity appear to be increasing. Flood damages in Vermont are associated with both inundation flooding and fluvial erosion. ***Inundation flooding*** is the rise of riverine or lake water levels, while ***fluvial erosion*** is streambed and streambank erosion associated with physical adjustment of stream channel dimensions (width and depth). Both inundation flooding and fluvial erosion occur naturally in stable, meandering rivers and typically occur as a result of any of the following, alone or in conjunction:

- Rainfall: Significant precipitation from rainstorm, thunderstorm, or hurricane/tropical storm. Flash flooding can occur when a large amount of precipitation occurs over a short period of time.
- Snowmelt: Melted runoff due to rapidly warming temperatures, often exacerbated by heavy rainfall. The quantity of water in the snowpack is based on snow depth and density.
- Ice Jams: A riverine back-up when flow is blocked by ice accumulation. Often due to warming temperatures and heavy rain, causing snow to melt rapidly and frozen rivers to swell.

Inundation and fluvial erosion may both increase in rate and intensity as a result of human alterations to a river, floodplain, or watershed. For instance, when a dam fails there may be significant, rapid inundation which can occur without warning. Public and private structures and infrastructure become vulnerable when they are located on lands susceptible to inundation and fluvial erosion.

Data indicate that greater than 75% of flood damages in Vermont, measured in dollars, are associated with fluvial erosion, not inundation. These events may result in widespread damage in major rivers' floodplains or localized flash flooding caused by unusually large rainstorms over a small area. The effects of both inundation flooding and fluvial erosion can be exacerbated by ice or debris dams, the failure of infrastructure (often as a result of undersized culverts), the failure of dams, continued encroachments in

floodplains and river corridors, and the stream channelization required to protect those encroachments.[42]

In addition to the inundation flooding and fluvial erosion dangers along rivers and lakes in Vermont, there can be significant ***flash flood*** dangers near small streams and alluvial fans. Alluvial fans are areas where streams transition between a steep mountain grade to gentler, flatter valleys below. Flash floods are likely to occur after a severe thunderstorm that produces a large amount of precipitation over a short amount of time. The precipitation falls so quickly that the soil is unable to absorb the water which results in surface runoff that collects in small, upstream tributaries, that then moves quickly downstream at a high velocity. The stream alterations described as increasing fluvial erosion may also exacerbate the effects of flash flooding. Mountainous areas are particularly prone to flash flooding due to the steep terrain.[43]

Other related flood dangers as briefly alluded to above include ice jams and dam failure. ***Ice jams*** occur when warm temperatures and heavy rain cause snow to melt rapidly. Snowmelt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of the river. The ice layer breaks into large chunks, which float downstream and pile up near narrow passages or other obstructions, such as bridges and dams. The water underneath the ice then looks for another means to pass, often resulting in road overtopping or damage to structures nearby.

While a rare occurrence, ***dam failure*** and resulting flooding can be devastating and threaten life and property downstream of dams. Dam failure is caused by the overtopping or structural failure of a dam resulting in a significant, rapid release of water, which can lead to flooding. Structural failure can be caused by many factors, such as internal soil erosion in earth embankment dams, sliding or overturning of concrete dams, gate failure, or caused by other means, such as deliberate sabotage. Dam failure can occur not only during large storms and high flows, but also during normal, sunny day conditions. While the depths and extents of flooding caused by dam failure are most severe during storms when reservoir elevations and rivers are at their highest, the public is generally conscience of flooding under these conditions. For this reason, it is often the sunny day failure scenario, that occurs with no warning, that is most dangerous.

More detailed information on all the distinct flood hazards described above can be found in Section 4-1 (Inundation Flooding & Fluvial Erosion) of the State Hazard Mitigation Plan.[44]

Location

The planning area lies within the Passumpsic River basin, which drains 507 square miles and is one of the largest tributaries of the Northern Connecticut River, reaching into thirteen of the seventeen towns in Caledonia County. The East and West Branch Passumpsic Rivers combine to make the main stem of the Passumpsic in Lyndon. The principal sources of inundation flooding and fluvial erosion include these

[42] Vermont State Hazard Mitigation Plan. October 2018. P. 55.
[43] Vermont State Hazard Mitigation Plan. October 2018. P. 58.
[44] Vermont State Hazard Mitigation Plan. October 2018. PP. 55-82.

rivers and the following major tributaries: Calendar Brook (Sutton), Dishmill Brook (Burke), Miller's Run (Sheffield and Wheelock), and South Wheelock Brook (Wheelock). Flash floods are most typically caused by heavy precipitation events that overwhelm the local drainage capacity of lower-lying areas across each town.

The land area where inundation flooding occurs is known as the floodplain. During high water events, water flows out of the riverbank and spreads out across its floodplain. In Vermont, there are two primary means of identifying areas subject to flood hazards: the areas mapped by FEMA as areas of special flood hazard; and areas mapped by the State of Vermont Department of Environmental Conservation known as the State-wide River Corridors. FEMA defines the portion of the floodplain inundated by the 1% annual chance flood as the Special Flood Hazard Area (SFHA); the area where the National Flood Insurance Program (NFIP) floodplain management regulations must be enforced and where the mandatory purchase of flood insurance applies for federally secured loans. FEMA's Flood Insurance Rate Maps (FIRMs) primarily identify areas of inundation (rising floodwaters), while the River Corridors identify areas subject to fluvial erosion hazards (when fast moving water in a river or stream erodes the streambank and adjacent land).

Figure 5 through Figure 8 show the location of flood hazard areas for each town as mapped using rough digital data[45] based on current FEMA FIRM data. Descriptions for these SFHAs are provided in the *Extent* portion of this section. It is also worth noting that the current FIRM maps made available by FEMA for the planning area, and most towns in the Northeast Kingdom, date back to the mid-1970s through mid-1980s, and do not reflect how rivers have meandered or floodplains have changed over the past few decades. These maps will greatly benefit from updated floodplain mapping studies for the Passumpsic River watershed which are expected to be completed by 2024.

[45] Although official digital FIRM data is not available for the planning area, rough non-official digital versions have been made available to the region through the Vermont Flood Ready Atlas. These maps cannot be used for municipal regulations or insurance purposes, but they are generally helpful to understand the mapped hazard areas at a town-wide or watershed scale. It is also worth noting that the effective FIRMs for each participating jurisdiction, like most towns in the Northeast Kingdom, date back to 1980 and would benefit from new study updates.

Figure 5. Flood Hazard Areas for Town of Burke.

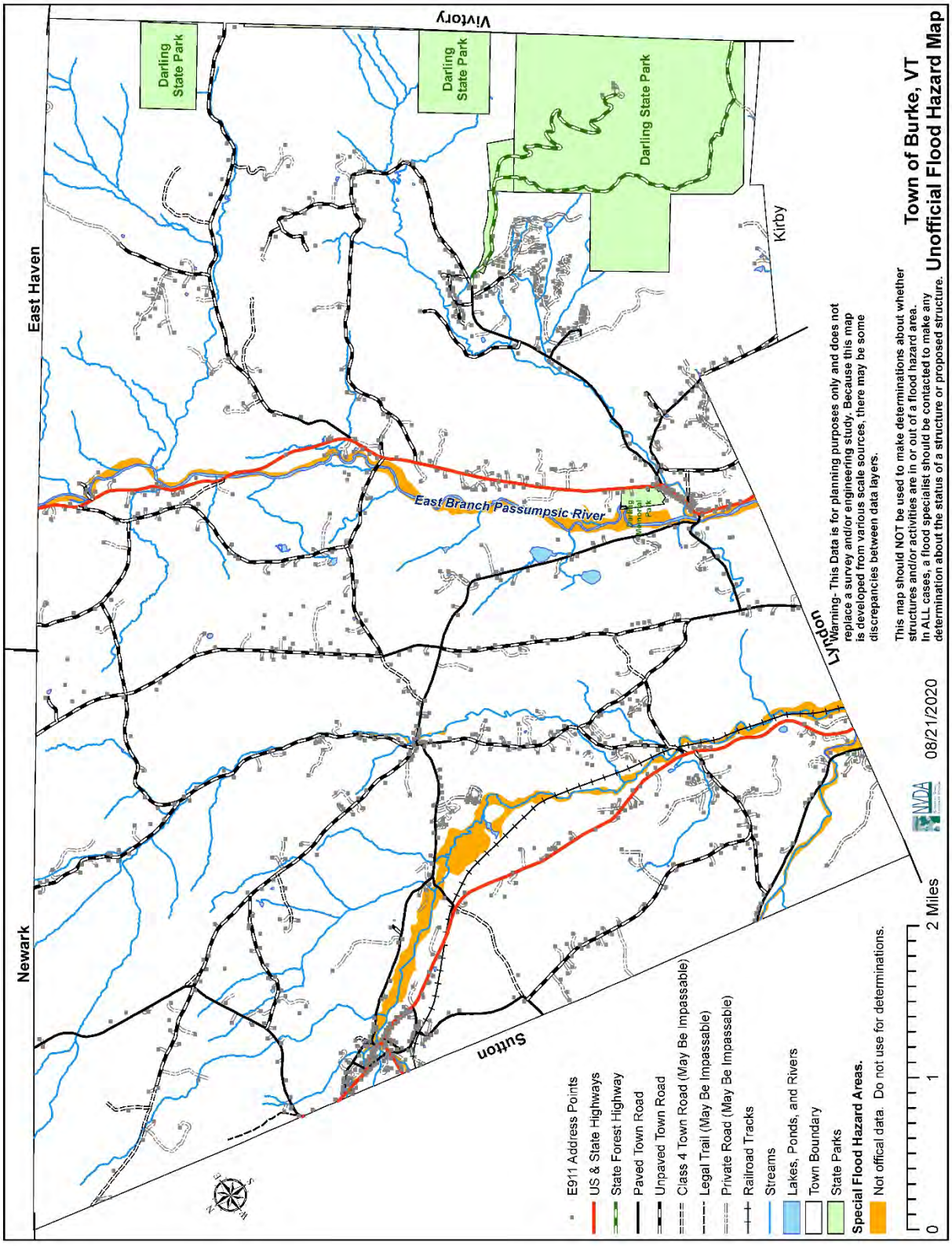


Figure 6. Flood Hazard Areas for Town of Sheffield.

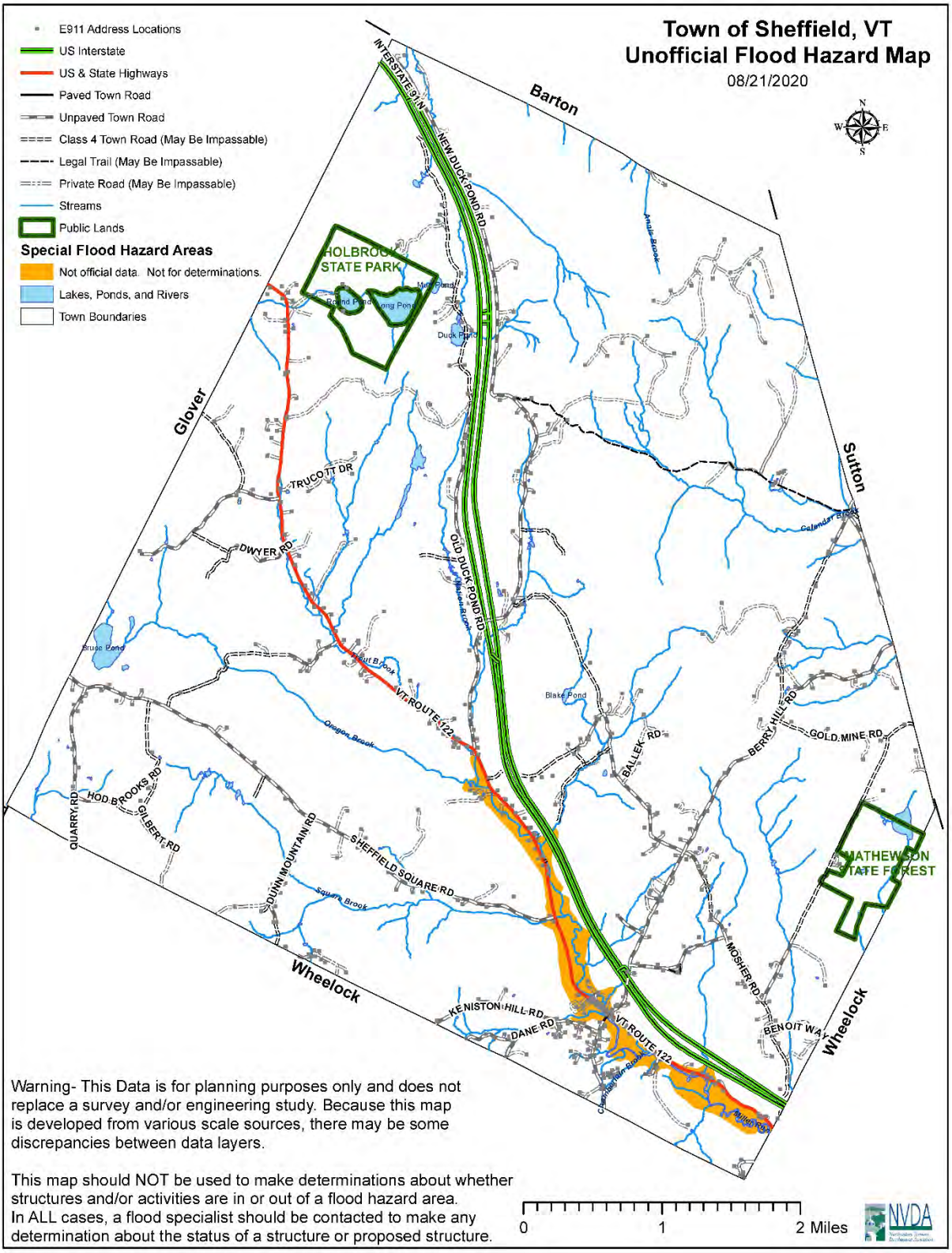


Figure 7. Flood Hazard Area for Town of Sutton.

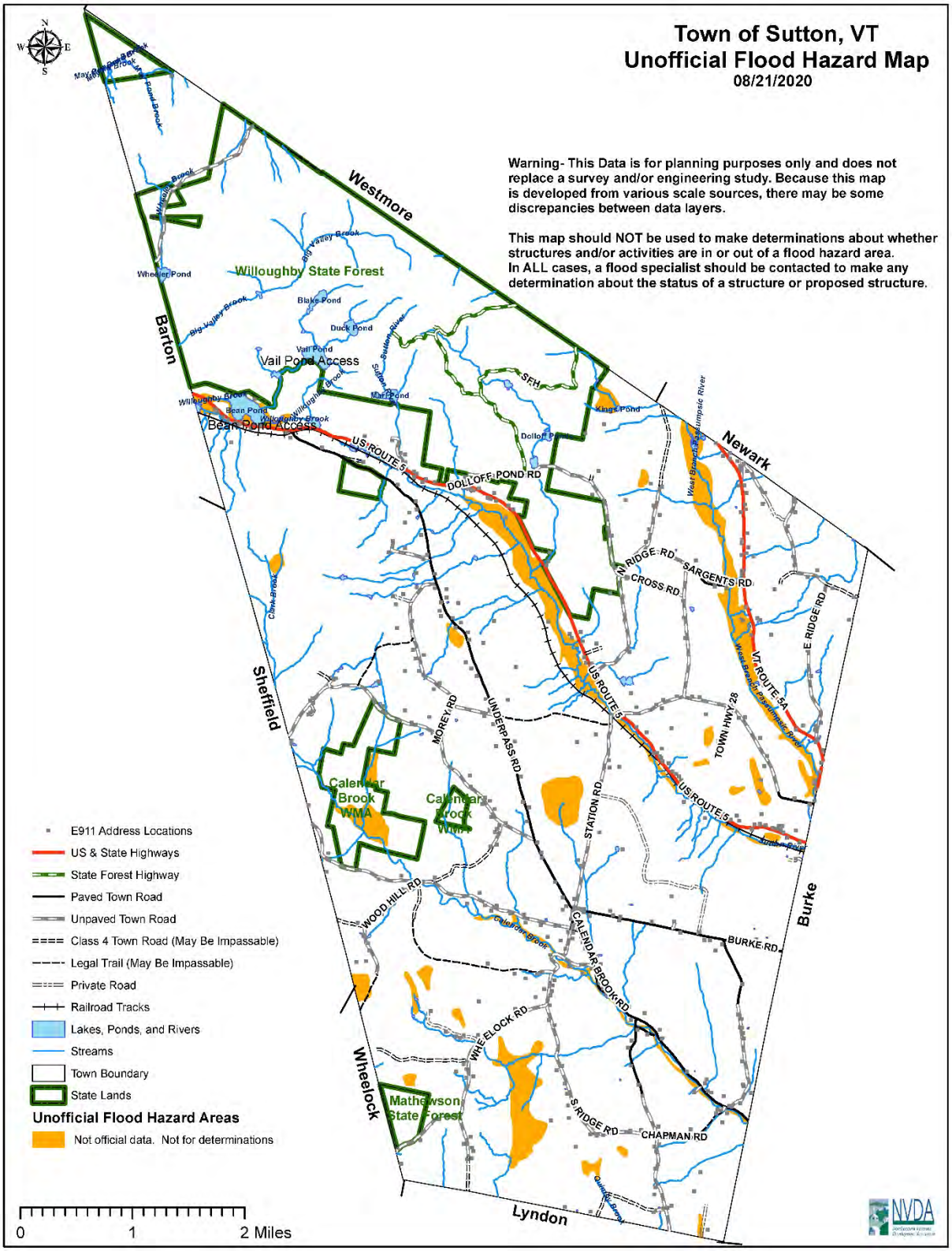
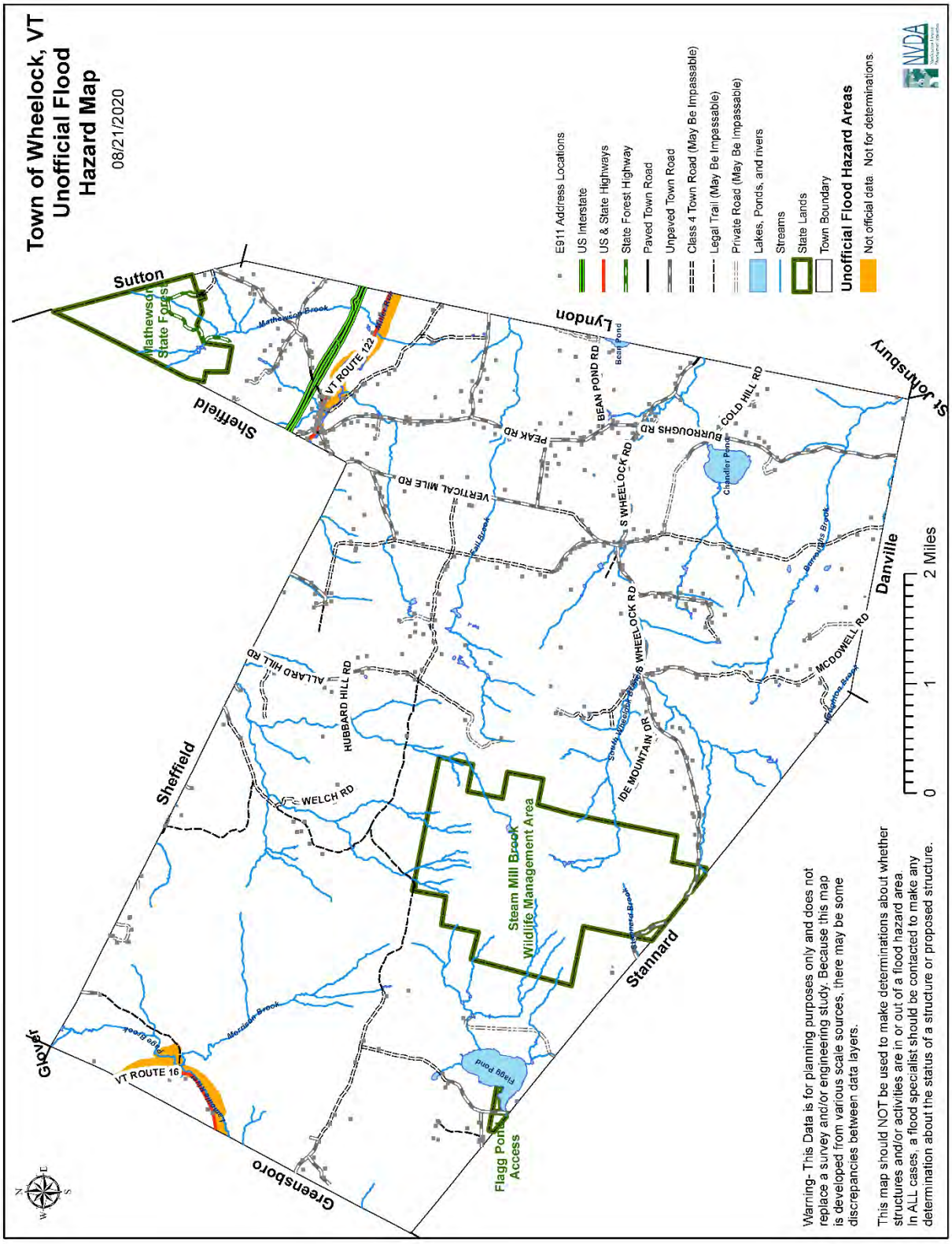


Figure 8. Flood Hazard Areas for Town of Wheelock.



While flood inundation areas as depicted on FIRMs is a significant component of flood disasters, it is worth noting again that the predominant cause of flood damage in Vermont is due to fluvial erosion hazards. The FIRMs published by FEMA do not consider fluvial erosion, however, fluvial erosion hazard areas are considered in the delineation of the State's River Corridor maps as shown in Figure 9 through Figure 12. River Corridors identify the area that the stream or river needs to maintain physical / geomorphic equilibrium, which in Vermont includes the meander belt of a stream or river and a buffer of 50 feet. These dynamic areas are also where a great deal of damage occurs during flooding disasters. The State's River Corridor data can be used by municipalities along with FEMA floodplain data to direct new structures to safer locations, including but not limited to the adoption of regulatory standards such as the State's model River Corridor bylaw (which the Town of Burke has done), or through a separate local overlay district to better manage fluvial erosion hazards.

Figure 9. River Corridors for Town of Burke.

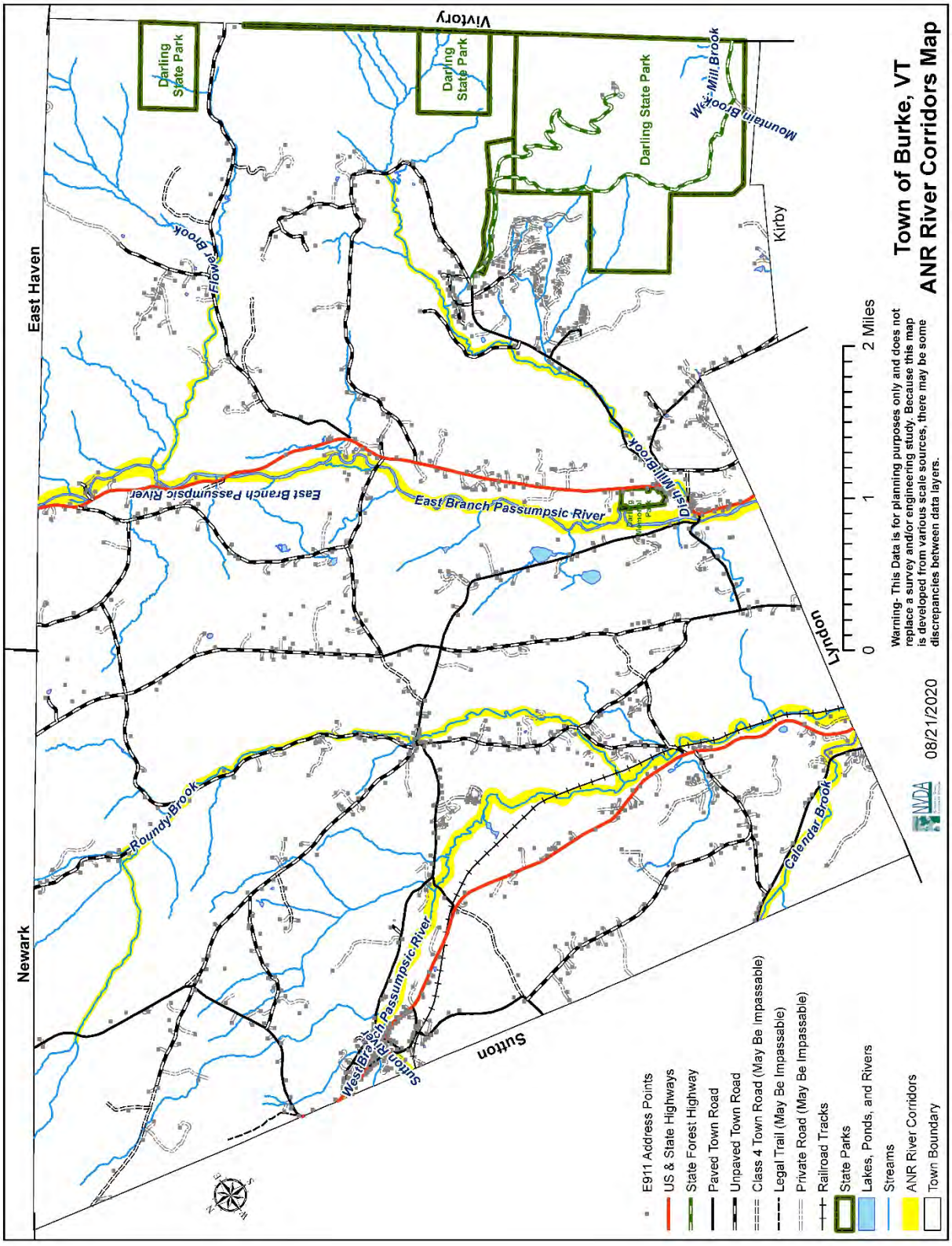


Figure 10. River Corridors for Town of Sheffield.

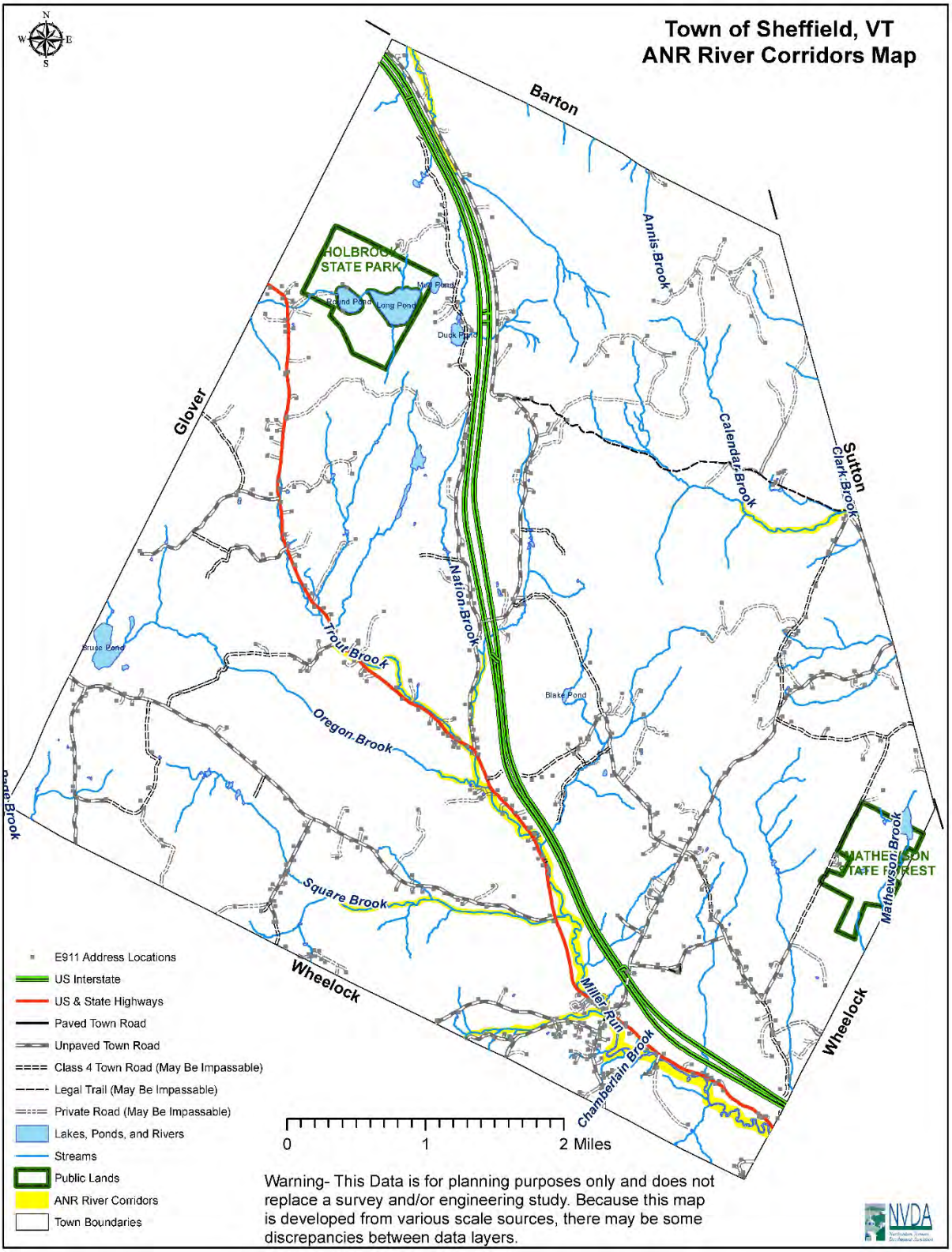


Figure 11. River Corridors for Town of Sutton.

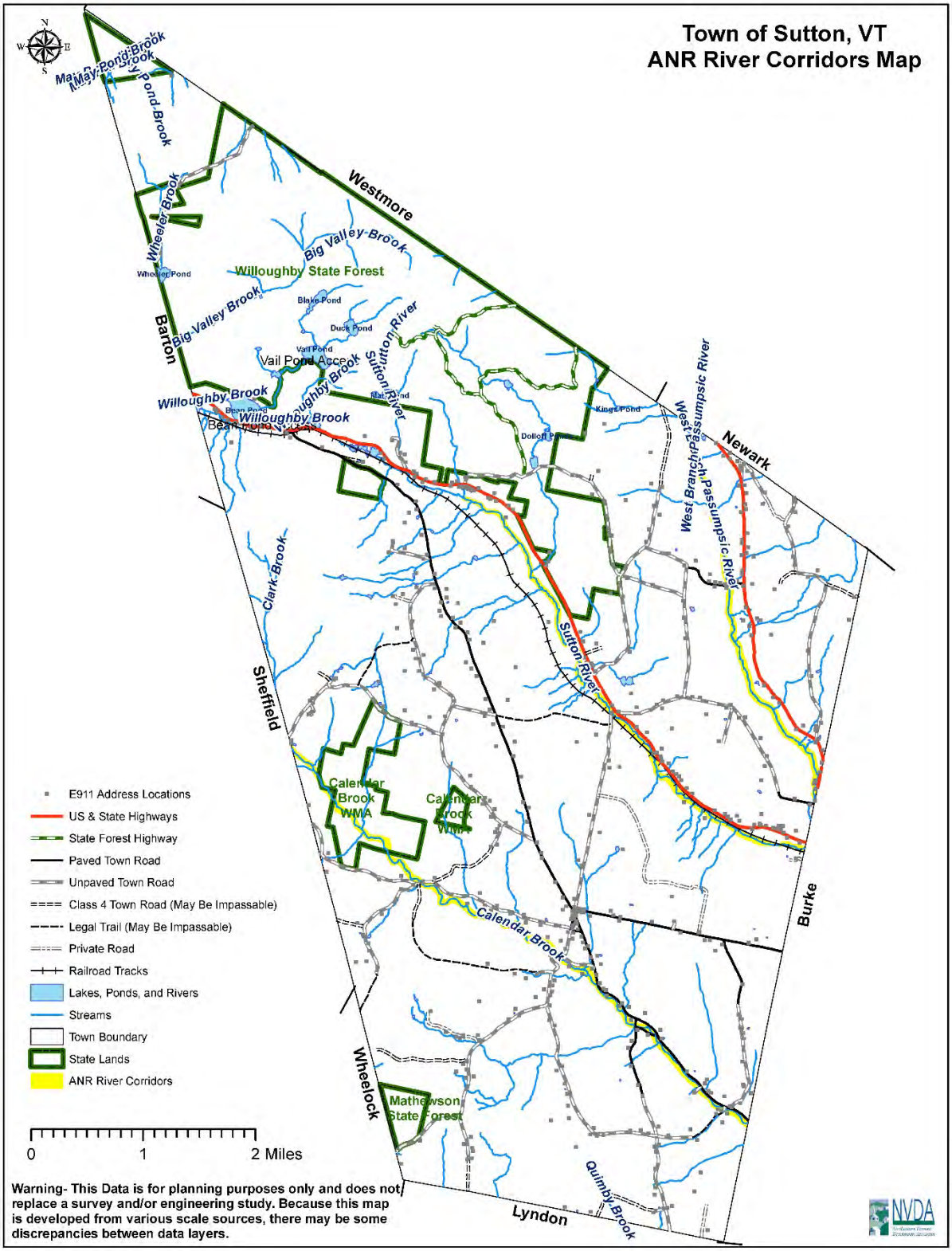
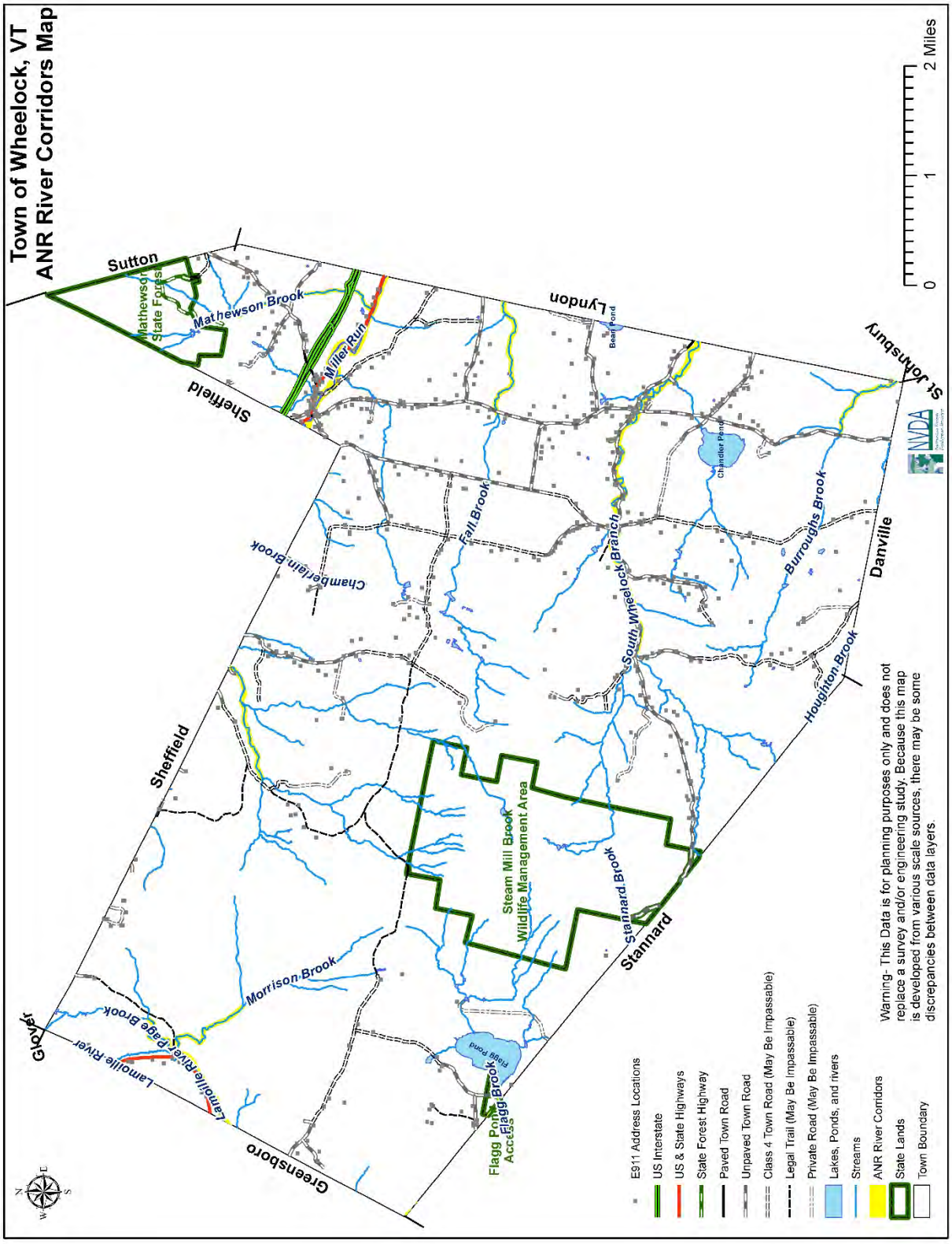


Figure 12. River Corridors for Town of Wheelock.



According to the Vermont Dam Inventory, there are three currently functioning (in service) dams located within the planning area as listed in Table 15. An additional seven dams are included in the inventory but identified as having since been removed or breached and no longer in service. Only one dam, the Chandler Pond Dam in southeastern Wheelock, is identified as posing a significant hazard (see *Severity/Extent* for the definition of specific dam hazard classifications). This dam is actually owned by the Village of Lyndonville but located in Wheelock, with Chandler Pond Farm and several residential structures located in close proximity and potentially vulnerable to damage during a dam failure event.

Table 15. Dams Located in Planning Area.

Dam Name	Town	Stream	Owner	Hazard Class
Burke Mountain Snow Pond	Burke	Dish Mill Brook-TR	Burke Mountain Resort	Low
Chandler Pond	Wheelock	South Wheelock Branch-TR	Village of Lyndonville	Significant
Burke-7	Burke	Roundy Brook	Unknown	Low

Source: Vermont Department of Environmental Conservation, Vermont Dam Inventory[46]

Some specific issues or more localized problem areas of concern identified in each community's Town Plan and/or by the Hazard Mitigation Committee include the following:

- **Burke** – Flooding has occurred in East Burke Village and West Burke due to a myriad of reasons but mainly from heavy rain and spring run-off coupled with ice jamming or debris build up. There are typically not many flash floods although areas impounded by beavers do tend to obstruct and redirect flows, which can become problematic if not addressed before heavy downpours or rapid snowmelt in spring months. Burke has two critical facilities in FEMA-mapped flood hazard areas, including the East Burke and West Burke Fire Stations.
- **Sheffield** – Current flood maps show areas that are prone to overrun the riverbanks. Flooding does pose a threat to some buildings and roads. Dirt road washouts are more common throughout the area, but culvert washouts are much less so since some new culverts have been installed (Sheffield has diligently replaced undersized culverts with larger culverts in the past several years). Erosion with flash flooding is common. Isolated areas still exist with what the town considers to be woefully inadequate culverts that contribute to continued erosion of streambanks and in some cases the landscape of private properties.
- **Sutton** – The Town of Sutton is located at relatively higher elevations than surrounding areas, and most water drains to lower areas. Although several areas in the town have been impacted by fluvial erosion and road washouts, more destructive inundation flooding is more likely in towns located further downstream.

[46] Vermont Dam Inventory (DTI). Vermont Department of Environmental Conservation, Dam Safety and Hydrology Section. Available at: https://geodata.vermont.gov/datasets/75b9d3671f474323a22165ba5a4c2677_161

- **Wheelock** – Flooding is rare in Wheelock but does pose a threat to some buildings and roads. Because of some low areas, the town builds roads up and upsizes culverts as much as possible, and a few rivers have been banked with large rocks to reduce the chance of erosion. Dirt road washouts are still common throughout the entire area though. A current priority concern is the relocating the Town Garage, which is located within a FEMA-mapped flood hazard area at the west end of the village on the bank of Miller's Run. Another particular concern is the bridge on Route 122 between Wheelock and Lyndon, as if it were to be washed out, the entire town would be cut off from its closest neighboring community. Lastly, per the Town Plan, there are small flood zones along the South Wheelock Branch but none of these appear on the current FEMA FIRMs and should be looked at closely during future floodplain mapping studies.

Severity/Extent

The severity of a riverine flood event is typically determined by a combination of several major factors, including stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; the degree of vegetative clearing; and impervious surface. The periodic flooding of lands adjacent to rivers, streams, and shorelines (floodplains) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is typically defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude (spatial extent and depths) increases with increasing recurrence intervals.

Floodplain areas are delineated according to the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood. A more appropriate way of expressing flood frequency is the percent chance of occurrence in any given year (annual probability). For example, the 100-year flood has a 1 percent chance of occurring in any given year, and the 500-year flood has a 0.2 percent chance of occurring in any given year. Statistically, the 1 percent annual chance flood has a 26 percent chance of occurring during a 30-year period, equal to the duration of many home mortgages. Contrary to what the term suggests, a "100-year flood" is not a flood that occurs only once every 100 years. A "100-year flood" can and often does occur in the same location multiple times in a century.

Special flood hazard areas identified on FEMA FIRMs (as shown in Figure 5 through Figure 8) are defined as the areas that will be inundated by the flood event having a 1 percent chance of being equaled or exceeded in any given year. The 1-percent-annual-chance flood is also referred to as the base flood elevation (BFE) and is the national minimum standard for applying FEMA's NFIP regulations and mandatory flood insurance purchase requirements. Areas shown to be inundated by the 0.2-percent-annual-chance flood are considered moderate flood hazard areas, and areas outside of these areas are considered minimal flood hazard areas.

The extent of fluvial erosion hazards is typically measured by the number of feet eroded along the banks of existing rivers and streams. While specific data on the extent of historical fluvial erosion events is not readily available for the planning area, it is considered a chronic, long-term hazard of concern. The

potential extent of fluvial erosion is considered to be within 50 feet of the meander belt of local rivers (including and often in addition to special flood hazard areas). The extent of these 50-foot buffers is delineated for each participating jurisdiction on the State's River Corridor maps (see Figures 9 through 12). As noted earlier these river corridors include the meander belt of a stream or river and a buffer of 50 feet, and show the area identified in many Vermont communities as the Fluvial Erosion Hazard Area (FEH). Many Vermont communities (including the Town of Burke) have adopted overlay zones with regulatory standards that are linked to these buffers and/or FEH zones to better manage fluvial erosion hazards.

Dams are classified according to their potential for causing loss of life and property damage in the area downstream of the dam if it were to fail using the general classification system: High Hazard, Significant Hazard, and Low hazard as described in Table 16. It is important to note that the hazard class is independent of the condition or structural integrity of a dam.

Table 16. Dam Failure Classifications.

Class	Hazard Category	Potential Loss of Life	Potential Economic Loss
1	High	More than few	Excessive (Extensive community, industry, or agriculture)
2	Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry, or structures)
3	Low	None expected (No permanent structures for human habitation)	Minimal (Undeveloped to occasional structures or agriculture)

Source: Vermont Department of Environmental Conservation, Dam Safety Program[47]

Previous Occurrences

Floods are a relatively frequent occurrence in the planning area. Some specific information for each town is provided below, followed by more general information for the planning area as a whole.

- **Burke** – East Burke has a history of flooding caused by excessive rainfall and occasional ice jams. Specifically, East Burke Village has flooded significantly in 1927, 1972 and in 2008. Some roads and culverts were also damaged in 2002 as part of a major flood that received a Federal disaster declaration.
- **Sheffield** – The town has a history of flooding and has received Public Assistance from FEMA from eight federal disaster declarations between 1989 through the present. The flooding that affected much of northern Vermont in 2002 created significant road damage in Sheffield.

[47] Vermont Department of Environmental Conservation, Dam Safety Program. Available at: https://dec.vermont.gov/water-investment/dam-safety/inspection-program

- **Sutton** – The town has qualified for FEMA disaster assistance from flood events in the past, including the 2002 event that affected much of northern Vermont. Several areas in town were affected with road washouts. There are no properties that have been identified as repetitively damaged by floods.
- **Wheelock** – Inundation flooding is rare in Wheelock, but fluvial erosion is a recurring problem and dirt road washouts have been a particular problem throughout the entire area. Wheelock received Federal disaster declaration funds due to flooding in August 1998 and in 2004 for a total of $77,834 in damages. In 2011, Wheelock received $145,986 in payment for damages caused by Hurricane Irene. The town experienced significant damages during the 1927 flood, including destruction of the Town Hall, a church, and other building located along Route 122 (see Figure 13).

Figure 13. Destruction in Wheelock, The Great Vermont Flood of 1927.

Source: Images of America – Caledonia County[48]

NOAA historical records include 45 flood events in Caledonia County since 1996, causing no fatalities, 1 injury, approximately $10.7 million in reported property damages, and $1 million in crop damages. Most of these damages occurred during Tropical Storm Irene in 2011 (further described later in this section). Table 17 lists the past events that are listed for Caledonia County with descriptions provided for any

[48] Images of America: Caledonia County. Dolores E. Ham. Arcadia Publishing. 2000.

events classified as countywide or with impacts specific to Burke, Sheffield, Sutton, or Wheelock. It should be noted that the damage figures associated with these events are believed to greatly underestimate the value of actual flood losses that have occurred but gone unreported and/or unrecorded in NOAA records. Also, based on a review of data available from the Vermont Dam Safety Program, the National Performance of Dams Program (NPDP) at Stanford University, the Association of State Dam Safety Officials, there have been no recorded dam failures causing impacts in the planning area.

Table 17. Previous Occurrences for Flood (January 1996 - August 2020).

Date	Flood Cause/Type	Description *(if applicable to participating towns)*	Casualties (Deaths/Injuries)	Damage/ Losses
10/2/2019	Heavy Rain	N/A	0/0	$5,000
6/20/2019	Heavy Rain	N/A	0/0	$5,000
7/1/2017	Heavy Rain	N/A	0/0	$400,000
2/25/2017	Ice Jam	Rainfall and snowmelt combined to create river rises and flood area roads. The river rises also broke up river ice, and ice jams developed on the Passumpsic River and its tributaries, as well as the Wells River.	0/0	$50,000
2/25/2016	Ice Jam	N/A	0/0	$75,000
2/25/2016	Ice Jam	N/A	0/0	$40,000
4/15/2014	Heavy Rain / Snow Melt	Heavy rainfall and snowmelt caused widespread flooding across Caledonia County, mainly in the Passumpsic River Basin. Route 5 was inundated from Lyndonville to St. Johnsbury by the Passumpsic River, and other smaller creeks and streams washed out roads and culverts.	0/0	$350,000
1/12/2014	Ice Jam	N/A	0/0	$2,000
1/11/2014	Ice Jam	N/A	0/0	$1,000
12/22/2013	Ice Jam	N/A	0/0	$15,000
8/28/2011	Heavy Rain	Flooding from Tropical Storm Irene was widespread across Caledonia County (further described later in this section).	0/0	$5,000,000

Date	Flood Cause/Type	Description *(if applicable to participating towns)*	Casualties (Deaths/Injuries)	Damage/ Losses
5/30/2011	Heavy Rain	N/A	0/0	$75,000
5/26/2011	Heavy Rain	N/A	0/0	$2,500,000
4/27/2011	Heavy Rain / Snow Melt	Runoff from heavy rain and snowmelt caused flooding of the upper reaches of the Passumpsic River and its tributaries.	0/0	$750,000
4/11/2011	Heavy Rain / Snow Melt	N/A	0/0	$5,000
3/13/2011	Ice Jam	N/A	0/0	$10,000
3/6/2011	Ice Jam	An ice jam formed on the East Branch of the Passumpsic along Route 114 between Lyndonville and East Burke, forcing the closure of the highway. Ice jams also formed in on the north side of Lyndonville at the confluence of the East and West Branches of the Passumpsic and Miller Run. East of Lyndonville, and ice jam caused flooding of Fall Brook Road and South Wheelock Road.	0/0	$0
10/1/2010	Heavy Rain	N/A	0/0	$100,000
3/23/2010	Heavy Rain / Snow Melt	N/A	0/0	$2,000
8/6/2008	Heavy Rain	N/A	0/0	$50,000
7/24/2008	Heavy Rain	N/A	0/0	$10,000
4/29/2008	Heavy Rain / Snow Melt	N/A	0/0	$25,000
3/8/2008	Ice Jam	An ice jam on the Dish Mill Brook caused flooding of several business, homes along lower Belden Hill Road and Route 114 in East Burke.	0/0	$200,000
7/11/2007	Heavy Rain	N/A	0/0	$250,000
5/16/2007	Heavy Rain	N/A	0/0	$20,000

Date	Flood Cause/Type	Description *(if applicable to participating towns)*	Casualties (Deaths/Injuries)	Damage/ Losses
1/18/2006	Flood	There was widespread field flooding and ponding of water on area roadways, as well as localized ice jams along the headwater regions of the Passumpsic in Wheelock and Lyndonville.	0/0	$25,000
4/3/2005	Flood	N/A	0/0	$5,000
10/27/2003	Flood	N/A	0/0	$5,000
3/29/2003	Flood	N/A	0/0	$0
6/12/2002	Flood	N/A	0/0	$50,000
4/13/2002	Flood	Flooding occurred due to the combination of snowmelt and 1 to 3 inches of rainfall across the area. In Caledonia County, flooding was reported in the Towns of Groton and Sheffield.	0/0	$20,000
4/24/2001	Flood	N/A	0/0	$1,000
12/18/2000	Flood	N/A	0/0	$5,000
12/17/2000	Flash Flood	N/A	0/0	$100,000
5/11/2000	Flash Flood	N/A	0/0	$5,000
4/4/2000	Flash Flood	N/A	0/0	$1,000
8/11/1998	Flash Flood	N/A	0/0	$1,000,000
6/29/1998	Flash Flood	N/A	0/0	$5,000
4/1/1998	Flash Flood	N/A	0/0	$5,000
3/31/1998	Flash Flood	N/A	0/0	$10,000
1/8/1998	Flash Flood	N/A	0/0	$5,000
7/15/1997	Flash Flood	Road washouts resulted with rapid rises on area rivers.	0/0	$500,000
7/3/1996	Flood	Periods of heavy rain enhanced by thunderstorms moved across the region. A woman was injured when her car was	0/1	$15,000

Date	Flood Cause/Type	Description *(if applicable to participating towns)*	Casualties (Deaths/Injuries)	Damage/ Losses
		driven into a flooded culvert during the late night hours of July 3rd (accident occurred in Stannard).		
4/27/1996	Flood	N/A	0/0	$5,000
1/19/1996	Flood	N/A	0/0	$25,000
		Total	**0/1**	**$11.7 M**

Source: National Oceanic and Atmospheric Administration[49]

In addition to the above summary data specific to Caledonia County, it is worth further describing the two most devastating floods in Vermont's history which did result in significant impacts for the planning area.

Tropical Storm Irene (August 28, 2011)

Inundation flooding and fluvial erosion caused by Tropical Storm Irene was catastrophic, destroying property, infrastructure and taking lives. After a very wet spring, which lead to multiple disaster declarations and saturated soils, Vermonters watched Hurricane Irene move up the Eastern Seaboard of the United States with great apprehension. The hurricane turned into a tropical storm as it made landfall in New York and Connecticut, shortly before moving northward towards Vermont. As the tropical storm moved into the State, dropping as much as 11 inches of rain, nearly every river and stream flooded and experienced catastrophic fluvial erosion. Extensive transportation damage was reported, with nearly every State highway affected and many local roads washed away. In Vermont, seven people died, and many were injured from the floods.[50]

Although northern Vermont experienced damaging impacts, the hardest hit areas were across central and southern portions of the state. In some cases, the flooding from Irene was worse than the Great Flood of 1927 (described below), with all-time record crests observed on some rivers. As a result of the storm, 500 miles of roadway and approximately 1,200 bridges and culverts were either damaged or destroyed, 6 of which were completely washed away, including the historic Bartonsville covered bridge. In addition, 3,500 homes were damaged or destroyed, 629 cultural sites damaged, and 20,000 acres of farmland flooded. Large sections of railway were washed away along with miles of power and fiber optic cable lines, resulting in nearly 50,000 power outages across the state.

[49] NOAA, National Centers for Environmental Information, Storm Events Database. Accessed August 5, 2020 at: https://www.ncdc.noaa.gov/stormevents/
[50] Vermont State Hazard Mitigation Plan. October 2018. P. 65.

Overall, Irene caused over $700 million in damages to state infrastructure and private property. Three fatalities and numerous injuries were reported. As a result of its devastating impact on the state, Tropical Storm Irene ranks as the second greatest natural disaster in Vermont's history.[51]

The Great Vermont Flood of 1927 (November 3-4, 1927)

The flood of November 3-4, 1927 stands as the greatest natural disaster in Vermont history. Devastation occurred throughout the state, with 1,285 bridges lost as well as countless numbers of homes and buildings destroyed and hundreds of miles of roads and railroad tracks (including those located in the planning area). The flood waters claimed 84 lives, including that of the Vermont Lieutenant Governor at the time, S. Hollister Jackson. The flood was the result of heavy rains in combination with heavily saturated soils from October rainfall (with some areas in northern and central Vermont receiving 200-300 percent of normal for the month). Combined with the lateness of the year and the fact that most vegetation was either in, or near, seasonal dormancy, any further rainfall would runoff directly into the rivers. This is exactly the scenario that led to Vermont's greatest disaster.

Rain began on the evening of November 2, as a cold front moved into the area from the west. Rainfall continued through the night with light amounts being recorded by the morning of the 3rd. Rainfall intensity increased during the morning of the 3rd as a low-pressure center moved up along the Northeast coast. This low had copious moisture associated with the remnants of a former tropical storm. As the low moved up the coast, a strong southeast flow developed. This moisture-laden air was forced to rise as it encountered the Green Mountains, resulting in torrential downpours along and east of the Green Mountains.

Devastation was distributed fairly evenly across the state, but the hardest hit area was most likely the Winooski Valley, where the majority of the population lived. As a result of the statewide devastation caused by the flood, the U.S. Army Corps of Engineers began building a series of flood retention reservoirs and accompanying dams to mitigate the effects of further flooding. The historic flooding of Tropical Storm Irene brought additional devastation to the state in August 2011, but given the massive extent of damage, the flood of 1927 still stands as the worst natural disaster in Vermont history.[52]

Probability of Future Occurrences

Floods of varying extent will continue to be a ***likely*** occurrence in the planning area. Larger inundation flooding and fluvial erosion events will be an occasional occurrence in planning area, while smaller and localized flash floods will likely occur more frequently. Historical trends indicate that Vermont is getting wetter. Average annual precipitation, whether as rain or snow, has increased by 1.5 inches per decade since 1960.[53] It is anticipated that the effects of climate change will result in an even greater increase in the extent and frequency of flooding due to more heavy precipitation and downpour events. According to the 2014 National Climate Assessment, the Northeast experienced a 71 percent increase in very

[51] National Weather Service. Flooding in Vermont. Available at: https://www.weather.gov/safety/flood-states-vt
[52] Ibid.
[53] Vermont's Climate Dashboard: https://climatechange.vermont.gov/

heavy precipitation events from 1958 to 2012, and it is projected that this trend will continue and even worsen under all future emissions scenarios. Under the rapid emissions reduction scenario, these events would still occur nearly twice as often. For the scenario assuming continued increases in emissions, these events would occur up to five times as often.[54]

Impact on the Community and Vulnerability

Flooding in the planning area will predominantly impact roads, especially at road-stream crossings. During Tropical Storm Irene, the towns experienced several damaged roads from blown out culverts and road washouts. Because of the many remote areas, the erosion and/or washout of dirt roads can be a major impact to residents as they can quickly become stranded during and following a flood event. New or upgraded culverts, deeper ditching, and better gravel has helped, but because of the steep roads and many streams, this issue remains a significant vulnerability and concern for all towns.

Fortunately, there is not a high number of flood-prone structures across the planning area. Based on GIS mapping and analysis conducted by NVDA, it is estimated that only 4% of buildings are located in mapped flood hazard areas (see Table 20 for more information on building exposure for each town). The vast majority of these structures are residential structures and primarily single-family dwellings.

NFIP Insured Structures

The Towns of Burke and Sutton participate in the National Flood Insurance Program (NFIP), however very few policies have been issued. According to data provided by Vermont DEC's Regional Floodplain Manager, Burke has three policies and Sutton has no policies, and there have been no NFIP claims paid to date.[55] The Towns of Sheffield and Wheelock do not currently participate in the NFIP and do not have NFIP-insured structures or policy/claim statistics to report. There are also no FEMA-identified "repetitive loss properties"[56] located within the planning area.

Invasive Species

General Description

The National Invasive Species Council defines an invasive species as one that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can overwhelm native species and their habitats, forcing the native species out. They are considered to pose the second greatest threat to biodiversity globally. Invasive plants in Vermont, such as Japanese knotweed, common reed (Phragmites), and purple loosestrife, can change soil composition, change water tables, and disrupt

[54] U.S. Global Change Research Program. *Climate Change Impacts in the United States: U.S. National Climate Assessment*. 2014.
[55] NFIP data provided by Sacha Pealer, CFM, Regional River Scientist & Floodplain Manager on May 23, 2020 (as reported in FEMA's Community Information System).
[56] FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling ten-year period since 1978.

insect cycles. They often lack food value upon which wildlife depends. Some invasive animals prey heavily upon native species while others, such as the alewife and zebra mussel, out-compete native species for food and nutrients with significant impacts reverberating up and down food chains.[57]

The spread of invasive species is primarily caused by human activity. Common examples include[58]:

- Ships: Can carry aquatic organisms in their ballast water or on the hull.
- Wood Products: Insects can get into wood, shipping palettes, and crates that are shipped around the world as well as travel in firewood.
- Ornamental Plants: Some ornamental plants can escape into the wild and become invasive.
- Pet Trade: Some invasive species start as pets that are intentionally or accidentally released.

The Nature Conservancy reports that invasive species have contributed directly to the decline of 42% of the threatened and endangered species in the United States. Further, the annual cost to the U.S. economy is estimated at $120 billion per year, with more than 100 million acres suffering from invasive plant infestation. Freshwater ecosystems and estuaries are especially vulnerable to invasion, as these areas are very difficult to contain and reverse. In Vermont, examples of economic impacts of invasive species can be observed in the costs of managing invasive water chestnut in Lake Champlain and payments to private landowners to improve tree regeneration and wildlife habitat by controlling buckthorn and honeysuckle in forests. Water pipes in Lake Champlain must now be cleaned out regularly to rid them of invasive zebra mussels. Invasive pests such as Emerald Ash Borer, first found in Vermont in 2018, will have serious financial implications for forest landowners and municipalities alike, as productive timber is destroyed and trees along roads become potential hazards as they die.

Additionally, invasive species can directly or indirectly cause harm to human health. Giant hogweed, wild parsnip and wild chervil are three invasive plant species in Vermont that have phytophototoxic properties, meaning direct contact of their sap with human skin can cause a chemical reaction that makes skin hypersensitive to ultraviolet light. Vermonters have received serious skin burns from the toxicity of the sap of these plants combined with exposure to sunlight. Another example is that of Japanese barberry, which has been proven to increase the incidence of Lyme disease by providing sheltered habitat that increases the abundance of small rodents, which act as hosts to the ticks that carry Lyme disease pathogens.[59]

Location

Because plant and animal life are so abundant throughout the region, the entire planning area is considered to be uniformly exposed to the invasive species hazard. Areas with high amounts of plant or animal life may be at higher risk of exposure to invasive species than less vegetated areas; however, invasive species can disrupt ecosystems of all kinds.

[57] Vermont State Hazard Mitigation Plan. October 2018. P. 132.
[58] Vermont Invasives Website: https://www.vtinvasives.org/intro-to-invasives/what-are-invasive-species
[59] Vermont State Hazard Mitigation Plan. October 2018. PP. 132-133.

The Vermont Invasives website maintains a crowd-sourced invasive species map that allows users to upload locations and photos of invasive species, which acts as an aid in determining spread rate and control measures across the State.[60] According to this source the wild parsnip and Japanese knotweed have been located along local roadways within the planning area (three recorded observations in Burke).

Severity/Extent

Invasive species are a widespread problem in Vermont and throughout the country. The geographic extent of invasive species varies greatly depending on the species in question and other factors, including habitat and the range of the species. Some (such as the gypsy moth) are nearly controlled, whereas others, such as the zebra mussel, remain consistent threats to impact aquatic ecosystems throughout the state.

The presence and severity/extent of Invasive species is routinely measured through monitoring and recording observances. In Vermont, this includes but is not limited to the following:

- Vermont's Agency of Agricultural, Food and Markets (VAAFM) maintains a list of invasive plants and regulates their importation, movement, sale, possession, cultivation, and distribution.
- Vermont's Department of Forests, Parks and Recreation (FPR) is responsible for the survey, detection, and management of forest pests in Vermont.
- The Department of Environmental Conservation (DEC) has a Vermont Aquatic Invasive Species Program that coordinates management activities associated with both aquatic invasive and nuisance species.
- The State also maintains a watch list, updated regularly, of non-native plants that have the potential to become invasive in Vermont based on their behavior in northeastern states.

Previous Occurrences

Because invasive species often spread over a long period of time, identification of a hazard event concerning invasive species is rather difficult. Vermont, like much of the eastern United States, has long been susceptible to invasive species brought from overseas – whether they were plants intentionally transported or organisms clinging to vessels. The State has a long history of invasive species infestation at the aquatic (e.g., water chestnut), terrestrial (e.g., Japanese knotweed) and forest pest (e.g. Emerald Ash Borer) levels.[61]

- Most notably, the emerald ash borer, first discovered in Michigan in 2002, has spread to 30 states and three Canadian provinces and was reported and confirmed to be in Vermont in 2017.
- The water chestnut, which spreads rapidly across lakes and ponds, preventing recreation and choking out sunlight from native aquatic species, has been actively managed since 1982.

[60] Vermont Invasives Website: https://www.vtinvasives.org/intro-to-invasives/what-are-invasive-species
[61] Vermont State Hazard Mitigation Plan. October 2018. P. 134.

- Japanese knotweed, an invasive plant that spreads by sprouting from broken plant rhizomes, was introduced into the United States in the 1800s and has been established in New England ever since.

One-third of the plant species found in Vermont are not native to the State, but only about 8% have the potential to create environmental and economic harm due to their ability to grow rapidly, profusely, and widely. These are the plant species monitored on the watch list, which acts as a resource for public information and as a means to enlist volunteers to monitor potentially harmful plants in Vermont, although it has no regulatory force.[62]

Probability of Future Occurrences

Because the presence of invasive species is ongoing rather than a series of discrete events, it is difficult to quantify the frequency of these occurrences. However, increased rates of global trade and travel have created many new pathways for the dispersion of exotic species. As a result, the frequency with which these threats have been introduced has increased significantly and the threat of invasive species is not going away. As stated on the Vermont Invasives website, "it's a long-term stewardship issue that must become a daily part of how we look at and care for the woods that provide us with beauty, recreation, forest products and our heritage."[63] For these reasons and based on the fact invasive species are an ongoing presence for the planning area, this hazard has been assigned a probability of ***highly likely***.

It is anticipated that the effects of climate change will result in an increase in the presence and extent of exotic species. Temperature, atmospheric concentration of CO2, frequency and intensity of coastal storm events, and available nutrients are key factors in determining species survival. It is likely that climate change will alter all of these variables. As a result, climate change is likely to stress native ecosystems and increase the chances of a successful invasion. Climate scientists point to the likelihood of more episodic droughts in Vermont as a result of warming temperatures, which over time makes trees more susceptible to insect damage or disease. In particular, non-native insects such as the Hemlock and Balsam Woolly-Adelgids, Emerald Ash Borer, and Asian Long-Horned Beetle can take advantage of reduced forest vigor.[64]

Impact on the Community and Vulnerability

The most significant impacts from invasive species will be on the natural environment and native ecosystems as described earlier in this section. Aquatic invasive species pose a particular threat to local water bodies, as in addition to threatening native species, they can degrade water quality and wildlife habitat. Invasive species rarely result in direct impacts on humans, but sensitive people may be vulnerable to specific species that could have negative effects on human health also described earlier in this section (and through vector-borne illness as covered under Infectious Disease). Economic impacts to the planning area are not expected to be of concern with the exception of agricultural sector which

[62] Ibid. P. 133.
[63] Vermont Invasives Website: https://www.vtinvasives.org/intro-to-invasives/what-are-invasive-species
[64] Vermont's Climate Dashboard: https://climatechange.vermont.gov/

could see more pest pressure from invasive species that may harm crops and cause farms to increase pesticide use. Agricultural or forestry operations that rely on the health of local ecosystems and specific species are likely to be more vulnerable to invasive species.

Snow Storm & Ice Storm

General Description

Severe winter storms can range from a moderate snowfall over a period of a few hours to blizzard conditions (sustained winds or frequent gusts of 35 miles per hour or more) with blinding wind-driven snow that lasts for several days. Heavy accumulations of snow or ice can bring down trees and power lines, disabling electric power and communications for days or weeks, and can paralyze a region by shutting down all air and rail transportation and disrupting medical and emergency services. Severe winter storms are indirectly and deceptively a significant threat to human life and safety, primarily due to automobile accidents, overexertion, and exposure (including to residents who lose home heating sources following major storms). The cost of snow removal, repairing damages, and loss of business can have large economic impacts on local communities.

Severe winter storms may include snow, ice, sleet, freezing rain, or a mix of these wintry forms of precipitation. Heavy accumulations of snow create hazards to transportation, as well buildings with flat rooftops or other structures not engineered to withstand heavy snow loads. Sleet – raindrops that freeze into ice pellets before reaching the ground – usually bounce when hitting a surface and do not stick to objects; however, sleet can accumulate like snow and cause a hazard to motorists. Freezing rain is rain that falls onto a surface with a temperature below freezing, forming a glaze of ice. Even small accumulations of ice or freezing rain can cause a significant hazard, especially to trees and power lines. Ice storms occur when heavy accumulations of freezing rain falls and freezes immediately upon impact. Electric power and communications can be disrupted for days, and even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Location

Snow storms and ice storms occur over large geographic areas and the entire planning area is uniformly susceptible to these hazards, though snow accumulation is highest at the upper elevations. According to the State Hazard Mitigation Plan there is no specific region of Vermont that is more vulnerable to ice or snow storms.[65]

Severity/Extent

NOAA developed the Regional Snowfall Index (RSI) for significant snow storms that impact the eastern two thirds of the United States. The RSI ranks snow storm impacts on a scale from 1 to 5, as shown in Table 18. RSI values are based on the spatial extent of the storm, the amount of snowfall, and the association of these elements with population and societal impacts. NOAA has analyzed and assigned

[65] Vermont State Hazard Mitigation Plan. October 2018. P. 86.

RSI values to over 500 storms going as far back as 1900 and new storms are added operationally. As such, RSI puts the regional impacts of snow storms into a century-scale historical perspective. The index is useful for those who wish to compare regional impacts between different snow storms.

Table 18. Regional Snowfall Index (RSI).

Category	RSI Value	Description
1	1–3	Notable
2	3–6	Significant
3	6–10	Major
4	10–18	Crippling
5	18.0+	Extreme

Source: National Oceanic and Atmospheric Administration[66]

Previous Occurrences

Snow storms, ice storms, and other winter weather events are a very frequent occurrence in the planning area. NOAA historical records include 271 recorded events in Caledonia County since 1996, causing no casualties, $2.86 million in reported property damages, and $20,000 in crop damages.[67] It should be noted that the damage figures associated with these events are believed to greatly underestimate the value of actual economic losses that have occurred but gone unreported and/or unrecorded in NOAA records, including but not limited to snow removal costs and the economic impacts from road closures, power outages, and related disruptions.

Notable previous occurrences include the following major storm events as noted by the Hazard Mitigation Committee and/or as summarized in the State Hazard Mitigation Plan. According to NOAA records the largest 1-day snowfall for Caledonia County was 33 inches on February 25, 1969.

- **Snow Storm, December 9-13, 2014 (DR-4207):** Rain and wet snow moved into Vermont midday December 9th and changed to a heavy, wet snow during the evening. A band of moderate snowfall impacted much of central and northern Vermont during the afternoon and evening hours of December 10, then scattered snow showers ending on December 11-12. Total snowfall totals across Vermont ranged from 12-20 inches across the Green Mountains into the Champlain Valley. The heavy, wet nature of the snowfall with snow to water ratios of 8:1 or less accounted for snow-loaded trees that resulted in more than 175,000 power outages in the region. This was

[66] NOAA Regional Snowfall Index: https://www.ncdc.noaa.gov/snow-and-ice/rsi/
[67] NOAA, National Centers for Environmental Information, Storm Events Database. Accessed August 4, 2020 at: https://www.ncdc.noaa.gov/stormevents/

the 2nd most power outages due to weather in Vermont. Over $4 million in property damages estimated.

- **Ice Storm, December 20-21, 2013 (DR-4163**): Approximately one quarter to one third of an inch of inch of ice accumulation from freezing rain on December 20 with an additional one half to three quarters of an inch of ice accumulation as well as 1-2 inches of sleet December 21 in portions of northern Vermont. Very cold temperatures (-10°F to teens) followed the event with no melting, thus ice stayed on trees and utility lines through December, prolonging recovery. The greatest impact was in northwest Vermont, with widespread tree and utility line damage as well as numerous vehicle accidents. More than 75,000 customers were without power from hours to days. Over $4 million in property damage estimated.
- **Snow Storm, December 28, 2011**: A strong cold front moved across Vermont during the late morning and afternoon hours accounting for a rapid cool down and localized snow squalls with heavy snow. The western slopes of the Green Mountains saw 5-12 inches of snow along foothill communities. Near white-out conditions in snow squalls and rapidly freezing roadways accounted for numerous vehicle accidents as well as a closure of I-89 between Richmond and Waterbury.
- **Winter Snow Totals, 2010-2011**: The winter of 2011 was the second snowiest on record for Vermont, with a total of 128.4 inches of snow. A March blizzard brought more than 25 inches of snow to northern Vermont. The storm closed schools for days, and many people were without power. Driving was hazardous due to a 1-inch layer of ice beneath several inches of snow.
- **Snow Storm, January 2-3, 2010:** Norther Vermont (Burlington) experienced the most significant snowfall on record from one event with 33.1 inches of snow.
- **Snow Storm, February 14, 2007**: The second heaviest snowfall ever recorded in the month of February. Some areas of Vermont received from 28-36 inches of snow in a 24 to 48-hour period. Heavy snow loads on roofs led to the collapse of at least 10 barns, causing the death of some cows and other livestock. Estimated nearly $3 million in property damage.
- **Snow Storm, March 2001**: A string of storms hit Vermont in March 2001, beginning with 15-30 inches of snow on March 5-6, 10-30 inches on March 22, and 10-20 inches on March 30.
- **Ice Storm, January 6, 1998 (DR-1201)**: An unusual combination of precipitation and temperature led to the accumulation of more than 3” of ice in many locations, causing closed roads, downed power lines, and damage to thousands of trees. This storm was estimated as a 200-500 year event. Power was out up to 10 days in some areas and 700,000 acres of forest were damaged in Vermont. Vermont suffered no fatalities, unlike Quebec where 3 million people lost power and 28 were killed. Over $6 million worth of estimated property damage.
- **Blizzard, December 26-27, 1969**: Snow amounts between 18–36 inches in northwestern Vermont and 45 inches in Waitsfield. Governor Dean Davis declared a State disaster. Drifts of snow from the storm piled up to 30 feet in places.
- **Blizzard, February 15-17, 1958**: More than 30 inches of snow and 26 deaths in New England.

Probability of Future Occurrences

Severe winter storms will continue to be a ***highly likely*** occurrence in the planning area, though snow storms will occur much more frequently than ice storms (which is notable because potential impacts from ice are more significant than those associated with snow). It is anticipated that the effects of climate change will result in winters that are shorter with fewer cold days and more precipitation, but less precipitation falling as snow and more as rain. This will likely result in reduced snowpack, earlier breakup of winter ice on lakes and rivers, and earlier spring snowmelt resulting in earlier peak river flows.[68]

Impact on the Community and Vulnerability

Snow storms and ice storms that occur in the planning area will predominantly impact transportation and mobility (including road closures and/or roads made impassible in remote areas), as well as occasionally electric power and other utilities. A heavy accumulation of snow, especially when accompanied by high winds, causes drifting snow and very low visibility. Sidewalks, streets, and highways can become extremely hazardous to pedestrians and motorists. The biggest threat from ice storms also include hazardous roadways in addition to more widespread power outages (which can lead to life-threating exposure to the Extreme Cold hazard for residents with unheated homes, or for those who rely on electricity for other special needs), and communication disruptions.

Wildfire

General Description

A wildfire is an unwanted, uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Other names such as brush fire or forest fire may be used to describe the same phenomenon depending on the type of vegetation being burned. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the frequency and severity of wildfire for people and property located within wildfire hazard areas, and particularly for those in rural areas with limited capabilities for rapid fire suppression. When not quickly detected and contained, wildfires have the potential to cause extensive damage to property and threaten human life.

Wildfires are part of the natural management of many forest ecosystems, but most are caused by human ignition factors. Nationally, over 80 percent of wildfires are started by negligent human behavior during dry conditions such as improperly discarding cigarettes, burning debris, or not extinguishing campfires in wooded areas. The second most common cause of wildfires is lightning strikes that occur during dry thunderstorms. Wildfires can also be the result of other natural hazard influences such as drought and extreme heat.

[68] Vermont's Climate Dashboard: https://climatechange.vermont.gov/

The majority of fires in Vermont are caused by burning debris, and most are quickly reported and contained. However, fires burning deep in ground fuels or in remote locations require more time and effort to fully suppress. Town Forest Fire Wardens and local fire departments primarily handle wildland fire control with assistance from other towns and the State, when necessary.[69]

Location

According to the State Hazard Mitigation Plan, there is no specific geographic area of Vermont that is particularly more vulnerable to wildfire, given that 76% of Vermont is forested.[70] In general, wildfire risk is considered statewide, though a specific location where infrastructure and life are potentially more vulnerable to structural fire is the wildland-urban interface (WUI). The WUI represents the area where infrastructure interacts with undeveloped land, creating the potential for fire to move from a forested environment to a grassed neighborhood.

Figures 13 through Figure 17 illustrate wildfire hazard areas for each town based on the location of WUI zones across the planning area as mapped by the SILVIS Laboratory at the University of Wisconsin.[71] These hazard areas include two types of wildland-urban interface areas: intermix and interface. Intermix areas are described as areas where housing and vegetation intermingle; interface areas are described as areas with housing in the vicinity of contiguous wildland vegetation.

[69] Vermont State Hazard Mitigation Plan. October 2018. P. 123.
[70] Vermont State Hazard Mitigation Plan. October 2018. P. 125.
[71] Radeloff, V.C., R.B. Hammer, S.I Stewart, J.S. Fried, S.S. Holcomb, and J.F. McKeefry. 2005. The Wildland Urban Interface in the United States. Ecological Applications 15: 799-805.

Figure 14. Wildfire Hazard Areas for Town of Burke.

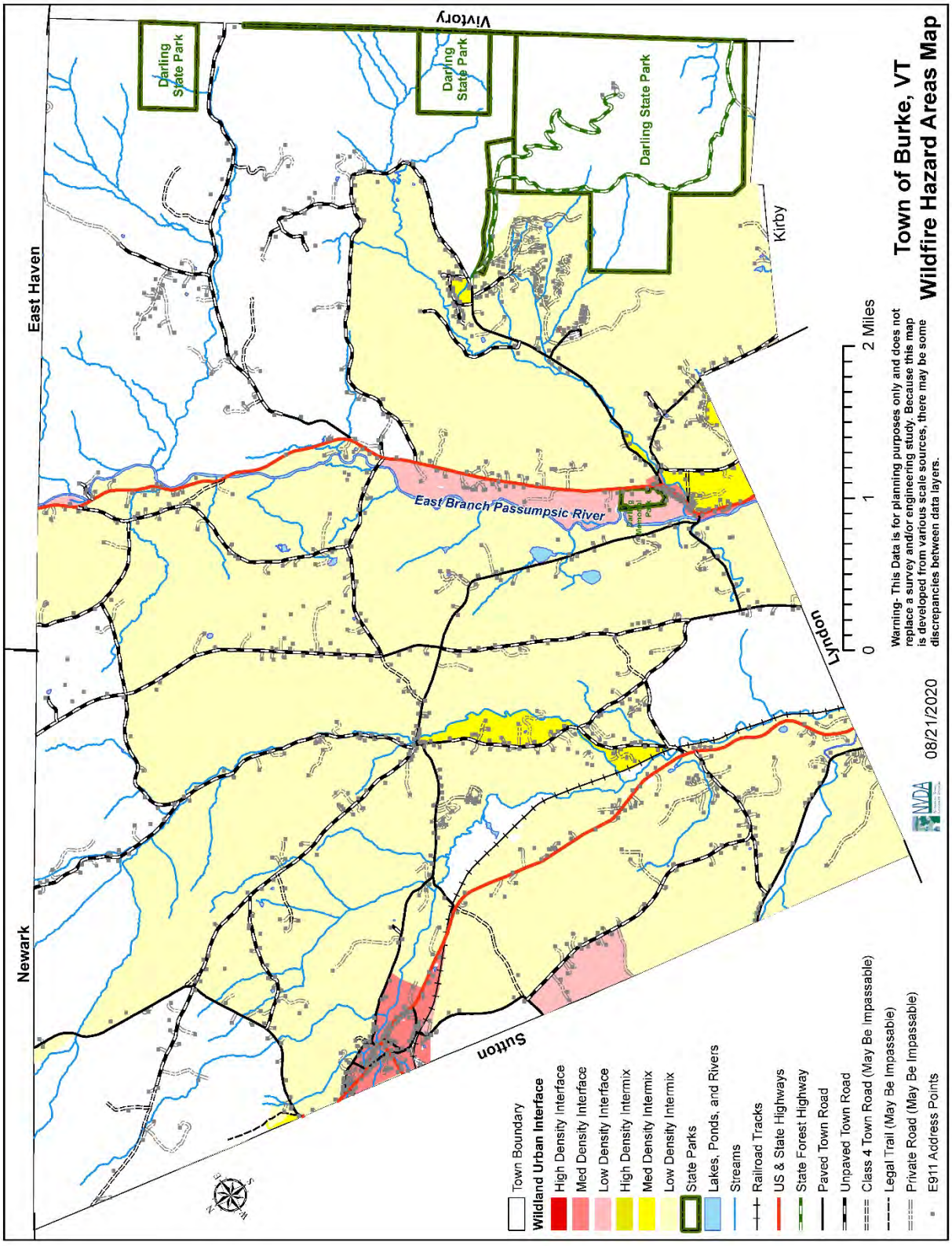


Figure 15. Wildfire Hazard Areas for Town of Sutton.

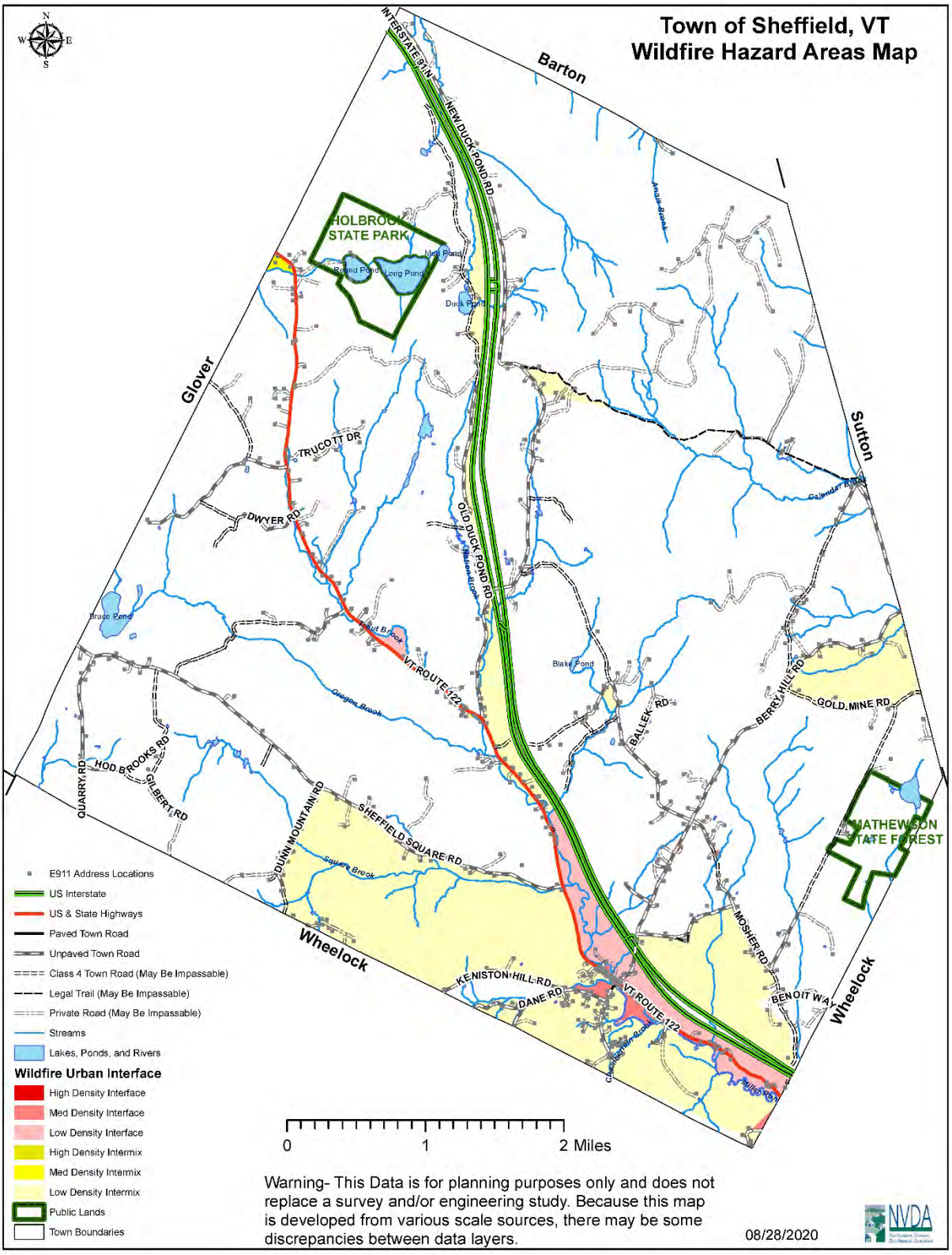


Figure 16. Wildfire Hazard Areas for Town of Sheffield.

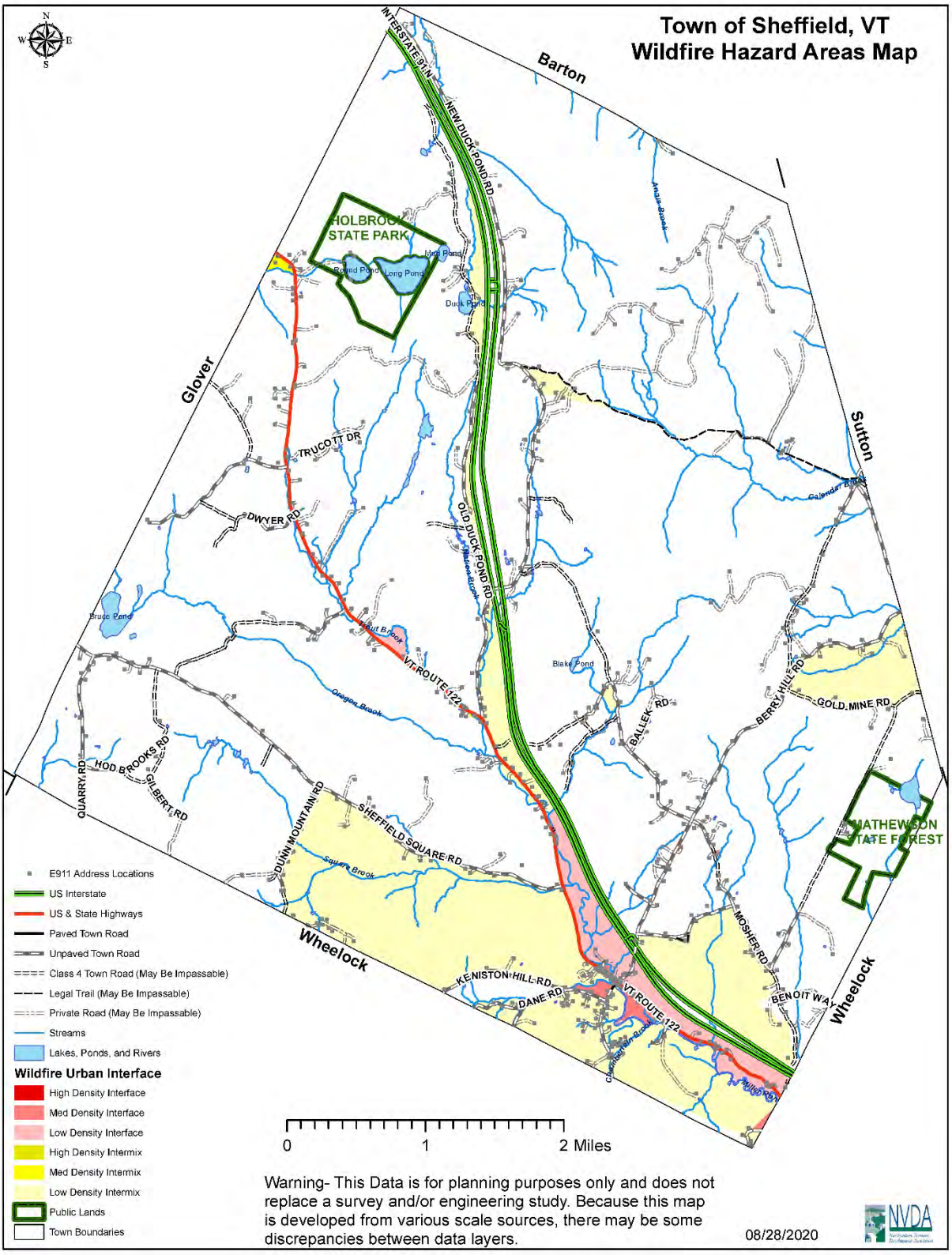
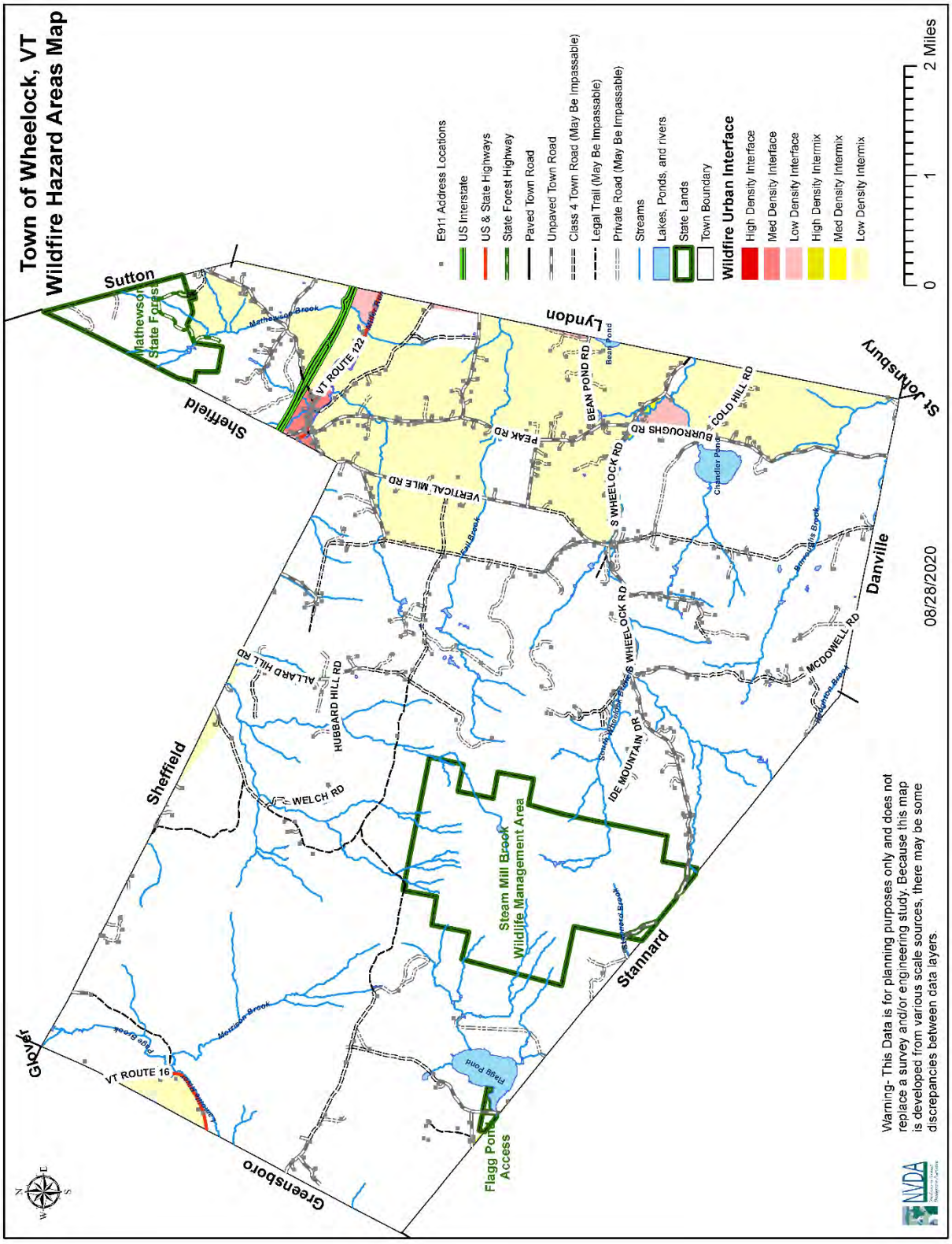


Figure 17. Wildfire Hazard Areas for Town of Wheelock.



Some specific issues or more localized problem areas of concern identified through previous mitigation planning efforts include the following:

- **Burke** – There is a high potential for devastating forest fires due to logging and dead brush in the forested areas. A large fire would deplete local resources and require mutual aid, at a time when there could be a need for large equipment from neighboring towns.
- **Sheffield** – Forest fires have been considered one of Sheffield's biggest threats because of the large forested area in town and the many camps and trails that are difficult to get to. Fires can escalate before the volunteer fire department can get into some areas, though large equipment contractors are on call for the town if firebreaks or roads are needed.
- **Wheelock** – Forest fires remain a big threat, and similar to Sheffield, accessibility into large surrounding forest areas is a concern. Multiple mutual aid departments and lightweight water packs have improved response time, but more will be done. Wheelock does not have any dry hydrants, but the town has gotten permission from many private pond owners to use their ponds for water sources if needed.

Severity/Extent

The magnitude of wildfire events is often characterized by their size and level of impact. This includes their speed of propagation, total number of acres and structures burned, and other resulting impacts to people and property. The magnitude and severity of wildfire events is also greatly dependent on weather, fuel conditions, and existing fire detection, control, and suppression capabilities.

Previous Occurrences

Large wildfire events are not a frequent occurrence in the planning area. NOAA historical records include no recorded events in Caledonia County, and according to the State there has not been a major wildfire in Vermont in the last 50 years.[72]

Traditionally, the State of Vermont has not had a high occurrence of large fires although individual fires of several thousand acres have burned in the past. On the average, Vermont has 200-400 fires per year with an average size of only 1.5–2 acres.[73] Despite the drought in 2016-2017, the 2017 fire season was well below normal at 49 acres burned from 51 fires. The average between 2012 and 2016 was 109 fires and 317 acres per year.[74] The risk of wildfire due to drought was severe enough to warrant statewide bans on open burning in 2012, 2005, 2001, 1999, and 1966 but they were all rescinded with no significant fire events recorded.[75]

The fires that have occurred in the planning area have been small and fairly easily contained and suppressed by local fire departments. There was a remote fire event on the backside of Stannard

[72] Vermont State Hazard Mitigation Plan. October 2018. P. 124.
[73] Northeastern Forest Fire Protection Commission: https://www.northeastwildfire.org/vermont
[74] Vermont Department of Forests, Parks & Recreation. Vermont Wildland Fire Program Annual Report. 2017.
[75] Vermont State Hazard Mitigation Plan. October 2018. P. 124.

Mountain in West Wheelock in 2004 which required eight volunteer fire department personnel for 7 hours, but no buildings or lives were threatened during this incident.

Probability of Future Occurrences

Based on historical occurrences, wildfires are considered a ***possible*** but relatively low risk and infrequent occurrence for the planning area. Fortunately, Vermont has a reliable system of local fire suppression infrastructure coordinated at the State-level, and Vermont's climate, vegetation type, and landscape discourage major wildfire events.[76]

Although wildfires are currently uncommon in Vermont, extended periods of warming due to climate change have the potential to increase the occurrence of wildfire events. Vermont is seeing an increase in average annual maximum and minimum temperature, which is also contributing to an increased likelihood of drought and wildfire risk, though an increase in precipitation events may limit that risk during certain times of the year. Wildfire conditions in Vermont are typically at their worst either in spring when dead grass and fallen leaves from the previous year are dry and new leaves and grass have not come out yet, or in late summer and early fall when that year's growth is dry. In drought conditions, this risk is obviously higher.[77]

Impact on the Community and Vulnerability

Although considered an infrequent and relatively low risk hazard, wildfires remain a concern for the planning area. This is primarily due to the expansive forested area throughout and surrounding each town, as well as the relatively large number of people and structures located in what are considered wildfire hazard areas (the wildland-urban interface, or WUI). Based on GIS mapping and analysis conducted by NVDA, it is estimated that 65% of buildings are located in WUI zones (see Table 20 for more information on building exposure for each town).

As noted in previous mitigation plans, there could be a high potential for devastating fires during dry periods due to logging and dead brush in heavily forested areas. A large fire would deplete local resources and require mutual aid, and there could be a need for large equipment from neighboring towns to prevent any potential impacts on the community. However, it is believed that Vermont's proven system of fire detection and suppression would minimize threats to structures and human safety and limit these impacts to mostly poor air quality due to smoke from large fires.

Wind

General Description

High winds can occur during a range of hazard events, including those weather systems described below, or can simply be the result of differences in air pressures and flow down a mountain. When winds are sustained at 40-50 miles per hour, isolated wind damage is possible. Widespread significant

[76] Vermont State Hazard Mitigation Plan. October 2018. P. 123.
[77] Vermont State Hazard Mitigation Plan. October 2018. PP. 124-25.

wind damage can occur with higher wind speeds, including but not limited to downed trees and power lines, flying debris, transportation disruptions (road closures or roads made impassible in remote areas), damage to buildings and vehicles, and threats to human life and safety. A high wind warning is issued by the National Weather Service when sustained winds of 40 miles per hour or greater or gusts to 58 miles per hour or greater are expected.

For purposes of this Plan, high wind can be the result of any of the following hazard events[78]:

- **Wind Storm**: high wind event without precipitation.
- **Thunderstorm**: high wind event with the potential for compounding impacts due to precipitation. During strong thunderstorms, straight-line wind speeds can exceed 50 miles per hour.
- **Hurricanes/Tropical Storms**: A hurricane is a tropical cyclone with sustained winds that have reached speeds of 74 miles per hour or higher, while a tropical storm has a maximum sustained wind speed of 39 to 73 miles per hour. However, the most significant impacts from hurricanes/tropical storms in Vermont are inundation flooding and fluvial erosion (profiled separately within this section).
- **Tornado**: a violently rotating column of air extending from a thunderstorm; a very rare occurrence in northern Vermont.

In Vermont, high winds are most often seen accompanying severe thunderstorms. In fact, straight-line winds are often responsible for most of the wind damage associated with a thunderstorm. Thunderstorms can also produce downburst winds that affect the land immediately beneath a storm. These downburst winds are called microbursts and microbursts, which move outward from the base of a thunderstorm and can reach speeds in excess of 80 miles per hour.

Location

The entire planning area is susceptible to the occurrence of high wind events. Sustained winds, which typically flow from west to east, is most significant on mountain peaks where wind speeds are highest.

Severity/Extent

One of the first scales to estimate wind speeds and the effects was created in 1805 to help sailors estimate winds via visual observations. The scale starts with 0 and goes to a force of 12. The Beaufort scale, as shown in Table 19, is still used today to estimate wind strengths.

[78] Vermont State Hazard Mitigation Plan. October 2018. P. 89.

Table 19. Beaufort Wind Scale.

Force	Wind (mph)	WMO* Classification	Appearance of Wind Effects	
			On the Water	On Land
0	< 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	13-18	Moderate Breeze	Small waves 1-4ft becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	19-24	Fresh Breeze	Moderate waves 4-8ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Larger waves 8-13ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	32-38	Neal Gale	Sea heaps up, waves 13-19ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	39-46	Gale	Moderately high (18-25ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, generally impedes progress
9	47-54	Strong Gale	High waves (23-32ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	55-63	Storm	Very high waves (29-41ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, considerable structural damage
11	64-72	Violent Storm	Exceptionally high (37-52ft) waves, foam patches cover sea, visibility more reduced	Very rarely experienced on land, accompanied by widespread damage

Force	Wind (mph)	WMO* Classification	Appearance of Wind Effects	
			On the Water	On Land
12	73+	Hurricane	Air filled with foam, waves over 45ft, sea completely white with driving spray, visibility greatly reduced	Devastation

Source: National Oceanic and Atmospheric Administration[79]

**World Meteorological Organization*

While other scales exist to describe the severity and extent of tropical cyclones and tornadoes, the occurrence of these hazards at even low magnitudes do not pose enough of a threat to northern Vermont to be included with this profile.

Previous Occurrences

High wind events are a very frequent occurrence in the planning area. NOAA historical records include 187 recorded events in Caledonia County since 1976, causing no casualties, $2.73 million in reported property damages. The highest recorded windspeeds during these events were 60-70 miles per hour, though most magnitudes were between 40-50 miles per hour. Most of the reported local impacts and damages for the planning area were identified as downed trees and powerlines. During an event in August 2007, thunderstorm winds reportedly blew off a roof barn in Sutton in addition to knocking down numerous trees.[80]

As noted above, severe winds caused by tropical cyclones or tornadoes are very rare events. NOAA records indicate no tropical cyclone events, and only one possible tornado event in Caledonia County since 1950. The suspected tornado occurred in Peacham in August 2010 and was estimated to be an EF-0 event (wind speeds of 65-85 miles per hour), resulting in hundreds of softwood trees downed, uprooted, or snapped but no reported structural property damages.

Probability of Future Occurrences

High wind events will continue to be a ***highly likely*** occurrence in the planning area, though the majority of these occurrences will not result in severe property damages or losses.

According to the 2014 National Climate Assessment, though there is an observable increase in severity of storms, changes in the frequency or severity of tornadoes and wind events are still uncertain but are being extensively studied.[81]

[79] NOAA, National Weather Service: https://www.weather.gov/mfl/beaufort
[80] NOAA, National Centers for Environmental Information, Storm Events Database. Accessed August 4, 2020 at: https://www.ncdc.noaa.gov/stormevents/
[81] National Climate Assessment: https://nca2014.globalchange.gov/report/our-changing-climate/changes-storms

Impact on the Community and Vulnerability

The most significant threat high wind events pose to the planning area are related to property damage from falling trees and widespread power outages, along with transportation and economic disruptions. High winds pose a serious concern for all electric and telecommunication utilities in Vermont due to the customer outages and damage to infrastructure they may cause. Power outages can also have a significant impact on those residents who rely on electricity to heat or cool their homes (or for other special needs), especially if they occur in during periods of extreme temperatures. Road closures or roads that become impassible due to down trees or other impacts can also have a significant impact, particularly for those residents living in remote areas.

Vulnerability Assessment

This section provides summary information to describe the exposure and potential vulnerability of existing buildings, critical facilities, infrastructure (roads, bridges, and culverts), and historic properties in each town to natural hazards. It includes a series of tables and charts that summarize and/or identify specific assets of concern to each town, and where applicable, those that are located in identified hazard areas. Additional hazard-specific impacts and vulnerabilities for the planning area can be found within each separate hazard profile (see "Impact on the Community and Vulnerability" sections for more information).

Buildings

This section provides the results of a GIS-based vulnerability assessment to estimate the number of buildings that are located within identified hazard areas. For this assessment these include flood and wildfire hazard areas as identified and described in each hazard profile section. Currently these are the only geographically defined hazard locations in the planning area. For all other hazards it is assumed the entire planning area is uniformly exposed to the effects of potential hazard occurrences (for example, earthquakes, wind, or severe winter storms), and the vulnerability of specific buildings to these hazards can only be determined through more site-specific evaluations that are outside the scope of this assessment.

Table 20 identifies the estimated number and percentage of buildings within each town that are located within identified flood and wildfire hazard areas. These estimates were generated using best readily available data for each jurisdiction, including E911 address points (for buildings) in combination with unofficial digital flood hazard data provided by the State and wildfire hazard data provided by the SILVIS Laboratory at the University of Wisconsin. For more information on the delineation and description of flood and wildfire hazard areas, please see the "Location" sections for within each hazard profile.

Table 20. Building Exposure to Flood and Wildfire Hazards, By Town.

Town	Total # of Buildings	Buildings in Flood Hazard Areas		Buildings in Wildfire Hazard Areas	
		#	%	#	%
Burke	1,105	21	2%	954	86%
Sheffield	534	57	11%	219	41%
Sutton	538	16	3%	341	63%
Wheelock	546	15	3%	252	65%
Total	**2,723**	**109**	**4%**	**1,766**	**65%**

Source: NVDA

** Please note that this data is for general planning purposes only and does not replace a survey and/or engineering study to determine the actual location, exposure, or vulnerability of buildings to flood and wildfire hazards.*

Critical Facilities

Critical facilities are considered structures or institutions necessary for emergency response and disaster recovery. These facilities must continue to operate during and following a disaster to reduce the severity of impacts and accelerate recovery. Critical facilities typically include emergency operation centers (EOCs), fire stations, police stations, hospitals and medical centers, schools, city/town halls, public works garages, and other key government buildings. Table 21 through

Table 24 lists the key public critical facilities for each town as identified by the Hazard Mitigation Committee during the hazard mitigation planning process. The tables briefly describe each facility's key function and current generator status and also note those that are located within currently identified/mapped flood hazard areas. It is worth noting though that there are additional community assets in each town that could support emergency response and disaster recovery activities such as general stores/markets, gas stations, churches, and other commercial or community gathering places.

Table 21. Critical Facilities for Town of Burke.

Facility	Address	Function	Generator? (y/n)
Burke Town School	329 Burke Hollow Road	Gymnasium/cafeteria is shelter, and have school building - shelter	Y

Facility	Address	Function	Generator? (y/n)
East Burke School	611 VT Route 114	could be a shelter	N
Burke Town Office and Community Building	212 School Street	SHELTER and Town Office	Y
Town Garage	Town Garage Road *(off School Street)*	Highway Department	N
East Burke Fire Station*	42 VT Route 5A	Emergency response	N
West Burke Fire Station*	195 VT Route 114	Emergency response	N

Table 22. Critical Facilities for Town of Sheffield.

Facility	Address	Function	Generator? (y/n)
Millers Run School*	3249 VT-122	Emergency Shelter *(generator not possible due to building set-up)*	N
Sheffield Town Hall*	3210 VT-12	Emergency Shelter *(no generator and no water)*	N
Sheffield Town Office *(includes Town Clerk Office, Highway Department, and Fire Station)*	37 Dane Road	Emergency Shelter	Y

* *Located in identified flood hazard area.*

Table 23. Critical Facilities for Town of Sutton.

Facility	Address	Function	Generator? (y/n)
Sutton Elementary School	95 Underpass Road	Emergency Shelter	Y
Sutton Town Office	167 Underpass Road	Town Administration	Y
Sutton Fire Station	611 Burke Road	Emergency Shelter	Y

Table 24. Critical Facilities for Town of Wheelock.

Facility	Address	Function	Generator? (y/n)
Wheelock Town Hall	1192 VT RT 122 Wheelock VT	Emergency Operations Ctr Stage 1 emergency shelter Town Clerk operations	Y
Wheelock Town Garage*	RT 122 Wheelock Village	Storage of equipment	N
South Wheelock Fire Station	Burroughs Rd South Wheelock 4 corners	Storage of emergency response equipment	N

* *Located in identified flood hazard area.*

Figure 18 through Figure 21 show the specific location of critical facilities identified in the above tables as mapped by NVDA.

Figure 18. Critical Facilities in the Town of Burke.

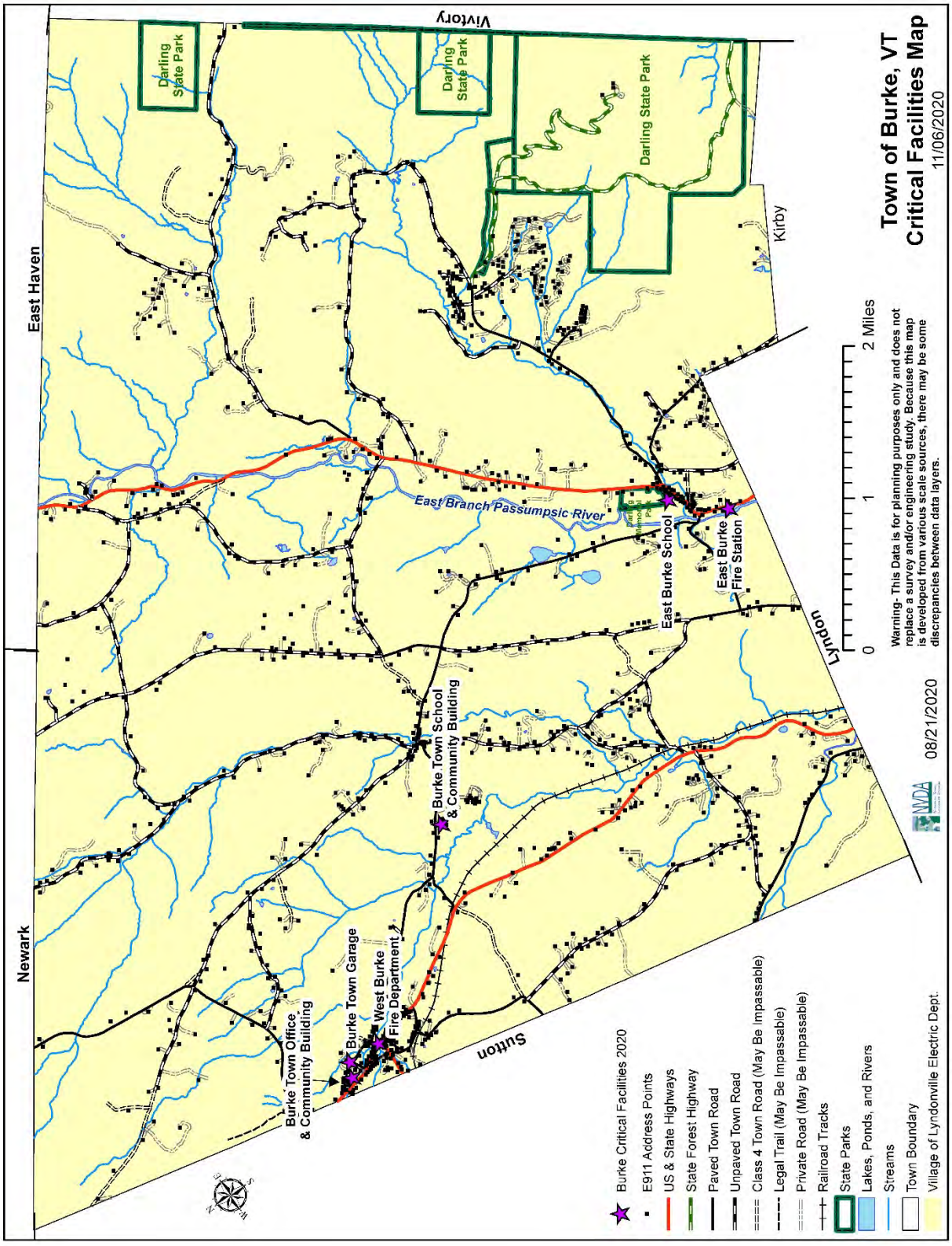


Figure 19. Critical Facilities for the Town of Sheffield.

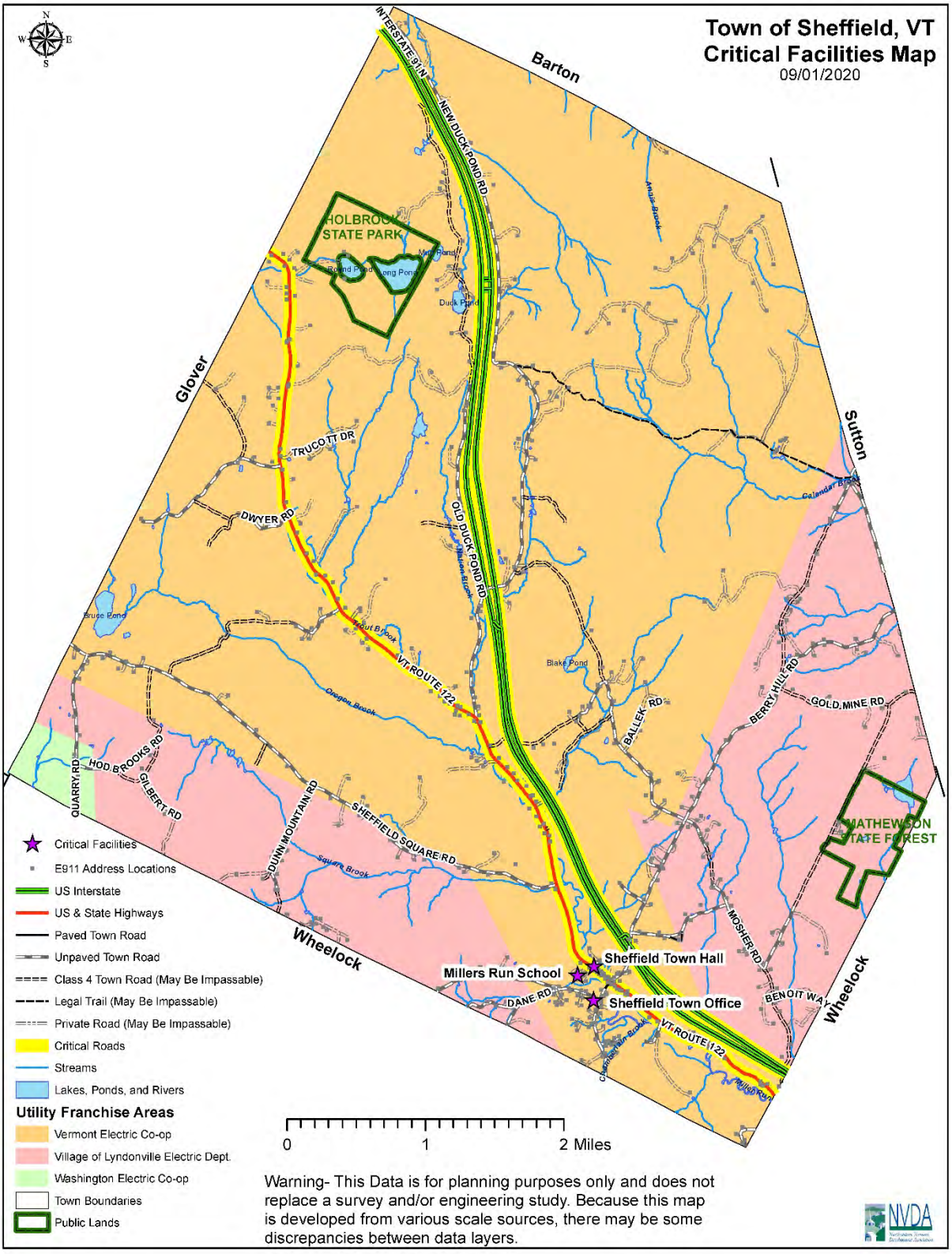


Figure 20. Critical Facilities for the Town of Sutton.

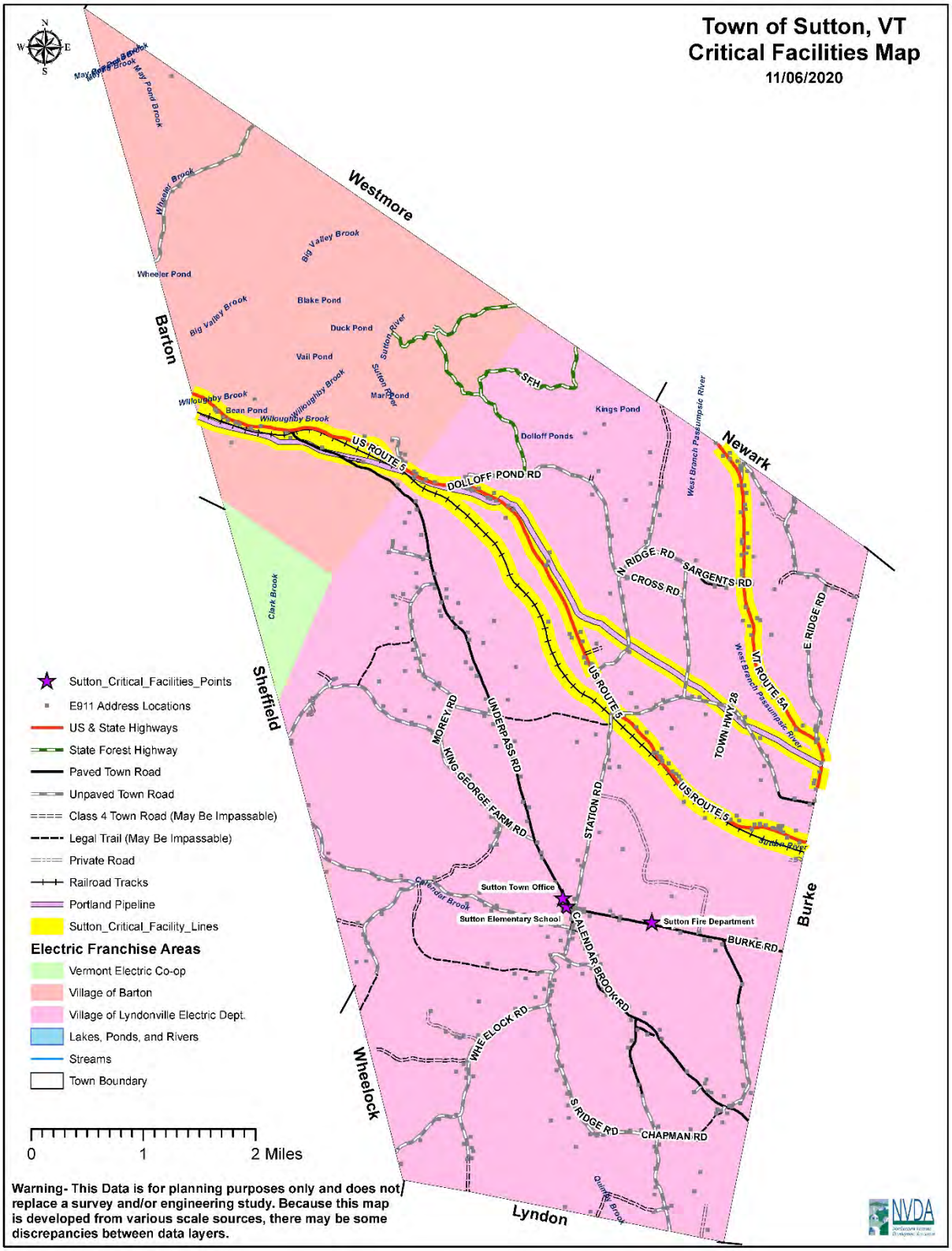
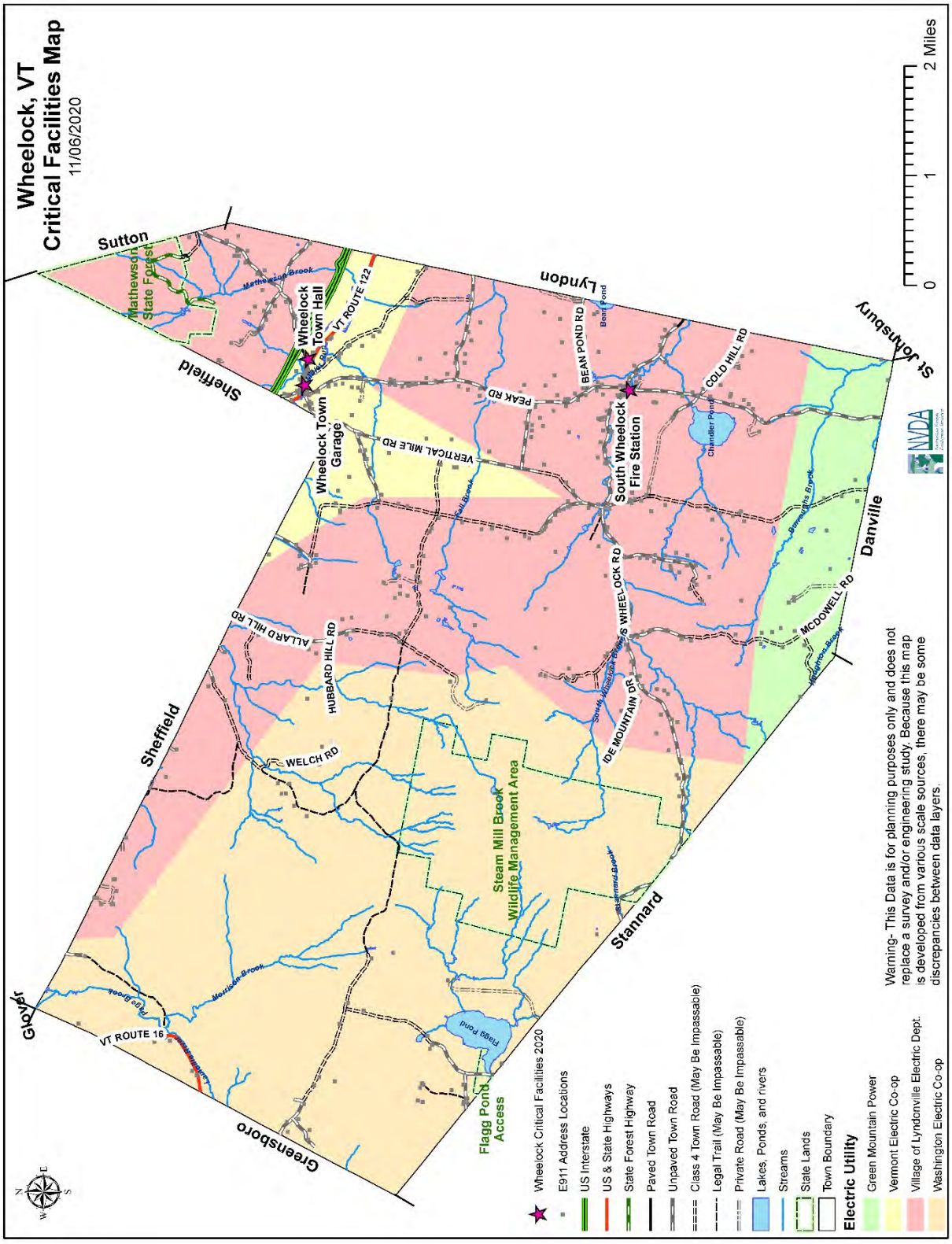


Figure 21. Critical Facilities for the Town of Wheelock.



Roads, Bridges, and Culverts

Beyond each town's existing buildings and critical facilities, the public infrastructure assets considered most at-risk to natural hazards are the many roads, bridges, and culverts located throughout the planning area. Each town has already adopted the State's minimum Road and Bridge Standards for the construction, repair, or maintenance of roads, bridges, and culverts. Table 25 provides some summary information for each town as made available through the Vermont Agency of Transportation (VTrans), which is then followed by more specific information on each type of infrastructure asset.

Table 25. Summary of Roads, Bridges, and Culverts, By Town.

Town	Total Highway Mileage	Highway Network Inventory Date	Road and Bridge Standards Adoption Date	Certificate of Compliance Date
Burke	56.66	4/5/2018	09/03/2019	5/15/2020
Sheffield	43.17	5/8/2017	07/03/2019	4/13/2020
Sutton	52.86	3/28/2018	06/27/2019	4/3/2020
Wheelock	46.66	3/29/2017	07/08/2019	3/18/2020

Source: VTrans, via the Vermont Flood Ready Website[82] and VTCULVERTs[83]

Vermont's Road Erosion Inventory (REI) was developed for municipalities to fulfill requirements of the Vermont DEC's Municipal Roads General Permit (MRGP). The MGRP is intended to achieve significant reductions in stormwater-related erosion from municipal roads, both paved and unpaved. MRGP requirements include conducting road erosion inventories of all hydrologically connected roads. The primary goal of the REI is to establish baseline conditions of road segments and evaluate progress of implementation efforts. For those road segments not meeting MRGP standards (Does Not Meet or Partially Meets scores), towns will be required to develop and implement a customized, multi-year plan to stabilize the road drainage system and bring them up to basic maintenance standards, along with additional corrective measure to reduce erosion as necessary to meet a TMDL or other water quality restoration effort.

Figure 22 through Figure 25 summarizes the number of road segments inventoried for each town and current inventory results as provided by Vermont DEC.[84] The REI results shown are preliminary and not part of an approved Road Stormwater Management Plan submitted by a municipality. More detailed

[82] Flood Ready Website, Community Reports. Accessed October 16, 2020 at: https://floodready.vermont.gov/assessment/community_reports
[83] VTCULVERTS, Vermont Agency of Transportation. Accessed September 24, 2020 at: https://vtculverts.org/
[84] Road Erosion Inventory, Vermont Department of Environmental Conservation. Accessed September 24, 2020 at: https://anrweb.vt.gov/DEC/IWIS/MRGPReportViewer.aspx?ViewParms=True&Report=Portal

information on each road segment is available to NVDA and town officials though the REI and were considered in determining those priority roads for flood and erosion hazard mitigation actions.

Figure 22. Summary of Road Erosion Inventory for Town of Burke.

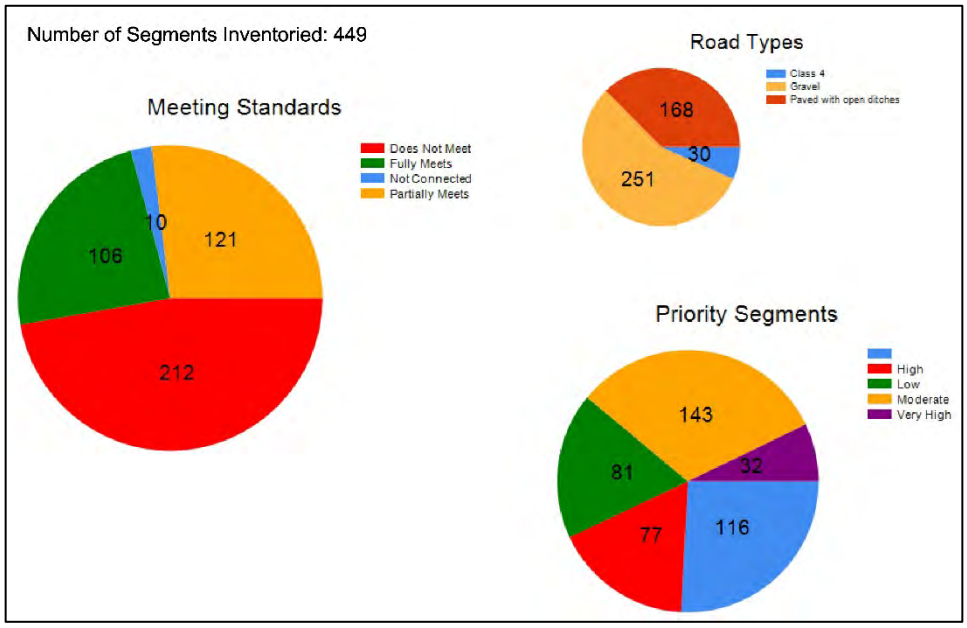


Figure 23. Summary of Road Erosion Inventory for Town of Sheffield.

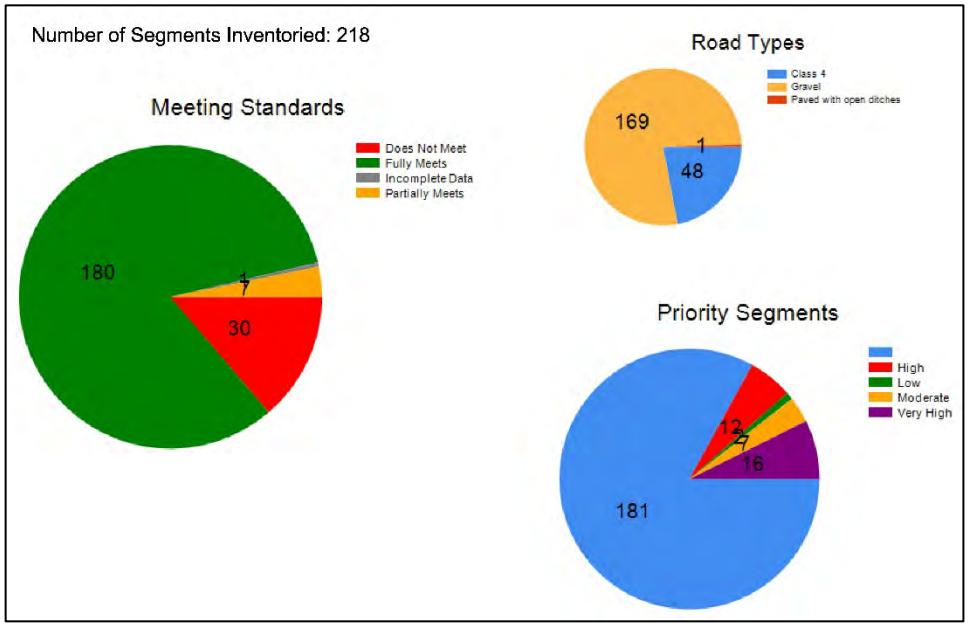


Figure 24. Summary of Road Erosion Inventory for Town of Sutton.

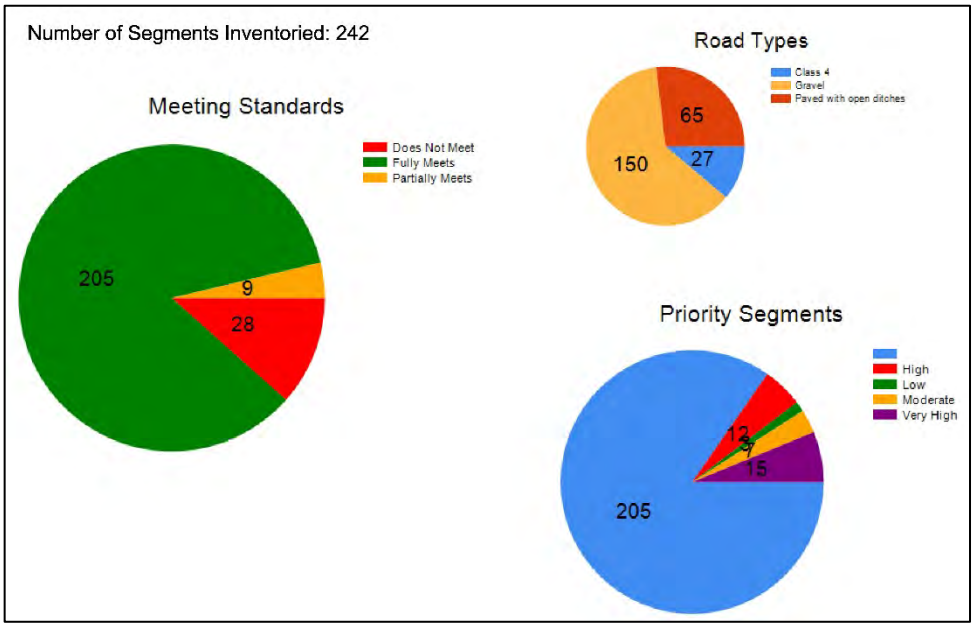
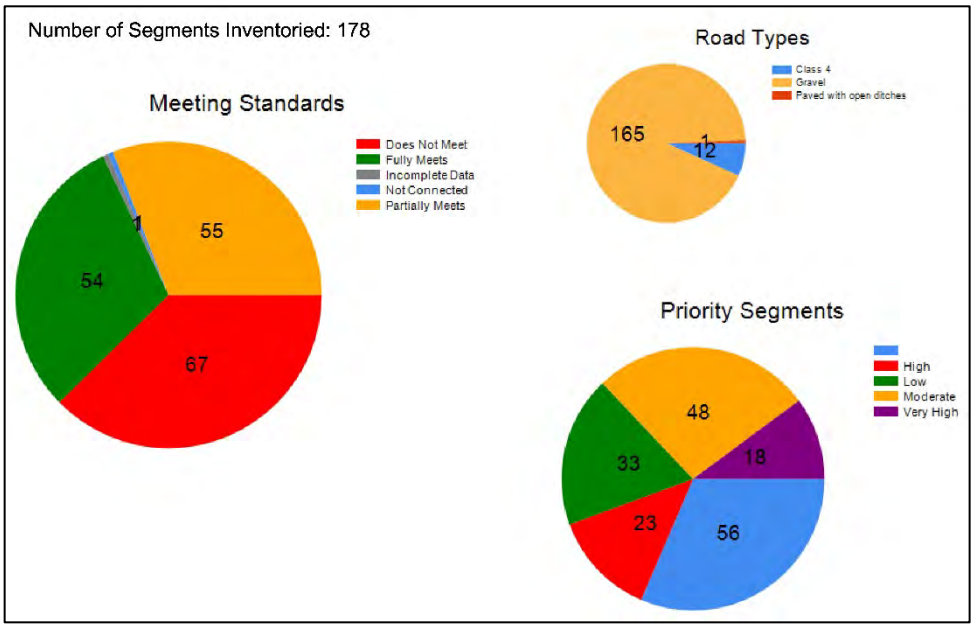


Figure 25. Summary of Road Erosion Inventory for Town of Wheelock.



VTCULVERTS, the online resource for accessing Vermont's Online Bridge and Culvert Inventory Tool (VOBCIT), provides a wealth of information collected and maintained by the Vermont Agency of Transportation in coordination with Vermont Regional Planning Commissions. Table 26 through

Table 28 summarize the overall condition of existing bridges and culverts for each town as provided through VTCULVERTS.[85] All bridge and culvert inventory data which has been previously collected and submitted through the old VOBCIT website is currently included as well. More detailed information on each road segment is available to NVDA and town officials though the REI and were considered in determining those priority bridges and culverts for flood and erosion hazard mitigation actions.

*Table 26. Condition of Existing Bridge Substructures, By Town. **

Town	Poor	Fair	Good	Unknown
Burke	2	1	15	3
Sheffield	0	0	4	0
Sutton	0	0	5	2
Wheelock	0	0	10	1

*Table 27. Condition of Existing Bridge Superstructure, By Town.**

Town	Poor	Fair	Good	Unknown
Burke	1	2	15	3
Sheffield	0	0	4	0
Sutton	0	0	5	2
Wheelock	0	0	10	1

*Table 28. Condition of Existing Bridge Decks, By Town.**

Town	Poor	Fair	Good	Unknown
Burke	2	3	13	3
Sheffield	0	0	4	0
Sutton	0	1	4	2
Wheelock	0	0	10	1

** Descriptions of Condition of Bridges:*

- Good – new, no noticeable deficiencies
- Fair – Minor deficiencies, no immediate attention necessary

[85] VTCULVERTS, Vermont Agency of Transportation. Accessed September 24, 2020 at: https://vtculverts.org/

- Poor – Missing or needs replacing soon, major deficiencies
- Unknown

*Table 29. Overall Condition of Existing Culverts, By Town.**

Town	Urgent	Critical	Poor	Fair	Good	Excellent	Unknown
Burke	0	0	87	175	194	0	2
Sheffield	2	10	53	86	138	50	2
Sutton	3	8	22	81	264	3	30
Wheelock	1	7	46	117	135	44	3

** Descriptions of Overall Condition of Culverts:*

- Urgent – Critical deficiencies that must be attended to immediately
- Critical – Less than 25% open and/or has critical deficiencies
- Poor – At least 25% open and/or has serious deficiencies
- Fair – At least 50% open, some existing or developing deficiencies
- Good – At least 75% open, few if any minor deficiencies
- Excellent – recently constructed, no visible deficiencies
- Unknown – Cannot provide evaluation due to structure not being visible, property owner, etc.

Summary Findings and Conclusions

The Hazard Analysis and Risk Assessment completed for the planning area includes both quantitative and qualitative information to help determine the potential impact of each identified hazard on community assets. This information provides significant findings that allow the Hazard Mitigation Committee to prioritize hazard risks and proposed hazard mitigation strategies and actions.

To assist in this process, the Hazard Mitigation Committee applied a “Priority Risk Index” (PRI). The PRI is a tool designed to (1) summarize relevant hazard profile information as included in this section; and (2) measure the degree of relative risk each hazard poses to the planning area based on that information. The PRI was used to assist the Hazard Mitigation Committee in ranking and prioritizing hazards based on a variety of characteristics including location, probability, potential impact, warning time, and duration.

The PRI results in numerical values that allow identified hazards to be ranked against one another – the higher the PRI value, the greater the hazard risk. PRI values are obtained by assigning varying degrees of risk to each of the five characteristics, or categories. Each degree of risk has been assigned an index value (1 to 4) and an agreed upon weighting factor, as summarized in Table 30.

To calculate the PRI value for a given hazard, the assigned index value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the below equation:

PRI VALUE =

(LOCATION x .20) + (PROBABILITY x .30) + (POTENTIAL IMPACT x .30) + (WARNING TIME x .10) + (DURATION x .10)

According to the weighting scheme applied by the Hazard Mitigation Committee, the highest possible PRI value is 4.0. Prior to being finalized, PRI values for each hazard were reviewed and accepted by the Hazard Mitigation Committee.

Table 30. Priority Risk Index (PRI).

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Location	Negligible	Less than 1% of planning area affected	1	20%
	Small	1-10% of planning area affected	2	
	Moderate	10-50% of planning area affected	3	
	Large	50-100% of planning area affected	4	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	1-10% annual probability	2	
	Likely	10-90% annual probability	3	
	Highly Likely	90-100% annual probability	4	
Potential Impact *	Minor	Very few injuries, if any. Only minor property damage and minimal disruption to quality of life. Partial or complete shutdown of critical facilities for less than one day.	1	30%
	Limited	Minor injuries only. 10-25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple fatalities/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of fatalities/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one month.	4	
Warning Time	More than 24 hours		1	10%
	12 to 24 hours		2	
	6 to 12 hours		3	
	Less than 6 hours		4	
Duration	Less than 6 hours		1	10%

	6 to 24 hours	2	
	1 to 7 days	3	
	More than 1 week	4	

** Potential impact is based upon the estimated maximum probable extent (magnitude/severity) for each hazard based on historic events or future probability data, as shown in Table 31.*

Table 31. Maximum Probable Extent.

Hazard	Maximum Probable Extent
Drought	Drought Category D3 (Extreme Drought) as classified by the US Drought Monitor (Drought Severity Classifications)
Earthquake	Magnitude of 4-4.9 on Richter Scale / Intensity of IV-V on MMI Scale
Extreme Cold	Wind chill of less than -40°F
Extreme Heat	3 consecutive days with a heat index exceeding 100°F
Hail	Intensity Category H6 on TORRO Hailstorm Intensity Scale
Infectious Disease	Pandemic (major disease outbreak with severe and life-threatening consequences)
Inundation Flooding & Fluvial Erosion	1 Percent Annual Chance Flood for all FEMA Special Flood Hazard Areas and up to 50-feet of erosion along the banks and adjacent lands of rivers and streams.
Invasive Species	Chronic, uncontrolled invasives with consistent threats to ecosystems and/or human health
Snow Storm & Ice Storm	Category 5 on Regional Snowfall Index (RSI)
Wildfire	100+ acres burned along wildland-urban interface
Wind	Winds gusts in excess of 70 miles per hour

Table 32 summarizes the degree of risk assigned for all identified hazards in the planning area based on the application of the PRI tool, along with the calculated PRI values. Please note that more detailed information on the specific locations, probabilities, vulnerabilities, and potential impacts for each hazard in the planning area are provided in each hazard-specific profile in this section. This detailed information was the basis for determining the overall summary of hazards as provided in Table 32.

Table 32. Summary of Priority Risk Index (PRI) Results.

Hazard	Category/Degree of Risk					PRI Value
	Location	Probability	Potential Impact	Warning Time	Duration	
Drought	Large	Possible	Minor	More than 24 hours	More than 1 week	**2.2**
Earthquake	Large	Possible	Minor	Less than 6 hours	Less than 6 hours	**2.2**
Extreme Cold	Large	Highly Likely	Limited	More than 24 hours	1 to 7 days	**3.0**
Extreme Heat	Large	Possible	Limited	More than 24 hours	1 to 7 days	**2.4**
Hail	Small	Likely	Minor	6 to 12 hours	Less than 6 hours	**2.0**
Infectious Disease	Small	Likely	Critical	More than 24 hours	More than 1 week	**2.7**
Inundation Flooding & Fluvial Erosion	Moderate	Likely	Critical	12 to 24 hours	1 to 7 days	**2.9**
Invasive Species	Negligible	Highly Likely	Minor	More than 24 hours	More than 1 week	**2.2**
Snow Storm & Ice Storm	Large	Highly Likely	Critical	More than 24 hours	1 to 7 days	**3.3**
Wildfire	Moderate	Possible	Limited	Less than 6 hours	1 to 7 days	**2.5**
Wind	Large	Highly Likely	Critical	More than 24 hours	1 to 7 days	**3.3**

The calculated PRI values were used by the Hazard Mitigation Committee to classify and rank each hazard according to three defined risk levels (Low, Moderate, or High) as shown in Table 33. It should be noted that although some hazards are classified as posing "low" risk, their occurrence of varying or unprecedented magnitudes is still possible and they will continue to be evaluated by the Hazard Mitigation Committee during future updates to this Plan.

Table 33. Hazard Risk Rating.

Hazard Risk Ranking	Hazards
High	Snow Storm & Ice Storm Wind Extreme Cold Inundation Flooding & Fluvial Erosion
Moderate	Infectious Disease Wildfire Extreme Heat
Low	Drought Earthquake Invasive Species Hail

Chapter 5. Capability Assessment

The purpose of conducting the capability assessment is to identify the strengths, limitations, or gaps for each participating town in terms of its current ability to manage and reduce risks from natural hazards. The capability assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals for the mitigation plan, but it also ensures that those goals are realistically achievable under existing local conditions. It also helps identify how mitigation actions should be prioritized or implemented.

> *C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))*

The capability assessment looks at each town's pre- and post-disaster hazard management capabilities, which are organized according to the following four key types of capabilities:

- ***Planning and Regulatory:*** Planning and regulatory capabilities refer to the ordinances, policies, laws, plans, and programs that the Tribe uses to guide physical development and growth on Tribal lands.
- ***Administrative and Technical:*** Administrative and technical capabilities refer to the Tribal government's staff, skills, and tools that can be used for mitigation planning and to implement specific mitigation actions.
- ***Financial:*** Financial capabilities refer to resources to fund mitigation actions.
- ***Outreach and Education:*** Outreach and education capabilities are programs and methods that could be used to encourage risk reduction behavior change and communicate hazard-related information.

The capability assessment also provides a review of each town's current participation and standing in the ***National Flood Insurance Program***, if applicable, prior to providing a final summary of results and conclusions at the end of this section.

One of the key steps in the capability assessment was to gather and review information on existing capabilities and resources in the planning area to gain an understanding of each town's current ability to mitigate risk. This process included multiple discussions with the Hazard Mitigation Committee as well as individual meetings with each town to further identify any specific capability issues that should be considered and/or addressed through the development of the mitigation action plan. The results of this assessment process are summarized through a series of tables provided in the following sections which align with the types of capabilities described above, along with some additional brief information that relates their current effectiveness for hazard risk reduction.

Planning and Regulatory

Vermont's local municipalities have the greatest authority to implement comprehensive hazard mitigation plans and regulations for their community. Vermont Statutes (Title 24 Chapter 117) clearly articulate that the right to determine which ordinances and bylaws will be adopted, what is included in those local regulations, and what is included in municipal plans rest largely with the local community. State agencies can suggest that certain provisions be incorporated into local regulations, and Act 250 and the NFIP provide State and Federal influence; however, the towns typically develop their own rules for development and land use, including in flood and erosion hazard areas. Towns are also responsible for issuance and review of municipal permits for compliance with their own municipal bylaws. Some municipalities in Vermont, including Sheffield and Wheelock, still choose not to have zoning. All Vermont communities have the option to develop and adopt different kinds of plans, including comprehensive plans, capital improvement plans, economic development plans, emergency operations/response plans, continuity of operations plans, and local hazard mitigation plans.

Table 34 provides a summary of the current planning and regulatory capabilities of each participating town as they relate to natural hazard risk reduction.

Table 34. Planning and Regulatory Capabilities.

Planning/Regulatory Tool	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	**Sheffield**	**Sutton**	**Wheelock**	
Plans					
Municipal (Town) Plan (Comprehensive/ Master Plan)	Yes *(updated 2017)*	Yes *(adopted 2017*)	Yes *(amended 2018)*	Yes *(amended 2019)*	Town plans are fairly comprehensive and inclusive of many of the below plans (separate elements) versus separate stand-alone plans. Also, "flood resilience plans" are required for all town plans adopted on July 1, 2014 and later (24 VSA §4382). These plans can be quite effective in supporting long-term risk reduction activities.
Open Space & Recreation Plan	No	No	No	No	Not as applicable for this region; however, land use and the preservation of natural resources is addressed in each Town Plan.

Planning/Regulatory Tool	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
Economic Development Plan	Yes*	Yes*	Yes*	Yes*	* Economic development is addressed as an element in each Town Plan. Also, to a large degree this is addressed through regional approaches.
Capital Improvements Plan	No	No	No	No	Each Town Plan addresses utilities and community facilities, but no town currently has an adopted CIP (though they have been recommended for Burke and Wheelock).
Local Emergency Management Plan	Yes *(adopted 2018)*	Yes *(updated 2019)*	Yes *(updated 2019)*	Yes *(adopted 2019)*	All towns routinely review, update, and formally readopt their LEMPs on an annual basis; however, these plans are more effective for emergency preparedness and response operations versus long-term risk reduction activities.
Continuity of Operations Plan	No	No	No	No	Town-specific COOPs have not been recommended before but could potentially become a part of LEMPs in the future.
Transportation Plan	Yes*	Yes*	Yes*	Yes*	* Transportation is addressed as an element in each Town Plan.
Stormwater Management Plan	No*	No*	No*	No*	* Stormwater is addressed in some town plans, but more so through road erosion inventories/plans now being created under DEC's Municipal Roads General Permit (MRGP) program. MRGP is intended to reduce stormwater-related erosion from municipal roads, both paved and unpaved, and under this legislation, towns must develop and implement a

Planning/Regulatory Tool	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
					customized, multi-year plan to stabilize their road drainage system. The plan will include bringing road drainage systems up to basic maintenance standards, and additional corrective measure to reduce erosion.
Wastewater Management Plan	No	No	No	No	All towns have on-site wastewater treatment systems but do not have specific WWMPs in place.
Historic Preservation Plan	No*	No*	No*	No*	Historic features and resources are addressed in each Town Plan; however, the inventories and related goals/actions remain somewhat vague and do not specifically relate to hazard risk reduction activities.
Community Wildfire Protection Plan	No	No	No	No	CWPPs are note in place at the local or regional / fire district level for participating towns.
Other special plans?	Yes	Yes	Yes	Yes	Passumpsic River Tactical Basin Plan (watershed/water quality management strategy). Priority actions from the plan that are relevant to hazard risk reduction include: (1) Improve river corridor and floodplain protections for the Passumpsic, Millers Run, East and West Branch Passumpsic River through zoning bylaws to allow these streams to develop new floodplains and reduce flood damage; and (2) Contact landowners in priority areas with important floodplain protection or restoration opportunities to encourage participation in

Planning/Regulatory Tool	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
					conservation and restoration programs.
Building Code, Permitting, and Inspections					
Building Code	Yes*	No	Yes*	No	* To obtain a building permit or occupancy certificate, the Towns of Burke and Sutton require proof that the State code was followed (Vermont Fire and Building Safety Code, 2015 edition, which adopted the IBC by reference.). Building codes are also linked to local zoning bylaws but such integration is considered somewhat vague.
Site Plan Review Requirements	Yes	No	Yes	No	Potential natural hazards are considered by the Development Review Boards in Burke and Sutton.
Zoning and Development Regulations					
Zoning Bylaws	Yes	No	Yes	No	Burke and Sutton have adopted and occasionally amend zoning regulations which are now integrated under a Unified Development Bylaw.
Subdivision Regulations	Yes	No	Yes	No	Burke and Sutton have adopted and occasionally amend subdivision regulations which are now integrated under a Unified Development Bylaw.
Flood Hazard Regulations	Yes	No	Yes	No	Burke and Sutton have adopted flood hazard regulations in compliance with federal NFIP standards, in addition to State standards for mitigating fluvial erosion hazards. These

Planning/Regulatory Tool	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
					regulations have been incorporated into each Town's Unified Development Bylaw.
Wetlands / River Corridor Regulations	Yes*	Yes*	Yes*	Yes*	* The State (ANR/DEC) regulates activities in and adjacent to wetlands. River corridor regulations are enforced for Burke via the State's River Corridors protection program.
Stormwater Management Regulations	No	No	No	No	Stormwater management regulations are adopted and enforced at the State level (ANR/DEC). The current Stormwater Permitting Rule went into effect in March 2019 and applies to development or redevelopment of one or more acres of impervious surface and will apply to sites of on half acre or more beginning in July 2022.
Other hazard-related regulations or ordinances?	Yes	Yes	Yes	Yes	Each town has adopted a Road and Bridge Standards policy for the construction, repair, or maintenance of roads, bridges, or culverts. Burke also has regulations regarding water quality for open water (setbacks/ buffers).

Administrative and Technical

Each of the four participating communities in the planning area have fairly limited administrative and technical capabilities as it relates to the implementation of hazard mitigation activities. Each town relies quite heavily on a small number of full-time employees who are supported through part-time staff and local volunteers (including those who serve as appointed or elected officials on Selectboards, Planning Commissions, etc.), in addition to external entities for technical support such as NVDA, State agencies, non-profit organizations, and private sector consultants. Each town also relies heavily on volunteer fire brigades and mutual aid agreements in response to major fires or other local emergencies. So, while

their overall governance capabilities are considered adequate for standard operations, each town faces human resource constraints when it comes to taking on additional activities or projects. This makes the integration of hazard risk reduction into routine government activities and operations even more important than for communities with higher levels of administrative and technical capability.

Table 35. Administrative and Technical Capabilities.

Administrative / Technical Resource	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
Administration					
Planning Commission	Yes	Yes	Yes	Yes	Planning Commissions include each Town's Zoning Officers and/or other town staff along with local volunteers who are provided stipends for their continued support.
Development Review Board	Yes	No	Yes	No	DRB's for Burke and Sutton routinely meet to maintain and enforce their Unified Development Bylaws.
Conservation Commission	Yes	No	Yes	No	Conservation Commissions in Burke and Sutton work to maintain the character of their towns by conserving and enhancing natural and cultural resources, which often helps to facilitate natural hazard mitigation.
Local Emergency Planning Committee	Yes	Yes	Yes	Yes	All towns participate in the regional LEPC (District 9), represented mostly by first responders.
Mitigation Planning Committee	Yes	Yes	Yes	Yes	Each town provides representatives to work closely with NVDA on the development, maintenance, and implementation of the local hazard mitigation plan.

Administrative / Technical Resource	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
Maintenance Programs to Reduce Risk	Yes	Yes	Yes	Yes	Each town has active Highway Departments for certain risk reduction activities (cleaning culverts, swales, etc.). All towns have a mix of paved and gravel roads that require frequent maintenance.
Mutual Aid Agreements	Yes	Yes	Yes	Yes	Each town's local Fire Department maintains mutual aid agreements with surrounding towns for back up assistance as needed, which can be greatly beneficial in managing and reducing impacts caused by natural hazard events.
Staff					
Chief Building Official	No	No	No	No	No designated local staff.
Floodplain Administrator	Yes	No	Yes	No	The Zoning Administrators for Burke and Sutton also serve as the local Floodplain Administrators.
Emergency Manager	Yes	Yes	Yes	Yes	Each town has a designated Emergency Management Director/Coordinator per their adopted LEMPs.
Community Planner	No	No	No	No	NVDA provides capability
Civil Engineer	No	No	No	No	Hired when required
GIS Coordinator	No	No	No	No	NVDA provides capability

Administrative / Technical Resource	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
Resource Development Staff or Grant Writers	No	No	No	No	NVDA provides capability along with other external organizations.
Public Information Officer	No	No	No	No	Select Board or other town representatives fill this role if/when needed.
Technical					
Staff with knowledge of land development and land management practices	Zoning Administrator	No	Zoning Administrator	No	NVDA and local residents also support this capability for all towns.
Staff trained in construction practices related to buildings and/or infrastructure	Zoning Administrator	No	Zoning Administrator	No	NVDA and local residents also support this capability for all towns.
Staff with an understanding of natural hazards and risk mitigation	Fire Chief	Fire Chief	Fire Chief	Fire Chief	NVDA and local residents also support this capability for all towns.
Hazards data and information	SHMP, Flood Ready Website	SHMP, Flood Ready Website	SHMP, Flood Ready Website	SHMP, Flood Ready Website	Anecdotal / local knowledge supplements data that is made available from State and FEMA, etc.
Warning systems/services (e.g., Reverse 911, outdoor warning signals, etc.)	No	No	No	No	Although no formal warning systems are in place, each town has some limited capability to share emergency information with residents through various services.

Financial

Most Vermont municipalities have very limited financial capabilities to implement hazard mitigation activities on their own, and this is true for all four towns covered under this Plan. While each town has the legal authority to levy taxes and assessments for special purposes, including those related to risk reduction, they are much more likely to pursue alternative and external sources of funding for hazard mitigation projects. Further, these sources are much more likely to be in the form of State or Federal grant funding assistance versus debt financing through bonds or other borrowing mechanisms that would require local approvals. One exception for each town is through road funds which are used to repair or improve the existing condition of roads, bridges, and culverts on public lands, and are generally considered by resident taxpayers as important and necessary expenses for towns to continue paying for.

Table 36. Financial Capabilities.

Financial Tool / Resource	Accessible for Hazard Mitigation Purposes?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
General funds	Maybe	Maybe	Maybe	Maybe	General funds may at times be used to support minor hazard mitigation projects, subject to the discretion of local budget planning and decision-making processes (i.e., Town Meeting, etc.).
Road funds	Yes	Yes	Yes	Yes	Road funds are routinely used by towns to mitigate existing flood and fluvial erosion hazards.
Capital Improvement Program (CIP) funding	No	No	No	No	CIPs not in place for any towns
Special purpose taxes	No	No	No	No	N/A
Fees for water, sewer, gas, or electric services	No	No	No	No	Sutton has a small water system; but with only 33 account payers and funds limited to O&M for the existing system.
Stormwater utility fee	No	No	No	No	N/A

Financial Tool / Resource	Accessible for Hazard Mitigation Purposes?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
Development impact fees	No	No	No	No	N/A
Incur debt through general obligation bonds and/or special tax bonds	No	No	No	No	Debt financing is occasionally considered on an ad-hoc basis; but bonds must be approved by referendum and are difficult to pass without clear benefits to the community.
Incur debt through private activities	No	No	No	No	N/A
FEMA Hazard Mitigation Assistance (HMA)	Yes	Yes	Yes	Yes	Towns may be able to provide local cash match, but this is mostly limited to smaller projects.
HUD Community Development Block Grant (CDBG)	Yes	Yes	Yes	Yes	Eligible for block grants; towns have used CDBG in past for planning projects.
Other federal funding programs	Yes	Yes	Yes	Yes	USDA Rural Development
State funding programs	Yes	Yes	Yes	Yes	Available through various sources and often leveraged through coordination with NVDA. Examples include the Municipal Planning Grant (MPG) program that encourages and supports planning and revitalization for local communities, and the Municipal Roads Grants in Aid Program that provides funding for best management practices (BMPs) on municipal roads.
Other resources?	No	Yes	No	No	As a result of the construction of a 40-megawatt, 16-turbine wind farm (developed by First Wind), the Town of Sheffield is expected to receive $520,000 annually for 20 years, which was more than its annual

Financial Tool / Resource	Accessible for Hazard Mitigation Purposes?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
					municipal budget in 2011 ($10 million in tax revenues from the project over its 20-year life). 50 percent of these funds are used to lower the resident tax rate, while the other half is typically invested in the markets (though the town reserves the right to borrow from these funds as needed for necessary expenses).

Education and Outreach

Each of the four participating towns already have some existing programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. These mostly include municipal websites and other digital or online platforms, such as Facebook and Front Porch Forum (a web-based neighborhood forum). However, the existing capabilities remain somewhat limited as none of the communities have their own public information or communications office to specifically handle education and outreach initiatives. Another identified constraint for implementing such initiatives was the lack of widespread broadband internet across the planning area which limits the number of residents able to be engaged through web-based tools and forums. All towns share this concern but have since joined a NEK Community Broadband, a Communications Union District (CUD) that is working to bring high speed Internet to every home and business in the Northeast Kingdom at an affordable price.

Table 37. Education and Outreach Capabilities.

Program / Organization	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
Local citizen groups or non-profit organizations focused on community planning, environmental protection, emergency preparedness, special/functional needs populations, etc.	Yes	No	No	No	Burke – “One Burke” was formed in 2017 as a result of a series of Community Visits organized by the Vermont Council on Rural Development. It includes 3 task forces (Education, Pedestrian Safety & Trails, and Village Infrastructure).

Program / Organization	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
					Wheelock – The "Wheelock Community Initiative" has a mission to encourage neighbors to get to know and trust one another. It seeks to create economic and social opportunities for all residents including elders, families, working people, and non-residents to develop a vibrant town.
Informational websites, newsletters, and other media for continuous public education and outreach	Yes	Yes	Yes	Yes	All towns maintain websites with local information and use Front Porch Forum (dedicated listserv / catch-all community outreach and awareness activities). In addition, Burke and Wheelock use social media (Facebook) for informational messaging to residents, and Wheelock prints and distributes monthly newsletters for its residents pick up at various sites around the community (Town Hall, Transfer Station, etc.).
Annual Festivals or other Recurring Community Events	Yes	Yes	No	No	Burke – Fall Foliage Festival; NEMBAFest Sheffield – Annual Field Day
Ongoing public education or information program (e.g., fire safety, responsible water use, household preparedness, environmental education, etc.)	No	No	No	No	
Natural disaster or safety-related school programs	No	No	No	No	
StormReady certification	No	No	No	No	

Program / Organization	In Place for Community?				Notes / Effectiveness for Hazard Risk Reduction
	Burke	Sheffield	Sutton	Wheelock	
Firewise USA® certification	No	No	No	No	
Public-private partnership initiatives addressing disaster-related issues	No	No	No	No	

National Flood Insurance Program Participation

The National Flood Insurance Program (NFIP) aims to reduce the impact of flooding on public and private structures by both providing insurance and encouraging proactive adoption and enforcement of floodplain management regulations. In Vermont, NFIP program oversight m oversight and technical assistance is provided by the State Floodplain Manager & NFIP Coordinator at the Agency of Natural Resources' Department of Environmental Conservation (ANR/DEC). Vermont is unique, in that State statute requires communities to submit floodplain development permit applications to DEC for review and comment. DEC regional floodplain managers provide technical review and written comments to assist communities in administration and enforcement of their adopted flood hazard regulations.

> *C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))*

As shown in Table 38, two of the four communities in the planning area currently participate in the NFIP (Burke and Sutton). Both of these towns have adopted local floodplain management regulations that are in compliance with current NFIP requirements, and each also enforces higher regulatory standards through the State's River Corridors program to better manage and address inundation flooding and fluvial erosion hazards. The Towns of Sheffield and Wheelock continue to have community discussions with regard to future NFIP participation, but like many Vermont communities, they have shared concerns with regard to the accuracy of existing FEMA floodplain mapping products which are out of date. These maps for Sheffield and Wheelock depicted flood hazards at the time of study (in 1974 and 1985, respectively) and do not reflect how rivers have meandered or floodplains have changed over the past few decades. The modernization of existing FEMA floodplain maps, State River Corridor maps, and future NFIP participation and compliance are identified as opportunities for capability improvements and potential hazard mitigation actions as part of this Plan.

Table 38. NFIP Participation.

Community	NFIP Participant?	NFIP Entry Date	Current Effective Map Date	Total # of Policies	Total Premiums	Total # of Paid Losses
Burke	Yes	06/23/1975	06/04/80	3	$1,326	0
Sheffield	No	N/A	11/15/74	N/A	N/A	N/A
Sutton	Yes	08/01/2017	08/01/17	0	$0	0
Wheelock	No	N/A	09/27/85	N/A	N/A	N/A

Source: FEMA and Vermont ANR/DEC

Summary and Conclusions

Given the rural nature of Vermont's communities, town capacity to develop, manage, and implement appropriate mitigation plans and measures is often considered insufficient. Accordingly, many towns across the State require assistance from their Regional Planning Commission and/or various State agencies to appropriately address hazard vulnerability. This holds true for many Northeast Kingdom communities and the four towns participating in this hazard mitigation plan, each of which maintains a strong, cooperative relationship with NVDA and State agencies to address their unique hazard risks and vulnerabilities.

As described throughout this section, each of the four participating towns operate with limited internal resources to develop and administer hazard risk reduction activities. For priority issues such as local road maintenance and fire protection, these limitations or constraints have often been overcome through the dedication of available town staff in combination with active citizens and community volunteers. These people and their willingness to provide their time, expertise, or other assistance is among the key strengths for towns as it relates to community resilience building. Each of the towns have also greatly benefited from the support and coordination of other agencies and organizations that provide technical, administrative, and financial assistance for local capacity building. This is especially the case for local community planning and risk reduction initiatives, including but not limited to the development of this multi-jurisdictional hazard mitigation plan.

In terms of specific gaps or opportunities to enhance existing capabilities, the Hazard Mitigation Committee identified the need to better communicate information on hazard risk and resiliency initiatives with community residents. This could likely be done through a coordinated regional approach with the support of NVDA but also tailored for each town through its own existing public education and outreach tools (i.e., websites, listservs, newsletters, etc.). Representatives from all towns suggested that public outreach initiatives are among the most feasible and desirable mitigation actions to implement given their relatively low cost and the existing tools or platforms available to support them. This is more of an immediate opportunity that builds off existing capabilities and strengths as mentioned above.

As it relates to flood risk reduction, each town has taken significant steps to improve their capabilities with the recent updates to their town plans, each of which includes specific sections that address local flood risks as well as specific strategies of actions to reduce those risks. The capability of all communities will greatly benefit from updated flood hazard maps which are anticipated to be complete for the Passumpsic River watershed by 2024. The Towns of Sheffield and Wheelock have also identified joining the NFIP (in combination with updated mapping) as an opportunity to greatly increase their capabilities to mitigate future flood losses, while also increasing the financial assistance available to them and their residents following a major disaster through FEMA and the State's Emergency Relief & Assistance Fund. Similarly, local adoption of the State's River Corridor bylaws (as done by the Town of Burke) provide an opportunity for Sheffield, Sutton, and Wheelock to reduce the future impacts of local flooding and fluvial erosion hazards more holistically. However, it must also be recognized that Hazard Mitigation Committee members expressed concerns over the difficulty in gaining widespread community support for these types of regulatory or permitting programs that may limit or restrict what can be done on private properties.

Lastly, the importance of continued financial support through State and Federal grant programs to help each town implement structural hazard mitigation projects cannot be overstated. The financial capabilities and resources available to each town to even provide a cash match to grant funding programs is quite limited, particularly for larger projects that can benefit the community or planning area as a whole. In terms of addressing this capability gap, all four towns strongly support multiple strategies and actions as proposed in the State Hazard Mitigation Plan, including but not limited to the following:

- Strategy: Establish a statewide conservation and buyout program.
    - Action: Create a dedicated State fund to support the purchase or local match of hazard-prone properties and the purchase of easements to conserve river corridors, floodplains, and wetlands identified as key flood attenuation areas.
    - Action: Fund ERAF for non-federal disasters in towns that have adopted floodplain and/or river corridor bylaws and to support the 25% non-federal match for buyouts and develop criteria for distribution when funding is limited.
- Strategy: Develop solutions to fund hazard mitigation.
    - Action: Convene State, federal, and private funders annually to identify ways to better leverage existing funding, fill funding gaps, increase funder alignment, and strengthen funding criteria that relate to hazard mitigation and climate adaptation.
    - Action: Develop a clearinghouse directory of mitigation funding opportunities including details on requirements, deadlines, and timeframes that can be available at the local level to implement mitigation action.
- Improve community resilience and local engagement.
    - Action: Support the coordination and capacity of community resilience initiatives at the local level (such as Community Resilience Organizations) to reduce community and individual vulnerability to natural hazards.

Chapter 6. Mitigation Strategy

The hazard mitigation strategy is the culmination of work presented in the Planning Area Profile, Hazard Analysis and Risk Assessment and Capability Assessment. It is also the result of multiple meetings and public outreach. The work of the Hazard Mitigation Committee during plan development was essential in creating mitigation goals and individual town actions included in this chapter. As described in Chapter 3 (Planning Process), the Hazard Mitigation Committee worked in a consistent, coordinated manner to identify and prioritize the goals and mitigation actions for the planning area as a whole in addition to their own towns. The Mitigation Strategy answers the question, "what are we going to do about the risks identified" with many specific projects each town can implement.

Hazard Mitigation Goals

> *C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))*

The Hazard Mitigation Committee developed a Mission Statement and four Goal Statements for this Plan. These were developed with careful review of the current State Hazard Mitigation Plan, the 2005 All-Hazards Mitigation Plans for each town, and each town's Town Plan. The Hazard Mitigation Committee developed the mission and goal statements for the region and then developed mitigation actions for each of their towns. The goal statements include a theme or category for easy reference. The figures below show the mission and goal statements.

Mission Statement

- **To protect life, property, natural resources and the quality of life in the planning area by reducing the vulnerability to climate change and natural hazards.**

Figure 26. Mission Statement.

High Hazards

- Mitigate risks due to high hazards such as snow storms, ice storms, high winds, extreme cold and flooding.

Natural Resources

- Prioritize the protection of natural resources when mitigating risk and restore natural features of rivers, streams and other surface waters.

Infrastructure

- Improve the resilience of the built environment, including buildings, roads and bridges, and utilities, to natural hazards and climate change.

Capacity

- Increase the capacity of the region to mitigate risk to natural hazards and climate change through municipal planning, public education, and regional collaboration.

Figure 27. Goal Statements.

Comprehensive Range of Mitigation Actions

> *C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))*

The mission statement and goal statements established for this Plan are broad in scope. Mitigation actions are more specific and identify an activity or process that is intended to reduce or eliminate risk to natural hazards. The Hazard Mitigation Committee reviewed the mitigation actions from each of the town's previous All-Hazards Mitigation Plans to identify actions that were completed and those that need revision and may still be relevant. The tables below indicate the status of all actions from the 2005 All-Hazards Mitigation Plans.

Town of Burke

Table 39. Burke Previous Mitigation Action Status.

Action ID#	Mitigation Project / Action	Status	Description
1	Need a Generator for emergency use (high priority). Provide backup power for shelter and EOC.	Completed	Both shelters (Burke Town School and Town Office) and the town's primary EOC have backup generators and wiring in place for generator hookups.
2	Adopt Highway Codes and Standards. Policies that require upgrades to meet state standards.	Completed	Road and Bridge Standards adopt that meet VTrans 2013 standards were adopted on 09/03/19.
3	GIS mapping of NFIP areas. Identify flood areas with vulnerable structures consistent with Vermont GIS mapping effort.	Completed	NVDA produced "digitized" maps of the FEMA floodplains, although the paper maps still remain the official maps of the Special Floodplain Hazard Area. NVDA also worked with the Burke Planning Commission and the state NFIP coordinator to map river corridors -- areas that provide the minimum amount of space for lateral movement of the stream channel over time, plus a 50 ft. vegetation buffer for streambank stability. The

Action ID#	Mitigation Project / Action	Status	Description
			Town of Burke amended its floodplain regulations based on this mapping effort and now discourage new development in the river corridors, which are subject to fluvial erosion.

Town of Sheffield

Table 40. Sheffield Previous Mitigation Action Status.

Action ID#	Mitigation Project / Action	Status	Description
1	Consider becoming a member if the National Flood Insurance Program (high priority). Will provide insurance protection for residents and businesses.	Delayed	Still under consideration.
2	Two generators for emergency shelters – one at school and one at Emergency Operations Center. Will provide back-up power at shelter and EOC. Needed due to frequent power outages.	Partially Completed / In Progress	The municipal building that houses the EOC has a propane generator, but it still needs roof coverage. The status of a generator at the school is now in the hands of Kingdom East School District.
3	Need a used four-wheel drive with pump and small tank for forest fire access. Will provide access to difficult terrain when forest fires break out.	Delayed	Coordination required with the Sheffield / Wheelock Fire Department.
4	Red Cross Pre-Agreement. Will help with setting up shelters quickly and efficiently.	Delayed	Still needed.

Action ID#	Mitigation Project / Action	Status	Description
5	GIS mapping of NFIP areas. Identify flood areas with vulnerable structures consistent with Vermont GIS mapping effort.	Partially Completed / In Progress	In progress with new LIDAR mapping.

Town of Sutton

Table 41. Sutton Previous Mitigation Action Status.

Action ID#	Mitigation Project / Action	Status	Description
1	Consider becoming a member if the National Flood Insurance Program (high priority). Will provide insurance protection for residents and businesses.	Completed	Sutton officially entered the NFIP on 08/01/2017.
2	One generator for the emergency shelter at the school. Will provide backup power at shelter. Needed due to frequent power outages.	Completed	This was done in April 2013.
3	Need a new bridge in place of culvert on Road #3. The culvert is not large enough and needs a bridge to alleviate problems.	Completed	Bridge was replaced in 2005 with a Precast Concrete Arch (Bridge #14) and is Town-Owned.
4	Adopt Codes and Standards as recommended by VTRANS (high priority). Adoption of standards will help improve roads, bridge and culvert upgrades and provide for	Completed	Road and Bridge Standards adopt that meet VTrans 2013 standards were adopted on 06/27/19.

Action ID#	Mitigation Project / Action	Status	Description
	additional grant funds in a disaster.		
5	GIS mapping of NFIP areas. Identify flood areas with vulnerable structures consistent with Vermont GIS mapping effort.	Partially Completed / In Progress	NVDA "digitized" FEMA floodplain maps (Special Flood Hazard Areas) and mapped river corridors, areas that provide the minimum amount of space for lateral movement of the stream channel over time, plus a 50-foot vegetation buffer for streambank stability. Based on this mapping exercise, the town opted to join the NFIP, but did not choose to regulate development in the river corridors. The current Town Plan, amended in March 2019, recommends ongoing work with the Vermont River Management Program to identify and protect areas subject to fluvial erosion, such as the Calendar Brook area. Updated FEMA flood hazard maps are anticipated to be complete for the Passumpsic River watershed by 2024.

Town of Wheelock

Table 42. Wheelock Previous Mitigation Action Status.

Action ID#	Mitigation Project / Action	Status	Description
1	Consider becoming a member if the National Flood Insurance Program (high priority). Will provide insurance protection for residents and businesses.	Partially Completed / In Progress	The Wheelock Planning Commission worked with NVDA to draft flood hazard regulations that were minimally compliant with FEMA standards (44 CFR); however, the Selectboard did not adopt them. Entry into the NFIP will continue to be explored and considered as it is a stated goal in the new Town Plan (adopted in 2019).

Action ID#	Mitigation Project / Action	Status	Description
2	Two generators for emergency shelters – one at school and one at Emergency Operations Center. Will provide back-up power at shelter and EOC. Needed due to frequent power outages.	Completed	Primary EOC (Wheelock Town Hall) now has a generator. The school is not located in Wheelock, so this part of the action is cancelled.
3	Need a used four-wheel drive with pump and small tank for forest fire access. Will provide access to difficult terrain when forest fires break out.	Delayed	Coordination required with the Sheffield / Wheelock Fire Department.
4	Red Cross Pre-Agreement. Will help with setting up shelters quickly and efficiently.	Delayed	Still relevant and move forward to this Plan.
5	GIS mapping of NFIP areas. Identify flood areas with vulnerable structures consistent with Vermont GIS mapping effort.	Partially Completed / In Progress	NVDA "digitized" FEMA floodplain maps (Special Flood Hazard Areas) and worked with the Vermont Department of Environmental Conservation to map river corridors, which are the minimum area to accommodate lateral movement of the stream channel over time, plus a 50-foot buffer to ensure streambank stability. Updated FEMA flood hazard maps are anticipated to be complete for the Passumpsic River watershed by 2024.

After accessing the status and relevancy of the mitigation actions from the previous plans, the Hazard Mitigation Committee began developing a new list of mitigation actions. To develop a new list of mitigation actions, the Hazard Mitigation Committee carefully reviewed the list of strategies in each of the town's Town Plans. They also considered the four mitigation action categories as defined by FEMA.

1. Local Plans and Regulations
2. Structure and Infrastructure Projects
3. Natural Systems Protection and
4. Education and Awareness Programs

The following table, taken from the Local Mitigation Planning Handbook, clearly defines each of these mitigation types and provides examples for each.

Table 43. Mitigation Action Categories.

Mitigation Action	Description of Category	Examples of Mitigation Actions
1 **Local Plans and Regulations**	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Building codes and enforcement • Capital improvement programs • Open space preservation • Stormwater management • regulations and master plans
2 **Structure and Infrastructure Projects**	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.	• Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits. • Floodwalls and retaining walls • Detention and retention structures • Culverts • Safe rooms
3 **Natural Systems Protection**	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements
4 **Education and Awareness Programs**	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.	• Radio or television spots • Websites with maps and information • Real estate disclosure • Mailings to residents in hazard-prone areas. • StormReady • Firewise Communities

NVDA Actions to Support Mitigation in the Region

The Northeastern Vermont Development Association (NVDA) took a lead role in developing this Multi-Jurisdiction Hazard Mitigation Plan. The agency is committed to continuing their support of mitigating risk in region by conducting the following activities:

- Support towns by hosting an annual Hazard Mitigation Committee meeting and supporting Plan updates.
- Support regional public education campaigns for hazard mitigation.
- Support towns interested in expanded broadband services.
- Support towns by disseminating information regarding weatherization opportunities, such as Heat Squad, Northeast Employment Training, and Efficiency Vermont).
- Assist towns with updating their infrastructure inventory on the Vermont Agency of Transportation bridge and culvert inventory database.
- Support towns with National Flood Insurance Program adoption and/or maintenance. Support Community Rating System (CRS) participation for towns if they enter the program.

Mitigation Action Plan

> *C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))*

The following tables define the mitigation actions for each town. The mitigation actions were ranked in order of priority with the help of the Hazard Mitigation Committee. Priority was determined using the following evaluation and prioritization criteria. These criteria helped to not only provide further qualitative screening for the proposed mitigation actions but also aided in a benefit vs cost review.

Table 44. Evaluation and Prioritization Criteria.

Priority Level	Evaluation and Prioritization Criteria
Very High	Extremely beneficial projects that will greatly contribute to mitigation of multiple hazards and the protection of people and property.
High	Strategies that provide mitigation of several hazards and have a large benefit that warrants their cost and time to complete.

Priority Level	Evaluation and Prioritization Criteria
Medium	Strategies that would have some benefit to people and property and are somewhat cost effective at reducing damage to property and people.
Low	Strategies that would not have a significant benefit to property or people, address only one or two hazards, or would require funding and time resources that are impractical.

The priority levels were developed using the following criteria:

- Application to multiple hazards – Strategies are given a higher priority if they assist in the mitigation of several natural hazards.
- Time required for completion – Projects that are faster to implement, either due to the nature of the permitting process or other regulatory procedures, or because of the time it takes to secure funding, are given higher priority.
- Estimated benefit – Strategies which would provide the highest degree of reduction in loss of property and life are given a higher priority. This estimate is based on the risk assessment chapter, particularly regarding how much of each hazard's impact would be mitigated.
- Cost effectiveness – To maximize the effect of mitigation efforts using limited funds, priority is given to low-cost strategies.

The above criteria, combined with local knowledge, classified each mitigation action as either Very High, High, Medium or Low priority. Regardless of priority level assigned, the completion of each mitigation action is contingent on the availability of funding. These priority classifications are specific to each town and will be evaluated and updated as a matter of routine plan maintenance, and as each town's conditions or planning objectives change. Appendix B includes the list of mitigation actions sorted by goal statement. The towns were also provided with a digital version of the mitigation actions called the Mitigation Action Tracker.

Mitigation actions were all assigned an associated cost of high, medium or low based on the following scale:

- Low Actions under $25,000
- Medium Actions between $25,000 - $100,000
- High Actions over $100,000

Burke Mitigation Actions

1	**Install generators at the Town Hall, Town Garage, and the Fire Stations.**	
Action Details	Some locations have generators, but the Town will follow up to ensure that all priority critical facilities have capabilities for emergency backup power in the future.	
Very High	**Responsible Party**	Town of Burke Office
	Supporting Agencies	NVDA
	Estimated Cost	Low
	Potential Funding Sources	FEMA (BRIC, HMGP), VT DPS (Emergency Management)
	Implementation Schedule	2021-2023
	Hazards Addressed	Snow Storm & Ice Storm, Wind
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

2	**Expand current efforts to install a Reverse 911 system.**	
Action Details	Ultimate objective is to have a specific resident list combined with the technology for real-time alerting for emergencies or other critical information related to Town provided services.	
Very High	**Responsible Party**	Town of Burke Office
	Supporting Agencies	NVDA, VT DPS (Emergency Management)
	Estimated Cost	Low
	Potential Funding Sources	FEMA (EMGP, HSGP, BRIC, HMGP), VT DPS (Emergency Management)
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	Capacity

	Mitigation Category	Structure & Infrastructure Projects

3	**Support regional education campaign and expand the Town's capacity for hazard mitigation with local resources such as websites, listservs, and newsletters.**	
Action Details	Hazard mitigation education may include information regarding weatherization, heating safety, renewable energy, flood regulations, flood mitigation, winter snow or ice storm issues such as snow loads or power outages, State building codes, and low-impact development.	
High	**Responsible Party**	Planning Commission/Conservation Commission
	Supporting Agencies	NVDA, VT DEC (River Management Program, Vermont Emergency Management Program
	Estimated Cost	Low
	Potential Funding Sources	FEMA (EMGP, HSGP, BRIC, HMGP)
	Implementation Schedule	2021-2026
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Education & Awareness Programs

4	**Identify the best location for relocating the new Town Garage (out of the special flood hazard area). Complete a feasibility study for the new location and demolish the old facility.**	
Action Details	Currently working towards this goal as the current location is no longer feasible.	
High	**Responsible Party**	Planning Commission/Selectboard
	Supporting Agencies	NVDA
	Estimated Cost	High
	Potential Funding Sources	VT ACCD Municipal Planning Grant, USDA Community Facilities Program, FEMA (BRIC, HMGP, FMA)
	Implementation Schedule	2021-2022

	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

5	**Annually update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool (VOBCIT).**	
Action Details	This is an ongoing activity performed with the assistance of NVDA.	
High	**Responsible Party**	Road Foreman
	Supporting Agencies	NVDA
	Estimated Cost	Low
	Potential Funding Sources	VTrans
	Implementation Schedule	2021-2026
	Hazards Addressed	Earthquake, Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

6	**Replace undersized or failing culverts identified in the Town's VOBCIT.**	
Action Details	Selectboard determines and makes a list of which bridges and culverts are the Town's highest priorities.	
High	**Responsible Party**	Road Foreman/ Town Administrator
	Supporting Agencies	NVDA
	Estimated Cost	Medium
	Potential Funding Sources	FEMA (BRIC, HMGP), VTrans, VTrans, VT DEC (Municipal Roads Municipal Roads Grants In Aid Program)
	Implementation Schedule	2021-2024

	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

7	**Adopt and enforce state level building codes.**	
Action Details	Building codes are somewhat linked to local zoning, and tied to permits through the Department of Fire Safety, Village Center Designation Program. Most structures were built before 1939 and need to be brought up to current codes (fit-up) for multi-unit dwellings and commercial properties, Burke has 2 village center designations.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	Planning Commission
	Estimated Cost	Low
	Potential Funding Sources	VT ACCD Municipal Planning Grant / Tax credits to individual property owners in designated areas
	Implementation Schedule	2021-2022
	Hazards Addressed	Earthquake, Inundation Flooding & Fluvial Erosion, Snow Storm & Ice Storm, Wind
	Mitigation Goal	High Hazards
	Mitigation Category	Local Plans & Regulations

8	**Mitigate flood risk in the river corridors along the Passumpsic River including the East and West branches of the river, and the Dishmill Brook Watershed.**	
Action Details	Mitigation measures may include acquisitions, easements, improving riparian buffers, improved stormwater management, dam removals, bridge and culvert replacements, gully remediation, and berm or abutment removals.	
High	**Responsible Party**	Conservation Commission/Planning Commission
	Supporting Agencies	NVDA, Caledonia County Natural Resources Conservation District
	Estimated Cost	Low

	Potential Funding Sources	Vermont Land Trust/Passumpsic Valley Land Trust
	Implementation Schedule	2021-2025
	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	High Hazards
	Mitigation Category	Natural Systems Protection

9	**Secure a long-term supply of gravel to protect roadways.**	
Action Details	As we are looking for a new location for Town Garage we are considering property that has these capabilities	
High	**Responsible Party**	Selectboard
	Supporting Agencies	NVDA, VTrans
	Estimated Cost	High
	Potential Funding Sources	VTrans
	Implementation Schedule	2021-2023
	Hazards Addressed	Inundation Flooding & Fluvial Erosion, Snow Storm & Ice Storm
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

10	**Update the town's road ordinance and policies to include "complete street" principles and stormwater management.**	
Action Details	"complete street principles" – the redesign of paved public roads to more safely accommodate all users, including motorists, cyclists, transit riders and pedestrians of all ages – for major road upgrades. Complete street principles may not apply to all local road projects, but at minimum should be considered for major highway and enhancement projects in East Burke, West Burke, and Burke Hollow.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	NVDA, VTrans

	Estimated Cost	Low
	Potential Funding Sources	VTrans
	Implementation Schedule	2021-2022
	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

11	**Improve the efficiency and weatherization of Burke's housing stock to minimize severe winter weather impacts.**	
Action Details	Use state and regional programs, such as Button Up, HEAT Squad, and others. Form a local energy committee.	
Medium	**Responsible Party**	Town of Burke (Energy Committee or Planning commission)
	Supporting Agencies	NVDA, Efficiency Vermont, Heat Squad, VECAN, VNRC
	Estimated Cost	Low
	Potential Funding Sources	Vermont AHS (Department for Children and Families), VECAN, VNRC
	Implementation Schedule	2022-2026
	Hazards Addressed	Snow Storm & Ice Storm
	Mitigation Goal	Capacity
	Mitigation Category	Structure & Infrastructure Projects

12	**Identify the best possible locations for fire stations in West Burke and East Burke out of special flood hazard areas. Complete feasibility studies and develop a plan to build a new fire stations in these ideal locations, and demolish the old structures.**	
Action Details	Relocation/reconstruction of these Town-owned critical facilities is deemed to be the only option.	
Medium	**Responsible Party**	Planning Commission/Selectboard

	Supporting Agencies	NVDA
	Estimated Cost	High
	Potential Funding Sources	VT ACCD Municipal Planning Grant, USDA Community Facilities Program
	Implementation Schedule	2021-2022
	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

13	**Implement project recommendations within the East and West River Corridor Plans.**	
Action Details	Work with the Caledonia County Conservation District and the State of VT to identify funding opportunities. Technical Basin Plan has been recently updated, and the Town will continue to work with NVDA on implementation activities (Frank Maloney, Ben Copens).	
Medium	**Responsible Party**	Conservation Commission/Planning Commission
	Supporting Agencies	ANR, NVDA, Cal
	Estimated Cost	High
	Potential Funding Sources	Vermont Land Trust/Passumpsic Valley Land Trust
	Implementation Schedule	2022-2025
	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Natural Resources
	Mitigation Category	Natural Systems Protection

14	**Conduct land evaluations and site analysis to prioritize conservation easements.**	
Action Details	Conservation easements can be leveraged for many natural ecosystem benefits, including those related to natural hazard risk reduction.	
Medium	**Responsible Party**	Conservation Commission/Planning Commission

	Supporting Agencies	NVDA, Caledonia County Natural Resources Conservation District
	Estimated Cost	Low
	Potential Funding Sources	VT ACCD Municipal Planning Grant
	Implementation Schedule	2022-2026
	Hazards Addressed	Inundation Flooding & Fluvial Erosion, Wildfire
	Mitigation Goal	Natural Resources
	Mitigation Category	Natural Systems Protection

15	**Establish a Town Bylaw that renewable energy resources will be considered for all new Town owned facilities and for current facilities that undergo construction or retrofit.**	
Action Details	Support the development of renewable resources that provide or the protection of natural and cultural resources, and that reinforce traditional land use patterns and municipal development policies. Consider co-generation using renewable energy resources for municipal facilities, especially for those build in the future.	
Medium	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA
	Estimated Cost	Low
	Potential Funding Sources	VT ACCD Municipal Planning Grant, if amendment is part of larger effort
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	Natural Resources
	Mitigation Category	Local Plans & Regulations

16	**Develop a bylaw to ensure that new development incorporate low-impact development standards that minimize impairment of watersheds and source protection areas.**

Action Details	Some of these techniques may include: · Disconnecting roof gutters from roads and driveways, allowing roof runoff to filtrate in soils or plants; · Landscaping such as rain gardens, vegetated swales, or infiltration trenches to absorb runoff from paved areas and roofs; · Limiting impervious surface coverage to further enhance on-site filtration.	
Medium	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA, VT DEC
	Estimated Cost	Low
	Potential Funding Sources	VT ACCD Municipal Planning Grant
	Implementation Schedule	2021-2023
	Hazards Addressed	Drought, Extreme Heat, Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Natural Resources
	Mitigation Category	Local Plans & Regulations

17	**Implement an intensive water quality monitoring program to evaluate phosphorus, nitrogen, sediment, and E. coli sources in the Basin. Use sampling results to identify pollution sources in the basin and work with basin partners to address these.**	
Action Details	One Burke is already looking at this opportunity which could help enhance the community's resilience to climate-related natural hazards and other adverse environmental problems.	
Medium	**Responsible Party**	One Burke
	Supporting Agencies	NVDA, Caledonia County Natural Resources Conservation District, VT ANR
	Estimated Cost	Low
	Potential Funding Sources	VT ANR
	Implementation Schedule	2022-2025
	Hazards Addressed	Invasive Species
	Mitigation Goal	Natural Resources

	Mitigation Category	Natural Systems Protection

18	**Contact landowners in priority areas with important floodplain protection or restoration opportunities to encourage participation in conservation and restoration programs.**	
Action Details	Collaborate with the towns of Sheffield and Wheelock because many of these landowners live along the East Branch of the Passumpsic where buffer plantings would provide protection.	
Medium	**Responsible Party**	Planning Commission/Conservation Commission
	Supporting Agencies	NVDA, Caledonia County Natural Resources Conservation District, UVM Ext.
	Estimated Cost	Low
	Potential Funding Sources	Passumpsic Valley Land Trust, Vermont Land Trust, Ecosystem Restoration Program, Upper CT River Mitigation Enhancement Fund
	Implementation Schedule	2021-2023
	Hazards Addressed	Inundation Flooding & Fluvial Erosion, Invasive Species
	Mitigation Goal	Natural Resources
	Mitigation Category	Education & Awareness Programs

19	**Complete outreach to farmers to improve nitrogen management on farms through the use of Adapt N software, pre-sidedress nitrate testing, and demonstrating the use of shorter duration corn with legume cover crops.**	
Action Details	This action could be woven together with other outreach activities and help enhance the agricultural community's resilience to climate-related natural hazards and other adverse environmental problems.	
Medium	**Responsible Party**	Planning Commission/Conservation Commission
	Supporting Agencies	VT Agriculture, Food & Markets, Caledonia County Natural Resources Conservation District
	Estimated Cost	Low

	Potential Funding Sources	Agricultural Clean Water Initiative Partnership, USDA, Vermont Agency of Agriculture
	Implementation Schedule	2022-2026
	Hazards Addressed	Drought, Invasive Species
	Mitigation Goal	Natural Resources
	Mitigation Category	Education & Awareness Programs

20	**Encourage underground placement of utility lines whenever possible to avoid high wind, snow, and ice damage that may result in power outages and road closures.**	
Action Details	Consider amendment to zoning regulations or a "an open trench bylaw". Possible technical assistance from Vermont Local Roads	
Medium	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA, Vermont Local Roads
	Estimated Cost	Low
	Potential Funding Sources	Town Funds
	Implementation Schedule	2022-2026
	Hazards Addressed	Snow Storm & Ice Storm, Wind
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

21	**Consider joining FEMA's Community Rating System (CRS). The Town may currently qualify for CRS points that would make it worthwhile.**	
Action Details	The Town's adoption of higher regulatory standards and other local floodplain management activities could result in premium rate reductions for existing NFIP policyholders.	
Medium	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA, VT DEC (River Program)

	Estimated Cost	Low
	Potential Funding Sources	VT ACCD Municipal Planning Grant
	Implementation Schedule	2021-2023
	Hazards Addressed	Inundation Flooding and Fluvial Erosion
	Mitigation Goal	High Hazards
	Mitigation Category	Local Plans & Regulations

Sheffield Mitigation Actions

1	**Review state's river-corridor map and consider the implications of protecting these areas mapped in order to mitigate risks to public safety, critical infrastructure, historic structures, and municipal investments.**	
Action Details	Participation in the Passumpsic River Watershed Analysis started in 2019; meantime, the Town can work with NVDA who will provide education and outreach regarding river corridor protection.	
Very High	**Responsible Party**	Planning Commission/ Selectboard
	Supporting Agencies	FEMA, USGS, NVDA, VT DEC, VT ANR
	Estimated Cost	Low
	Potential Funding Sources	FEMA, USGS, VT DEC, VT ANR
	Implementation Schedule	2022-2024
	Hazards Addressed	Inundation Flooding and Fluvial Erosion
	Mitigation Goal	Natural Resources
	Mitigation Category	Natural Systems Protection

2	**Expand current efforts to install a Reverse 911 system.**	
Action Details	NVDA will support the town with this effort.	
Very High	**Responsible Party**	Selectboard

	Supporting Agencies	NVDA, VT DPS (Emergency Management)
	Estimated Cost	Medium
	Potential Funding Sources	FEMA (EMGP, HSGP, BRIC, HMGP), VT DPS (Emergency Management), PUC, Comm Util
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	High Hazards
	Mitigation Category	Structure & Infrastructure Projects

3	**Retrofit or replace insufficient roads, bridges, culverts, and ditches identified in the Sheffield Road, Bridge, Culvert, and Ditching Backlog of Maintenance and Repair Listing.**
Action Details	Repair/ Maintenance actions as needed on a listing developed and updated annually by the Road Foreman. Work to be accomplished so as to reduce the backlog to zero within 5 years.

Very High	**Responsible Party**	Road Commissioner and Road Foreman
	Supporting Agencies	VTrans, NVDA
	Estimated Cost	High
	Potential Funding Sources	FEMA (BRIC, HMGP), VTrans, VTrans, VT DEC (Municipal Roads Municipal Roads Grants In Aid Program)
	Implementation Schedule	2021-2026
	Hazards Addressed	All
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

4	**Support regional education campaign and expand the Town's capacity for hazard mitigation with local resources such as websites, listservs, and newsletters.**

Action Details	Hazard mitigation education may include information regarding weatherization, heating safety, renewable energy, flood regulations, flood mitigation, winter snow or ice storm issues such as snow loads or power outages, State building codes, and low-impact development.	
High	**Responsible Party**	Selectboard and Planning Commission
	Supporting Agencies	NVDA, VT DEC (River Management Program, Vermont Emergency Management Program
	Estimated Cost	Low
	Potential Funding Sources	FEMA (EMGP, HSGP, BRIC, HMGP)
	Implementation Schedule	2021-2026
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Education & Awareness Programs

5	**Conduct analysis to determine if joining the National Flood Insurance Program (NFIP) is in the best interests of the Town.**	
Action Details	This effort has been going on for some time. Further work contingent on completion of #1 above. Once received further action to be considered.	
High	**Responsible Party**	Planning Commission and Selectboard
	Supporting Agencies	NVDA, Vermont DEC
	Estimated Cost	Low
	Potential Funding Sources	Town Funds
	Implementation Schedule	2022-2026
	Hazards Addressed	Inundation Flooding and Fluvial Erosion
	Mitigation Goal	High Hazards
	Mitigation Category	Local Plans & Regulations

6	**Conduct a town study of the condition, needs, and replacement/upgrade schedule of facility requirements for the fire station, town garage, town offices, and emergency/shelter center.**	
Action Details	Hire a consultant to provide an assessment, and short and long term goals on the identified facilities and needs.	
High	**Responsible Party**	Planning Commission and Selectboard
	Supporting Agencies	NVDA, American Red Cross
	Estimated Cost	Medium
	Potential Funding Sources	Town Funds
	Implementation Schedule	2021-2023
	Hazards Addressed	All
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

7	**Install standby generators in attached sheds on, two critical facilities, the Emergency Operations Center (Town offices) and the Town Hall.**	
Action Details	Work partially complete; generator needs a shed on the town offices, and a shed and generator are needed on the town hall. Work to be coordinated with developing an MOU with local school district.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	NVDA
	Estimated Cost	Low
	Potential Funding Sources	FEMA (BRIC, HMGP), VT DPS (Emergency Management)
	Implementation Schedule	2021-2023
	Hazards Addressed	Snow Storm & Ice Storm, Wind
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

8	**Develop a MOU with the local school district to use the school auditorium for an emergency shelter.**	
Action Details	Development of an MOU; provide a standby generator and facility for the auditorium only. Coordination with installing standby generators.	
High	**Responsible Party**	Selectboard & School District Leadership
	Supporting Agencies	NVDA
	Estimated Cost	Low
	Potential Funding Sources	Town Funds
	Implementation Schedule	2021-2023
	Hazards Addressed	All
	Mitigation Goal	High Hazards
	Mitigation Category	Structure & Infrastructure Projects

9	**Annually update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool (VOBCIT).**	
Action Details	Review inventory document and conduct annual field survey of bridge, culvert, and ditch/channel conditions to confirm/update listing.	
High	**Responsible Party**	Road Commissioner and Road Foreman
	Supporting Agencies	VTrans, NVDA
	Estimated Cost	Low
	Potential Funding Sources	VTrans
	Implementation Schedule	2021-2026
	Hazards Addressed	Earthquake, Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

10	**Collaborate with the Town of Wheelock to purchase a fire fighting vehicle that can access highly wooded areas.**	
Action Details	Will provide access to difficult terrain when forest fires break out.	
Medium	**Responsible Party**	Selectboard
	Supporting Agencies	NVDA, FEMA, USDA
	Estimated Cost	High
	Potential Funding Sources	FEMA (EMPG, HSGP), Vermont League of Cities and Towns has template documents for share purchase agreements among towns.
	Implementation Schedule	2021-2026
	Hazards Addressed	Wildfire
	Mitigation Goal	Capacity
	Mitigation Category	Structure & Infrastructure Projects

11	**Develop an agreement with the American Red Cross to assist with disaster planning and education.**	
Action Details	Collaborate with the NVDA, Red Cross, & Emergency Action Planner to develop this agreement.	
Medium	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA, American Red Cross
	Estimated Cost	Low
	Potential Funding Sources	Town funds
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Education & Awareness Programs

12	**Commission a study on how to include off-the-grid homeowners on the internet and emergency alerting systems.**	
Action Details	Present studies do not anticipate inclusion of off-the-grid residents into any solutions.	
Medium	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA, FEMA
	Estimated Cost	Medium
	Potential Funding Sources	FEMA, PUC, Comm Util
	Implementation Schedule	2021-2026
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Structure & Infrastructure Projects

13	**Develop a Flood Mitigation Plan for the Village.**	
Action Details	Contingent on receipt of new floodplain mapping.	
Medium	**Responsible Party**	Planning Commission
	Supporting Agencies	USGS, NVDA, DEC, FEMA
	Estimated Cost	Medium
	Potential Funding Sources	FEMA (BRIC, HMGP, FMA)
	Implementation Schedule	2022-2026
	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	High Hazards
	Mitigation Category	Local Plans & Regulations

14	**Perform an investigation and study to: install a new under/overpass on I-91 to reconnect Drake place Road with VT Route 122, and enlarge the New Duck Pond Road I-91 underpass to state road standards.**	
Action Details	Investigation/study conducted by a licensed engineering firm coordinated by VTrans and the town.	
Medium	**Responsible Party**	Planning Commission
	Supporting Agencies	VTrans, NVDA
	Estimated Cost	Medium
	Potential Funding Sources	Federal Highway Administration
	Implementation Schedule	2021-2026
	Hazards Addressed	All
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

15	**Query DEC local river engineer to perform a hydraulic analysis of the drainage structures/systems in various subdivisions for adequacy and to provide corrective actions proposals.**	
Action Details	The culverts in the area of various subdivisions are proving to be inadequate which is contributing to erosion of streambanks and landscaping of private properties. DEC software can provide adequacy reviews and engineer can suggest solutions.	
Medium	**Responsible Party**	Road Commissioner and Road Foreman
	Supporting Agencies	VTrans, NVDA
	Estimated Cost	Medium
	Potential Funding Sources	Private Owners, VTrans, Town
	Implementation Schedule	2021-2023
	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	High Hazards
	Mitigation Category	Structure & Infrastructure Projects

16	**Study the need for land planning to properly manage upland areas to mitigate flood risk.**	
Action Details	Coordination with FPR, NVDA, and eventual acquisition of floodplain mapping from USGS to determine needs and solutions.	
Low	**Responsible Party**	Planning Commission
	Supporting Agencies	USGS, NVDA, DEC, FPR
	Estimated Cost	Low
	Potential Funding Sources	N/A
	Implementation Schedule	2021-2026
	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Natural Resources
	Mitigation Category	Natural Systems Protection

17	**Investigate the possibility and cost of burying critical power and communication utilities with the village proper**	
Action Details	Coordination with local utility providers as to workability and cost.	
Low	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA
	Estimated Cost	Low
	Potential Funding Sources	Utilities, Town
	Implementation Schedule	2021-2026
	Hazards Addressed	Snow Storm & Ice Storm, Wind
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

Sutton Mitigation Actions

1	**Expand current efforts to install a Reverse 911 system.**	
Action Details		
Very High	**Responsible Party**	Town Clerk
	Supporting Agencies	NVDA, VT DPS (Emergency Management)
	Estimated Cost	Low
	Potential Funding Sources	FEMA (EMGP, HSGP, BRIC, HMGP), VT DPS (Emergency Management)
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	High Hazards
	Mitigation Category	Structure & Infrastructure Projects

2	**Support regional education campaign and expand the Town's capacity for hazard mitigation with local resources such as websites, listservs, and newsletters, consisting of a minimum of quarterly communications.**	
Action Details	Hazard mitigation education may include information regarding weatherization, heating safety, renewable energy, flood regulations, flood mitigation, winter snow or ice storm issues such as snow loads or power outages, State building codes, and low-impact development.	
High	**Responsible Party**	Selectboard, Town Clerk
	Supporting Agencies	Planning Commission, Energy Committee, NVDA
	Estimated Cost	High
	Potential Funding Sources	Town Funds
	Implementation Schedule	2021-2026
	Hazards Addressed	All

	Mitigation Goal	Capacity
	Mitigation Category	Education & Awareness Programs

3	**Public education on weatherization, heating systems and renewable energy projects.**	
Action Details	Energy Committee leading, Window Dressers, Button Up Vermont, subsidized energy audits available, recreate PACE program - funds improvements without large upfront capital expense. Implement projects identified by the Energy Audit that will mitigate risk to extreme cold.	
High	**Responsible Party**	Energy Committee
	Supporting Agencies	NVDA, Efficiency Vermont, Nearby towns
	Estimated Cost	Low
	Potential Funding Sources	Town Funds
	Implementation Schedule	2021-2026
	Hazards Addressed	Extreme Cold, Extreme Heat
	Mitigation Goal	Capacity
	Mitigation Category	Education & Awareness Programs

4	**Assign road crew to NVDA training regarding minimizing sedimentation of brooks and wetland areas.**	
Action Details	Education of road foreman and crew to minimize environmental impacts of road system, VTrans training will be available, Better Backroads Program, how to better use equipment	
High	**Responsible Party**	Road Foreman
	Supporting Agencies	Selectboard
	Estimated Cost	Low
	Potential Funding Sources	Town Funds
	Implementation Schedule	2021-2026
	Hazards Addressed	Inundation Flooding & Fluvial Erosion

	Mitigation Goal	Infrastructure
	Mitigation Category	Natural Systems Protection

5	**Develop a Capital Budget and Plan that, at a minimum, addresses a multi-year roads budget, including an analysis of how best to fund major maintenance/ improvement projects and scheduled equipment replacements. This should include completing Act 64 "Drainage and Erosion Assessment."**	
Action Details		
High	**Responsible Party**	Selectboard, Budget Committee, Road Foreman
	Supporting Agencies	NVDA
	Estimated Cost	Medium
	Potential Funding Sources	Grants-in-Aid Program, Better Back Roads, VTrans, VT ACCD Municipal Planning Grant, Town Funds
	Implementation Schedule	2021-2026
	Hazards Addressed	All
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

6	**Increase capacity of the Fire Department to minimize the impact of hazardous material incidents.**	
Action Details	Sheffield Wind Project has 16 turbines; each has 400 gallons of oil in nacelle that could leak and impact ecosystem, Portland Pipeline and Pumping Station poses potential risk of leak, Washington County Railway parks up to 50 tank cars full of gas on siding adjacent to U. S. Route 5.	
High	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA, Vermont Emergency Management, LEPC, Disaster planning exercises
	Estimated Cost	Medium

	Potential Funding Sources	Companies owning projects
	Implementation Schedule	2021-2022
	Hazards Addressed	Wildfire
	Mitigation Goal	Capacity
	Mitigation Category	Natural Systems Protection

6	**Increase capacity of the Fire Department to minimize the impact of hazardous material incidents.**	
Action Details	Sheffield Wind Project has 16 turbines; each has 400 gallons of oil in nacelle that could leak and impact ecosystem, Portland Pipeline and Pumping Station poses potential risk of leak, Washington County Railway parks up to 50 tank cars full of gas on siding adjacent to U. S. Route 5.	
High	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA, Vermont Emergency Management, LEPC, Disaster planning exercises
	Estimated Cost	Medium
	Potential Funding Sources	Companies owning projects
	Implementation Schedule	2021-2022
	Hazards Addressed	Wildfire
	Mitigation Goal	Capacity
	Mitigation Category	Natural Systems Protection

7	**Develop a system for quarterly communication with residents regarding hazard mitigation.**	
Action Details	This system may include workshops, fairs, newsletters, mailings, and web-based resources.	
High	**Responsible Party**	Town Clerk, Energy Committee
	Supporting Agencies	NVDA

	Estimated Cost	Low
	Potential Funding Sources	Town Funds
	Implementation Schedule	2021-2026
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Education & Awareness Programs

8	**Annually update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool (VOBCIT).**	
Action Details		
Medium	**Responsible Party**	Road Foreman, Selectboard
	Supporting Agencies	VTrans, NVDA
	Estimated Cost	Low
	Potential Funding Sources	Town Funds
	Implementation Schedule	2021-2026
	Hazards Addressed	Earthquake, Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

9	**Investigate installation of additional fire hydrants in Sutton Village.**	
Action Details		
Medium	**Responsible Party**	Fire Department
	Supporting Agencies	Selectboard
	Estimated Cost	Low

	Potential Funding Sources	Vermont Association of Conservation Districts
	Implementation Schedule	2021-2022
	Hazards Addressed	Wildfire
	Mitigation Goal	Capacity
	Mitigation Category	Structure & Infrastructure Projects

10	**Identify and protect river corridors that are subject to fluvial erosion.**
Action Details	The Town Plan recommends a conservative approach that goes beyond the minimal thresholds for NFIP participation and asserts that most forms of development within Sutton's floodplains and river corridors should be prohibited. The Town of Sutton also supports the completion of more geomorphic assessments and incorporating these areas into the town's flood maps so that such hazards can be managed appropriately. Until such assessments are completed, this plan also calls for the protection of areas that may be subject to fluvial erosion by establishing provisional buffers. The Planning Commission will work with Vermont River Management staff to further evaluate river corridors in Sutton through geomorphic assessments and through the delineation of riparian buffers.

Low	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA, Vermont River Management, FEMA
	Estimated Cost	Low
	Potential Funding Sources	FEMA, Municipal Planning Grant
	Implementation Schedule	2021-2022
	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Natural Resources
	Mitigation Category	Local Plans & Regulations

Wheelock Mitigation Actions

1	**Install a generator at the fire station in South Wheelock.**

Action Details	A generator would provide backup power for the fire station during a power outage.	
Very High	**Responsible Party**	Sheffield-Wheelock Volunteer Fire Dept., Selectboards in Wheelock and Sheffield
	Supporting Agencies	NVDA
	Estimated Cost	Low
	Potential Funding Sources	FEMA (BRIC, HMGP), VT DPS (Emergency Management)
	Implementation Schedule	2021-2022
	Hazards Addressed	Snow Storm & Ice Storm, Wind
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

2	**Collaborate with the Town of Sheffield to develop an agreement with the American Red Cross for opening a shelter during a disaster.**	
Action Details	See also the sections concerning needed updates to Wheelock Town Hall, so there can be an ADA compliant shelter site in Wheelock.	
Very High	**Responsible Party**	Selectboards in both Towns, Sheffield-Wheelock Volunteer Fire Department
	Supporting Agencies	Red Cross
	Estimated Cost	Low
	Potential Funding Sources	Town funds
	Implementation Schedule	2023-2024
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Structure & Infrastructure Projects

3	**Renew Village Center designation which requires bringing buildings up to code.**	
Action Details	Re-apply for designation when it comes due in 2025. Bringing public Village Center buildings up to code includes the fire code, accessibility, and other measures that provide sustainability and tax credits to the Town.	
Very High	**Responsible Party**	Selectboard
	Supporting Agencies	NVDA, VT Agency of Commerce & Community Development
	Estimated Cost	Low
	Potential Funding Sources	Explore community development grants & loans through NCIC, Town budget, bond
	Implementation Schedule	2024-2025
	Hazards Addressed	Earthquake, Inundation Flooding & Fluvial Erosion, Snow Storm & Ice Storm, Wind
	Mitigation Goal	High Hazards
	Mitigation Category	Local Plans & Regulations

4	**Protect the Historic District from natural hazards by establishing a long-term repair and maintenance plan for Town facilities including Town Hall and Garage to decrease vulnerability to high winds, snow loads, heavy rains, power outages, flooding, and other natural hazards.**	
Action Details	Identify hazards and plan to mitigate them.	
Very High	**Responsible Party**	Selectboard
	Supporting Agencies	Facilities Task Force
	Estimated Cost	Medium
	Potential Funding Sources	Town Funds, FEMA (BRIC, HMGP, FMA)
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	Infrastructure

	Mitigation Category	Local Plans & Regulations

5	**Upgrade the Town Hall to meet emergency shelter requirements.**	
Action Details	Town Hall is the only public building except for S Wheelock Fire Station and Garage. It is the only building suitable as an emergency shelter but it needs ADA upgrades.	
Very High	**Responsible Party**	Planning Commission/Conservation Commission
	Supporting Agencies	Wheelock Facilities Task Force, NCIC, VEM
	Estimated Cost	High
	Potential Funding Sources	BRIC, VTrans grants, Town matching funds
	Implementation Schedule	2021-2024
	Hazards Addressed	All
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

6	**Identify best new location for Town Garage out of the floodplain and move the Garage campus to that location. Complete a feasibility study for the new location and tear down the old facility.**	
Action Details	Consider placing on Town Hall campus or former Clark property on Sutton Rd.	
Very High	**Responsible Party**	Selectboard
	Supporting Agencies	Facilities Task Force
	Estimated Cost	High
	Potential Funding Sources	VT ACCD Municipal Planning Grant (pending), explore community development grants and loans through NCIC, annual Town Road budget, bond
	Implementation Schedule	2021-2024
	Hazards Addressed	Inundation Flooding & Fluvial Erosion

	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

7	**Adopt the State's River Corridor bylaws as a way to address local flooding and fluvial erosion.**	
Action Details	Adopting these bylaws is necessary for increased 17.5% cost-share from the State for public assistance (along with joining the NFIP, adopting the Hazard Mitigation Plan, and re-adopting the Local Emergency Operations Plan). Note: Getting Wheelock into the NFIP will be necessary first. Work with Sheffield on outreach about joining the NFIP, and provide information about river corridor protection.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	Wheelock Planning Commission, Wheelock Community Initiative for outreach, Sheffield Planning Commission, VT DEC
	Estimated Cost	Low
	Potential Funding Sources	Town funds
	Implementation Schedule	2022-2024
	Hazards Addressed	Inundation Flooding & Fluvial Erosion
	Mitigation Goal	High Hazards
	Mitigation Category	Local Plans & Regulations

8	**Maintain quality and adequacy of potable water at each of the significant sites on the 5049 Wheelock Fire District 1 Water System. (Significant sites includes Wheelock Village Store (food and gas), Town Hall and Town Garage).**	
Action Details	Eleven buildings in Wheelock village on both sides of Rte 122 use this spring-fed system to supply potable water. Buildings are potentially at risk if the water table is low, or testing is inadequate, or if the system is poorly maintained. It is not operated by the Town but the Town is a user at Town Hall and the Town Garage. Explore whether the system is adequate to add another facility should Town Garage move to the Town Hall campus.	
High	**Responsible Party**	5049 Wheelock Fire District 1

	Supporting Agencies	Drinking Water & Groundwater Protection Division Selectboard, Facilities Task Force, NVDA, NCIC
	Estimated Cost	Medium
	Potential Funding Sources	Community Infrastructure loans and grants
	Implementation Schedule	2021-2026
	Hazards Addressed	Drought, Wildfire
	Mitigation Goal	Natural Resources
	Mitigation Category	Natural Systems Protection

9	**Develop and maintain long-range plan for capital improvement projects.**	
Action Details	CIPs can relate to many things: neglected cemeteries with stones in unstable condition, now under Selectboard jurisdiction, road equipment, and road improvement projects.	
High	**Responsible Party**	Selectboard, assisted by Planning Commission, Roads Task Force, other Task Forces as needed
	Supporting Agencies	NVDA, a CPA to audit the cemetery records if it beyond what the elected auditors feel they can handle
	Estimated Cost	Low
	Potential Funding Sources	VT ACCD Municipal Planning Grant
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	Infrastructure
	Mitigation Category	Local Plans & Regulations

10	**Support regional hazard mitigation education campaign and expand the Town's capacity for hazard mitigation with local resources such as websites, listservs, and newsletters.**

Action Details	Hazard mitigation education may include information regarding weatherization, heating safety, renewable energy, flood regulations, flood mitigation, winter snow or ice storm issues such as snow loads or power outages, State building codes, and low-impact development.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	Wheelock Planning Commission, Wheelock Community Initiative for outreach, Sheffield Planning Commission, VT DEC
	Estimated Cost	Low
	Potential Funding Sources	FEMA (EMGP, HSGP, BRIC, HMGP)
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Education & Awareness Programs

11	**Form an Energy Committee.**	
Action Details	Promote energy efficiency measures and equipment for new and existing town buildings and develop a plan to promote home weatherization so residents can save energy dollars, and make their homes more comfortable and healthier. Promote and utilize information and services available to help defray costs.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	Planning Commission, NVDA, NETO, Efficiency Vermont, RuralEdge
	Estimated Cost	Low
	Potential Funding Sources	Town funds
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	Natural Resources

	Mitigation Category	Education & Awareness Programs

12	**Fix bridge on Stannard Mountain Road near Blakely Road.**	
Action Details	Engineering design and budget was completed in 2019. Permissions from adjacent landowners have been secured.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	Road Dept., NVDA, VTrans District 7
	Estimated Cost	High
	Potential Funding Sources	Muni. Hwy, Structures grant is pending, since 4/15/2020. NVDA & District 7, Town matching funds
	Implementation Schedule	2021-2022
	Hazards Addressed	All
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

13	**Fix Twin Bridges, built in 1927, over Miller's Run Brook on Peak Rd. near Rte. 122.**	
Action Details	According to a 2017 assessment: not built for today's heavy loads, large vehicles. Scouring under both abutments. 6" to 18" of missing concrete. Wing walls cracked.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	Road Dept., NVDA, VTrans District 7
	Estimated Cost	High
	Potential Funding Sources	FEMA (BRIC, HMGP), VTrans, VTrans, VT DEC (Municipal Roads Municipal Roads Grants In Aid Program)
	Implementation Schedule	2022-2024
	Hazards Addressed	All

	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

14	**Fix Bridge, built in 1928, over S. Branch Brook, Minister Hill Rd. corner S. Wheelock Rd.**	
Action Details	According to a 2017 assessment: deterioration and structural weaknesses on the wing walls and inlet. Split in 4 places. Significant scouring. North wing wall is undermined by between 18" and 2 1/2' in various places. South wing wall split and cracked. Guardrail posts seriously deteriorated.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	Road Dept., NVDA, VTrans District 7
	Estimated Cost	High
	Potential Funding Sources	FEMA (BRIC, HMGP), VTrans, VTrans, VT DEC (Municipal Roads Municipal Roads Grants In Aid Program)
	Implementation Schedule	2023-2025
	Hazards Addressed	All
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

15	**Develop and implement a 5-year plan for repair and replacement of culverts, bridges, roads.**	
Action Details	Reference VOBCIT and REI and MRGP to develop funding proposals and annual work plans.	
High	**Responsible Party**	Selectboard
	Supporting Agencies	Highway Supervisor, Roads Task Force, NVDA
	Estimated Cost	High
	Potential Funding Sources	FEMA (BRIC, HMGP), VTrans, VTrans, VT DEC (Municipal Roads Municipal Roads Grants In Aid Program)

	Implementation Schedule	2021-2026
	Hazards Addressed	All
	Mitigation Goal	Infrastructure
	Mitigation Category	Local Plans & Regulations

16	**Annually update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool (VOBCIT) and the Online Road Erosion Inventory (REI) regarding Municipal Roads General Permit program (MRGP).**	
Action Details	Update frequently as soon as projects are completed to facilitate grant seeking efforts.	
High	**Responsible Party**	Highway Supervisor
	Supporting Agencies	Selectboard, NVDA
	Estimated Cost	Low
	Potential Funding Sources	Town funds
	Implementation Schedule	2021-2026
	Hazards Addressed	Earthquake, Inundation Flooding & Fluvial Erosion
	Mitigation Goal	Infrastructure
	Mitigation Category	Structure & Infrastructure Projects

17	**Expand current efforts to install a Reverse 911 system.**	
Action Details	Explore methods, partnerships, and costs.	
Medium	**Responsible Party**	Selectboard
	Supporting Agencies	NVDA, VT DPS (Emergency Management)
	Estimated Cost	Medium

	Potential Funding Sources	FEMA (EMGP, HSGP, BRIC, HMGP), VT DPS (Emergency Management)
	Implementation Schedule	2022-2023
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Structure & Infrastructure Projects

18	**Prioritize the use of renewable energy.**	
Action Details	Review current Town Plan and consider recommended actions and/or updates. Consider forming an Energy Committee or Task Force. Explore options for solar at Town Hall, possibly at former Clark Property on Sutton Rd.	
Medium	**Responsible Party**	Planning Commission
	Supporting Agencies	Selectboard, Facilities Task Force
	Estimated Cost	Low
	Potential Funding Sources	Efficiency Vermont
	Implementation Schedule	2022-2023
	Hazards Addressed	All
	Mitigation Goal	Natural Resources
	Mitigation Category	Natural Systems Protection

19	**Maintain healthy water courses and water bodies. Protect Chandler Pond, Flagg Pond and Bean Pond, as well as the Miller's Run and other streams, from the adverse effects of commercial development. Further residential development adjacent to these natural attributes should be minimal.**
Action Details	Join National Flood Insurance Program. The Selectboard may adopt and enforce a floodplain ordinance or bylaw that meets minimum NFIP standards. The Selectboard would utilize the ordinance adoption process that requires public noticing and a wait time for comments and revisions prior to enforcement. Utilize a strong education and outreach component.

Medium	**Responsible Party**	Selectboard, Planning Commission
	Supporting Agencies	NVDA, VT DEC, Sheffield Planning Commission
	Estimated Cost	Low
	Potential Funding Sources	FEMA BRIC
	Implementation Schedule	2022-2024
	Hazards Addressed	Drought, Inundation Flooding & Fluvial Erosion, Invasive Species
	Mitigation Goal	Natural Resources
	Mitigation Category	Natural Systems Protection

20	**Add a generator to the Town Hall to establish it as a shelter.**	
Action Details	This action will take place after the town has determined what to do with the town hall building.	
Medium	**Responsible Party**	Selectboard
	Supporting Agencies	NVDA
	Estimated Cost	Medium
	Potential Funding Sources	BRIC
	Implementation Schedule	2023-2026
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Structure & Infrastructure Projects

21	**Develop a program to plant new trees and shrubs in areas prone to fluvial erosion.**	
Action Details	Consider forming a Conservation Commission to lead efforts.	
Low	**Responsible Party**	Planning Commission

	Supporting Agencies	NVDA, Caledonia County Natural Resources Conservation District
	Estimated Cost	Low
	Potential Funding Sources	Town funds
	Implementation Schedule	2022-2023
	Hazards Addressed	Drought, Inundation Flooding & Fluvial Erosion, Invasive Species
	Mitigation Goal	Natural Resources
	Mitigation Category	Natural Systems Protection

22	**Emerald Ash Borer: Conduct a survey of ash trees in town rights of way to identify trees susceptible to death and toppling over from damage caused by the invasive species, Emerald Ash Borer. Develop an action plan.**	
Action Details	Consider forming a Conservation Commission to lead efforts.	
Low	**Responsible Party**	Selectboard, Road crew, local loggers who have the training
	Supporting Agencies	VT Urban and Community Forestry Program
	Estimated Cost	Low
	Potential Funding Sources	VT ANR, VAAFM, VT FPR
	Implementation Schedule	2022-2023
	Hazards Addressed	Invasive Species
	Mitigation Goal	Natural Resources
	Mitigation Category	Natural Systems Protection

23	**Collaborate with the Town of Sheffield to purchase a fire fighting vehicle that can access highly wooded areas.**

Action Details	Research, developing a budget, seeking grant funds, informing the voters if there's a match.	
Low	**Responsible Party**	Sheffield-Wheelock Volunteer Fire Dept.
	Supporting Agencies	Town of Wheelock, Town of Sheffield budgets for 2021 or 2022
	Estimated Cost	Medium
	Potential Funding Sources	FEMA (EMGP, HSGP, BRIC, HMGP)
	Implementation Schedule	2021-2024
	Hazards Addressed	Wildfire
	Mitigation Goal	Capacity
	Mitigation Category	Structure & Infrastructure Projects

24	**Emerald Ash Borer: Public information campaign.**	
Action Details	Consider forming a Conservation Commission to lead efforts.	
Low	**Responsible Party**	Planning Commission
	Supporting Agencies	Selectboard, Wheelock Community Initiative, neighboring towns, VT Urban and Community Forestry Program, invite people from other towns
	Estimated Cost	Low
	Potential Funding Sources	VT ANR, VAAFM, VT FPR
	Implementation Schedule	2021-2022
	Hazards Addressed	Invasive Species
	Mitigation Goal	Natural Resources
	Mitigation Category	Education & Awareness Programs

25	**Continue representation from Wheelock on the Communications Union District Board of NEKBroadband.org.**	
Action Details	Provide broadband internet access for all Town buildings and municipal activities including disaster management.	
Low	**Responsible Party**	Wheelock's representatives to the CUD Board, Selectboard
	Supporting Agencies	The CUD, VT Public Service Dept., Sheffield-Wheelock Fire Department, should they want Wi-Fi at the S. Wheelock Fire Station
	Estimated Cost	Low
	Potential Funding Sources	Town funds
	Implementation Schedule	2021-2026
	Hazards Addressed	All
	Mitigation Goal	Capacity
	Mitigation Category	Structure & Infrastructure Projects

26	**Conduct land evaluations and site analysis to prioritize conservation easements and erosion prevention measures.**	
Action Details	Consider forming a Conservation Commission to lead efforts.	
Low	**Responsible Party**	Planning Commission
	Supporting Agencies	NVDA, Caledonia County Natural Resources Conservation District
	Estimated Cost	Low
	Potential Funding Sources	VT ACCD Municipal Planning Grant
	Implementation Schedule	2023-2026
	Hazards Addressed	Inundation Flooding & Fluvial Erosion, Wildfire
	Mitigation Goal	Natural Resources

	Mitigation Category	Natural Systems Protection

Integration with Other Planning Mechanisms

> *C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))*

The previous plans were not actively implemented. In comparison this Plan will be implemented and integrated throughout each town. The planning process has made a big impression on the Hazard Mitigation Committee and they are interested in actively integrating hazard mitigation with other town activities and development. They intend to bring the Hazard Mitigation Plan to Town Meeting to present it and to review mitigation actions. This will be a way to increase public engagement and awareness in hazard mitigation and to integrate the Plan with other planning mechanisms undertaken by each town. In addition, the support of NVDA with the implementation of the Plan and its integration into regional activities should lead to success.

The Hazard Mitigation Committee identified some policies and procedures that could be updated to reflect hazard mitigation, and these are included as hazard mitigation actions. They also recognize that educating town residents in hazard mitigation principles and opportunities will lead to more resilient communities. Finally, the Hazard Mitigation Committee intends to form a committee within each town to focus on implementing mitigation actions and identifying funding opportunities.

With support from NVDA, the Hazard Mitigation Committee will assist each town in integrating the Hazard Mitigation Plan into their municipal plans. Each town is required by the state to contain a section regarding flood resilience in the Municipal Plan. They will also annually update town emergency operations plans with hazard mitigation information. Basin Plans will also contain town specific hazard mitigation information.

Finally, NVDA is seen as the prefect bridge to aid the towns in integrating this Plan into other local and regional planning mechanisms. NVDA‘s regional perspective and expertise is exactly what is necessary to facilitate this integration. They will facilitate a regular schedule of Hazard Mitigation Committee meetings that will alert the towns to opportunities for plan integration.

Possible funding sources

All of the mitigation actions included in this Plan have identified one or more potential funding sources. Many of these are State based sources. The towns are also eligible for FEMA funding, through the State. Below is a list of some of the federal funding mechanisms to keep in mind when identifying or implementing mitigation actions.

Federal Emergency Management Agency (FEMA) Mitigation Grants

The Federal Emergency Management Agency (FEMA) makes grant funding available for a range of mitigation activities via several Hazard Mitigation Assistance (HMA) programs. These grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. They are not intended to fund repair, replacement, or deferred maintenance activities but are rather designed to assist in developing long-term, cost-effective improvements that will reduce risk to natural hazards.

- **Building Resilient Infrastructure and Communities (BRIC)**
  BRIC is a new FEMA hazard mitigation program designed to replace the agency's former HMA Pre-Disaster Mitigation (PDM) grant program, aiming to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community resilience. It is a result of recent amendments made to Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) by Section 1234 of the Disaster Recovery Reform Act of 2018 (DRRA). BRIC will support states, local communities, tribes, and territories as they undertake hazard mitigation projects reducing the risks they face from natural hazards. The BRIC program's guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.
- **Hazard Mitigation Grant Program (HMGP)**
  The HMGP is authorized under Section 404 of the Stafford Act. The HMGP provides grants to states, tribes, and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. A key purpose of the HMGP is to ensure that any opportunities to take critical mitigation measures to protect life and property from future disasters are not lost during the recovery and reconstruction process following a disaster. HMGP is typically available only in the months subsequent to a federal disaster declaration, as funding amounts are determined based on a percentage of the funds spent on FEMA's Public and Individual Assistance programs.
- **Flood Mitigation Assistance (FMA) Program**
  The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP. FEMA provides FMA funds to assist states and communities with implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. One limitation of the FMA program is that it is generally used to provide mitigation for structures that are insured or located in Special Flood Hazard Areas (SFHAs) as mapped by FEMA. Federal funding for this nationally competitive grant program is generally an annual allocation (subject to Congressional appropriation) and eligibility is linked to a community's good standing in the NFIP.

Chapter 7. Plan Implementation and Maintenance

The Hazard Mitigation Committee with support from the Northeastern Vermont Development Association (NVDA) will implement the mitigation strategy and specific mitigation actions outlined in this Plan and update and maintain the Plan according to the guidelines below. The NVDA and the Hazard Mitigation Committee which includes members from each of the four towns will use the Plan's goals, as well as continued analysis of hazard risks and capabilities, to weigh the available resources against the costs and benefits for each mitigation action. Each town understands the value of this Plan and its positive mitigation impact and intend to continue updating this Plan and implementing the Plan's strategies.

Methods for Continued Public Involvement

> *A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))*

Engaging the public in the Plan maintenance process is a priority for the Hazard Mitigation Committee. The need to engage the public is based on the fact that the public and specifically public volunteers lead these communities. Each town has minimal paid staff and relies on volunteer and elected staff. In addition, each town has a Town Meeting, the first Tuesday in March. This is the day that municipal officers are elected, budgets are approved, and other civic issues are discussed. The Hazard Mitigation Committee recognizes that for the Multi-Jurisdiction Hazard Mitigation Plan to be implemented successfully town residents must be involved.

The Northeastern Vermont Development Association (NVDA) has agreed to take the lead with engaging the public in some areas of Plan implementation and maintenance. Specifically, they will host annual Hazard Mitigation Committee meetings, they will work toward the outreach and implementation of some mitigation actions and finally, they will support regional public education campaigns for hazard mitigation. The regional effort that NVDA will take toward engaging the public in plan maintenance and implementation will assist the individual towns with meeting their goals.

Each town will consider appointing a volunteer committee at Town Meeting to focus on the implementation of this Plan. It is envisioned, that a group of approximately four members of the public will review the list of mitigation actions, identify potential grant sources, and facilitate the implementation of the mitigation actions. Finally, this group will update the Selectboard on a quarterly basis who will in-turn notify the public of mitigation projects.

Each town recognizes the challenge of public engagement and has a handful of mitigation actions geared toward engaging the public. The towns intend to support regional education campaign efforts and expand their capacity for hazard mitigation through outreach to the public by way of websites, listservs, and newsletters. NVDA has agreed to host the Multi-Jurisdiction Hazard Mitigation Plan on their website (www.nvda.net) and to post meeting announcements and other mitigation related

information. The towns will advertise all meetings and outreach activities on their town web pages as well as on Front Porch Forum. Each town will maintain a hard copy of this Plan in their Town Office.

Method and Schedule for Monitoring, Evaluating, and Updating the Plan

> *A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))*

The Hazard Mitigation Committee will meet annually at a minimum to review this Plan. The NVDA will host these meetings either in-person or virtually depending upon what the Committee wants. Hazard Mitigation Committee members are encouraged to extend an invitation to town staff members or resident volunteers who are responsible for implementing the Plan. There are three key methods to keeping the Plan current, monitoring, evaluating and updating. FEMA defines these the following way:

- Monitoring: Tracking the implementation of the plan over time.
- Evaluating: Assessing the effectiveness of the plan at achieving its stated purpose and goals.
- Updating: Reviewing and revising the plan at least once every five years.

Monitoring

The best way to track the implementation of the Plan over time is to track the implementation of the mitigation actions. The Consulting Team developed a Hazard Mitigation Action Tracker, a digital web-based spreadsheet, to maintain the list of mitigation actions and their implementation status. In addition, the Mitigation Action Progress Report, show in Appendix C, may be used. The Mitigation Action Progress Report will be distributed by the Hazard Mitigation Committee to any department or individual responsible for implementing a mitigation action. Hazard Mitigation Committee members will also collect information toward any additional mitigation actions that each town may propose. NVDA will prompt completion of the Mitigation Action Progress Report and the Hazard Mitigation Action Tracker on an annual basis. If the Mitigation Action Progress Reports are completed, NVDA will transfer this information to the Hazard Mitigation Action Tracker so an up-to-date digital list is always available.

Evaluating

Alison Low will lead the Hazard Mitigation Committee through a plan evaluation using the Plan Update Evaluation Worksheet (shown in Appendix C) to evaluate this Plan and make recommendations for future Plan updates and enhancements. The worksheet will be completed in April 2021. It will then be completed annually with any updates to the Plan in November of each year. Each annual Hazard Mitigation Committee meeting will include a review of the Plan's goal statements, the status of each mitigation action, and funding and implementation opportunities for mitigation actions. The Committee will also discuss how to incorporate this Plan into other planning mechanisms regionally and in each

town. NVDA will document a summary of the annual Hazard Mitigation Committee meetings for each town to share with the public as they choose.

Updating

NVDA has committed to maintaining this Plan by applying for funding toward Plan updates and facilitating the Hazard Mitigation Committee meetings. Alison Low, NVDA Senior Planner, will take the lead in this effort. She will collaborate with other NVDA staff members to invite the Hazard Mitigation Committee members and make sure that each of the four towns is well represented in future multi-jurisdiction plan updates. In the event of a large-scale disaster, NVDA will host a Hazard Mitigation Committee meeting to review the Plan and verify its accuracy, and the Plan will be updated as necessary. The schedule for monitoring, evaluating, and updating this Plan is shown in the figure below. NVDA and Hazard Mitigation Committee members will continue to participate in regional and state-based meetings in an effort to stay current with best risk-mitigation practices.

2021

- NVDA will initiate a review of the planning process for lessons learned.
- NVDA hosts Hazard Mitigation Committee meeting following any large scale disaster.
- NVDA hosts annual Hazard Mitigation Committee meeting in November.
- Each town works toward mitigation action implementation and considers additional mitigation actions.
- Each town works toward mitigation action implementation and considers additional mitigation actions.

2022

- NVDA hosts Hazard Mitigation Committee meeting following any large scale disaster.
- NVDA hosts annual Hazard Mitigation Committee meeting in November.
- Each town incorporates this Plan into other Town plans.
- Each town works toward mitigation action implementation and considers additional mitigation actions.

2023

- NVDA hosts Hazard Mitigation Committee meeting following any large scale disaster.
- NVDA hosts annual Hazard Mitigation Committee meeting in November.
- Each town incorporates this Plan into other Town plans.
- Each town works toward mitigation action implementation and considers additional mitigation actions.

2024

- NVDA seeks funding for Plan update.
- NVDA hosts Hazard Mitigation Committee meeting following any large scale disaster.
- NVDA hosts annual Hazard Mitigation Committee meeting in November.
- Each town incorporates this Plan into other Town plans.
- Each town works toward mitigation action implementation and considers additional mitigation actions.

2025

- NVDA leads Plan update process.
- NVDA hosts Hazard Mitigation Committee meeting following any large scale disaster.
- Each town incorporates this Plan into other Town plans.
- Each town works toward mitigation action implementation and considers additional mitigation actions.
- Each town works toward mitigation action implementation and considers additional mitigation actions.

Figure 28. Plan Update Schedule.

Multi-Jurisdiction Hazard Mitigation Plan Update

Each town agrees to update and adopt this Multi-Jurisdiction Hazard Mitigation Plan on a five-year basis. The update will include a comprehensive review and a planning process similar to the one used to develop this Plan. It will update the mitigation action list, current land use practices, collecting and reviewing best available data, updating the capability assessment and engagement of the public and key stakeholders. This process will occur according to State and FEMA guidelines. NVDA will see funding for the development of the Plan update at least a year before the Plan expires. The Plan update process gives each town the chance to add and/or re-prioritize mitigation actions based on current risk, capabilities, and public/stakeholder suggestions. NVDA will serve as the Project Manager for the update process.

List of Acronyms

ANR	Agency of Natural Resources
BFE	Base Flood Elevation
BRIC	Building Resilient Infrastructure and Communities
CALEX	Caledonia Essex Ambulance Service
CDC	Centers for Disease Control
CFR	Code of Federal Regulations
CUD	Communications Union District
DEC	Department of Environmental Conservation
DEMHS	Vermont Department of Emergency Management and Homeland Security
DMA	Disaster Mitigation Act
EEE	Eastern Equine Encephalitis
EOC	Emergency Operations Center
FEMA	Federal Emergency Management Agency
FIRMs	Flood Insurance Rate Maps
FPR	Vermont's Department of Forests, Park and Recreation
MMI	Modified Mercalli Intensity
MRGP	Vermont DEC's Municipal Roads General Permit
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NPDP	National Performance of Dams Program
NVDA	Northeastern Vermont Development Association
PRI	Priority Risk Index
REI	Vermont's Road Erosion Inventory
RSI	Regional Snowfall Index
SFHA	Special Flood Hazard Area
TMDL	Total Maximum Daily Load
TORRO	Tornado and Storm Research Organization
USDA	US Department of Agriculture
VAAFM	Vermont's Agency of Agricultural, Food and Markets
VOBCIT	Vermont's Online Bridge and Culvert Inventory Tool
WHO	World Health Organization
WMO	World Meteorological Organization
WUI	Wildland Urban Interface

List of Resources

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Appendices

Appendix A. Planning Process Supporting Materials

Hazard Mitigation Committee Meetings

Suggested Hazard Mitigation Committee Members

SUGGESTED HAZARD MITIGATION COMMITTEE MEMBERS

Local Agencies

- Building Code Enforcement
- Town/City Management
- Planning or Community Development
- Emergency Management
- Environmental Protection
- Fire Department
- Floodplain Administration
- GIS
- Clinic or Health Department
- Housing
- Parks and Recreation
- Public Information Officer
- Public Works
- Stormwater Management
- Transportation
- Planning Commission
- School District
- Utilities

Agencies with Authority to Regulate Development

- Select Board
- Planning Commission
- Special Districts
- Development Corporation

Non-Governmental Organizations

- Cultural Institutions (museums, libraries)
- Faith-based Organizations
- Tribal Organizations
- Schools

Federal or State Agencies

- FEMA
- Bureau of Indian Affairs
- Federal Land Management Agencies
- National Weather Service
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Geological Survey
- State Emergency Management Agency
- State Geologist
- State Climatologist
- State NFIP Coordinator

Other

- Major Employers or Businesses
- Hospitals
- Regional Planning Councils
- Neighboring Jurisdictions
- Private or Non-Profit Groups
- Environmental Organizations
- Homeowners Associations
- Utility Companies

Multi-Jurisdiction Hazard Mitigation Plan for the
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont
Kick-off Call Agenda
March 13, 2020
Call-in # 951-799-9430

Introductions

- Consulting Team Introductions
- Planning Team Introductions
    - Introduce yourself and let us know your role with the Town you represent, your experience with hazard mitigation, and how you anticipate being involved in this project.

Hazard Mitigation Planning

- What is included in a mitigation plan?
- Why is it important to have one?

Review of the Attached Scope of Work

- Stop for discussion regarding hazards to include in the plan
- Emphasis on role of the Planning Team throughout the project

Outreach and Public Engagement

- What's typical and what should we do in light of the pandemic?
    - Planning Team Meetings
    - Public Meetings/Stakeholder Interviews
    - Survey

Discussion

- What is unique about your town?
- What disaster events have you experienced in the last 5-15 years?

Next Steps for the Planning Team

- Review the Previous Mitigation Plans
    - Develop a list of critical facilities for your town
    - Develop a document regarding what is new, different or important to know about your town for the new plan – Notes are fine!
    - Upload the information to the Google Drive https://drive.google.com/drive/folders/1kmMQq6uZ3Lf1t8lCu1AdInILo9aucAjz?usp=sharing

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July 6, 2020

Multi-Jurisdiction Hazard Mitigation Plan for the
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Planning Team Meeting Agenda
March 13, 2020
ZOOM
https://us02web.zoom.us/j/86076301867?pwd=blNhRXZmMzNZVEQxZ1ArS3NvWWdSQT09

Revised Schedule and Scope

Planning Process

- Role of Planning Team
- Public Engagement Plan

Risk Assessment

- Hazard Identification
- Critical Facility List

Capability Assessment

- Worksheets

Mitigation Strategy

- Review and Comment on Previously Identified Mitigation Actions

Next Steps for the Planning Team

- Critical Facility List
- Capability Assessment Survey
- Mitigation Action Tracker
- Develop a document regarding what is new, different or important to know about your town for the new plan – Notes are fine!
- Google Drive https://drive.google.com/drive/folders/1kmMQq6uZ3Lf1t8lCu1AdInILo9aucAjz?usp=sharing

7/6/2020

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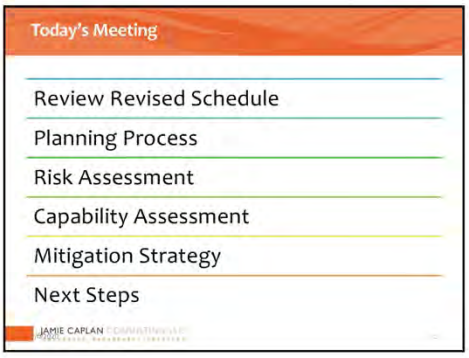

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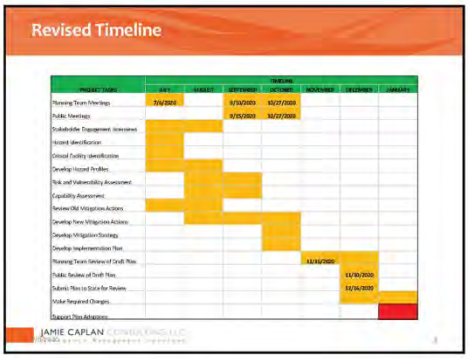

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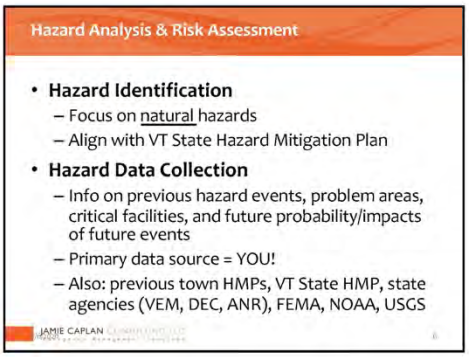

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7/6/2020

Hazard Analysis & Risk Assessment

- **Hazard Profiles**

General Description	A basic description of each hazard, its characteristics, and potential effects.
Location	Describes the geographic areas within the planning area that are affected by the hazard. Some hazards affect the entire planning area universally, while others apply to a specific portion, such as a floodplain or area that is susceptible to wildfires.
Severity/Extent	Describes the potential strength or magnitude of a hazard. Where appropriate, extent is described using an established scientific scale or measurement system.
Previous Occurrences	Provides information on the history of previous hazard events in the planning area, including their impacts on people and property. Events listed may have occurred on a local or regional level.
Probability of Future Occurrences	Describes the likelihood of future hazard occurrences in the planning area. This section also includes a brief summary of any anticipated effects that **climate change** may have on the frequency, duration, or intensity of future hazard events.
Impact on Community and Vulnerability	Describes the hazard's potential impact on the community and its assets (i.e., people, economy, built environment, natural environment) as well as an overall summary of the community's vulnerability to the hazard.

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Hazard Analysis & Risk Assessment

- **Vulnerability Assessment**
  - Use best available data + GIS support from NVDA
- **Findings & Conclusions**
  - To be determined by applying a *Priority Risk Index* (PRI) in close coordination with Planning Team

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Hazard Identification

- Drought
- Earthquake
- Extreme Cold
- Extreme Heat
- Hail
- Infectious Disease
- Inundation Flooding & Fluvial Erosion
- Invasive Species
- Landslides
- Snow Storm & Ice Storm
- Wildfire
- Wind

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Hazard Identification

Atmospheric	Hydrologic	Geologic	Environmental
Extreme Cold **Extreme Heat** **Hail** **Snow Storm & Ice Storm** *(includes blizzards and nor'easters)* **Wind** *(includes windstorms, severe thunderstorms, tornadoes, nor'easters, hurricanes, and tropical storms)*	**Drought** **Inundation Flooding & Fluvial Erosion** *(includes flash flooding, ice jams, and dam failures)*	**Earthquake** **Landslides** *(includes rock falls, rockslides, debris flows, or other mass failures)*	**Infectious Disease** *(includes epidemic/pandemic and vector-borne diseases)* **Invasive Species** **Wildfire**

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Critical Facilities

- Draft tables have been developed using data from previous (2005) plans

Facility	Address	Function	Generator? (y/n)
Margaret M^Flanagan		Children's Day Care	
Millers Run School USD 37		Children's Day Care	
Alondi's Village Day Care		Children's Day Care	
Vermont Electric Coop (VEC)		Electric Utility	
Village of Londonville Electric		Electric Utility	
Millers Run School USD 37		Emergency Shelter	
Sheffield Town Hall		Emergency Shelter	
Wheelock Offices		Emergency Shelter	
Sheffield Town Office		Emergency Shelter	
Sheffield Wheelock Fire Dept		Fire Department	
Raymond Berry		Hazardous Materials	
Town of Sheffield		Hazardous Materials	
Interstate - 91		Interstate Highway	
Sheffield Town Office		Municipal Office	
Millers Run School USD 37		Schools	
VT Route 122		State Highway	
Millers Run School USD 37		Underground Tank (UST)	
Sheffield Village Water		Water Supply	
Millers Run School USD 37		Water Supply	
King George School #, Girls Dorm		Water Supply	

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Capability Assessment

- **Purpose:** To assess each town's existing authorities, policies, programs, and resources available to support hazard mitigation.
- **Categories:**
  - Planning & Regulatory
  - Administrative & Technical
  - Financial
  - Education & Outreach

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7/6/2020

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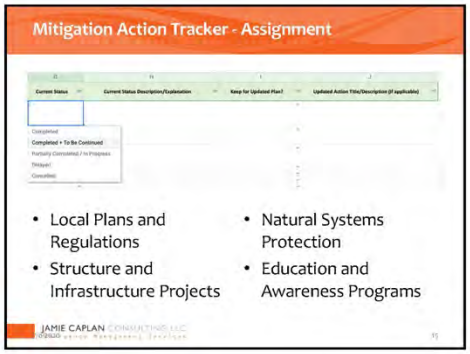

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September 23, 2020

9/23/2020

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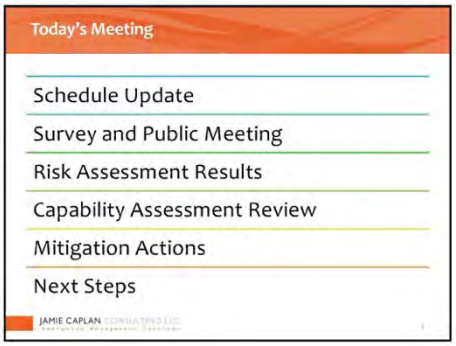

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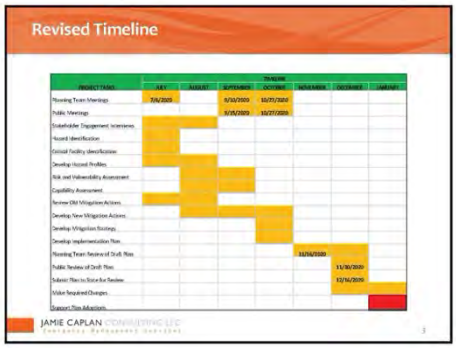

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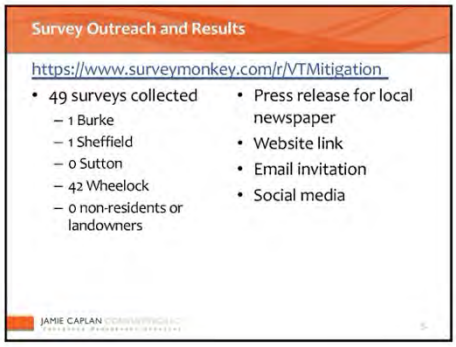

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Hazard Identification

- Drought
- Earthquake
- Extreme Cold
- Extreme Heat
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- Infectious Disease
- Inundation Flooding & Fluvial Erosion
- Invasive Species
- Snow Storm & Ice Storm
- Wildfire
- Wind

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Hazard Identification

Hazard Identification and Screening Summary

Natural Hazard	Significant Risk for Planning Area?	Rationale for Inclusion/Exclusion from Risk Assessment
Drought	Yes	• History of previous occurrences • Potential for increased frequency, duration, and severity of drought events due to climate change • Potential impacts to public water suppliers, individual/private wells, and sources for firefighting
Earthquake	Yes	• Vermont is classified as an area with low to moderate seismic activity • History of relatively minor and infrequent events, however the potential for larger events exists. • Expected probability of ground shaking at damaging levels is very low but older, unreinforced masonry buildings or other structures/infrastructure assets not built to modern codes could still be at risk
Extreme Cold	Yes	• High frequency of previous occurrences • Potential life/safety impacts to populations in the planning area with underlying vulnerabilities that could be disproportionately affected (seniors, low-moderate income households, older housing stock with no home heating fuel, etc.).

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Hazard Profiles

General Description	A basic description of each hazard, its characteristics, and potential effects.
Location	Describes the geographic areas within the planning area that are affected by the hazard. Some hazards affect the entire planning area universally, while others apply to a specific portion, such as a floodplain or area that is susceptible to wildfires.
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Impact on Community and Vulnerability	Describes the hazard's potential impact on the community and its assets (i.e., people, economy, built environment, natural environment) as well as an overall summary of the community's vulnerability to the hazard.

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Hazard Profiles

Primary data sources:

- Vermont State Hazard Mitigation Plan (2018)
- Previous All-Hazards Mitigation Plans (2005)
- NVDA
- State Agencies (DEC, DPS/VEM, VDH, etc.)
- Federal Agencies (NOAA, FEMA, USGS, etc.)
- **YOU!**

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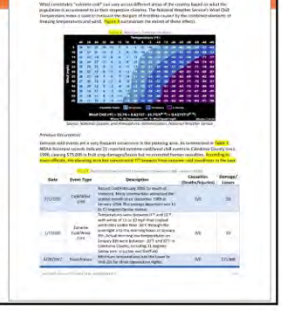
Hazard Profiles

- Each profile contains narrative text, tables, graphics, and/or maps to fully describe the characteristics of each hazard.
- Data sources and references are cited throughout.
- Highlighted areas still require some updates or confirmation.



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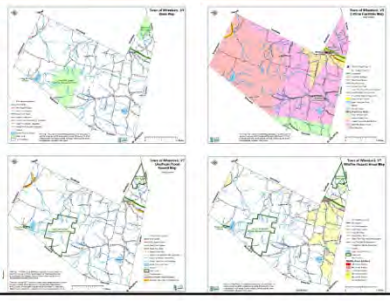
Maps *(available for review on Google Drive)*



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9/23/2020

Priority Risk Index (PRI)

PRI Category	Degree of Risk: Level	Criteria	Index Value	Assigned Weighting Factor
Location	Negligible	Less than 1% of planning area affected	1	20%
	Small	1-10% of planning area affected	2	
	Moderate	10-50% of planning area affected	3	
	Large	10-100% of planning area affected	4	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	1-10% annual probability	2	
	Likely	10-90% annual probability	3	
	Highly Likely	90-100% annual probability	4	
Potential Impact *	Minor	Very few injuries, if any. Only minor property damage and minimal disruption to quality of life. Partial or complete shutdown of critical facilities for less than one day.	1	30%
	Limited	Minor injuries only. 10-25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple fatalities/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of fatalities/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one month.	4	
Warning Time	More than 24 hours		1	10%
	12 to 24 hours		2	
	6 to 12 hours		3	
	Less than 6 hours		4	
Duration	Less than 6 hours		1	10%
	6 to 24 hours		2	
	1 to 7 days		3	
	More than 1 week		4	

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Summary of Draft PRI Results

Hazard	Category/Degree of Risk: Location	Probability	Potential Impact	Warning Time	Duration	PRI Value
Drought	Large	Possible	Minor	More than 24 hours	More than 1 week	2.2
Earthquake	Large	Possible	Minor	Less than 6 hours	Less than 6 hours	2.2
Extreme Cold	Large	Highly Likely	Limited	More than 24 hours	1 to 7 days	3.0
Extreme Heat	Large	Possible	Limited	More than 24 hours	1 to 7 days	2.4
Hail	Small	Likely	Minor	6 to 12 hours	Less than 6 hours	2.0
Infectious Disease	Small	Likely	Critical	More than 24 hours	More than 1 week	2.7
Inundation Flooding & Fluvial Erosion	Moderate	Likely	Critical	12 to 24 hours	1 to 7 days	2.9
Invasive Species	Negligible	Highly Likely	Minor	More than 24 hours	More than 1 week	2.2
Snow Storm & Ice Storm	Large	Highly Likely	Critical	More than 24 hours	1 to 7 days	3.3
Wildfire	Moderate	Possible	Limited	Less than 6 hours	1 to 7 days	2.5
Wind	Large	Highly Likely	Critical	More than 24 hours	1 to 7 days	3.3

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Summary of Draft PRI Results (Sorted by PRI Value)

Hazard	Category/Degree of Risk: Location	Probability	Potential Impact	Warning Time	Duration	PRI Value
Snow Storm & Ice Storm	Large	Highly Likely	Critical	More than 24 hours	1 to 7 days	3.3
Wind	Large	Highly Likely	Critical	More than 24 hours	1 to 7 days	3.3
Extreme Cold	Large	Highly Likely	Limited	More than 24 hours	1 to 7 days	3
Inundation Flooding & Fluvial Erosion	Moderate	Likely	Critical	12 to 24 hours	1 to 7 days	2.9
Infectious Disease	Small	Likely	Critical	More than 24 hours	More than 1 week	2.7
Wildfire	Moderate	Possible	Limited	Less than 6 hours	1 to 7 days	2.5
Extreme Heat	Large	Possible	Limited	More than 24 hours	1 to 7 days	2.4
Drought	Large	Possible	Minor	More than 24 hours	More than 1 week	2.2
Earthquake	Large	Possible	Minor	Less than 6 hours	Less than 6 hours	2.2
Invasive Species	Negligible	Highly Likely	Minor	More than 24 hours	More than 1 week	2.2
Hail	Small	Likely	Minor	6 to 12 hours	Less than 6 hours	2

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Summary of Draft PRI Results (Sorted by PRI Value)

Hazard	Category/Degree of Risk: Location	Probability	Potential Impact	Warning Time	Duration	PRI Value
Snow Storm & Ice Storm	Large	Highly Likely	Critical	More than 24 hours	1 to 7 days	3.3
Wind	Large	Highly Likely	Critical	More than 24 hours	1 to 7 days	3.3
Extreme Cold	Large	Highly Likely	Limited	More than 24 hours	1 to 7 days	3
Inundation Flooding & Fluvial Erosion	Moderate	Likely	Critical	12 to 24 hours	1 to 7 days	2.9
Infectious Disease	Small	Likely	Critical	More than 24 hours	More than 1 week	2.7
Wildfire	Moderate	Possible	Limited	Less than 6 hours	1 to 7 days	2.5
Extreme Heat	Large	Possible	Limited	More than 24 hours	1 to 7 days	2.4
Drought	Large	Possible	Minor	More than 24 hours	More than 1 week	2.2
Earthquake	Large	Possible	Minor	Less than 6 hours	Less than 6 hours	2.2
Invasive Species	Negligible	Highly Likely	Minor	More than 24 hours	More than 1 week	2.2
Hail	Small	Likely	Minor	6 to 12 hours	Less than 6 hours	2

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Risk Assessment Summary (DRAFT)

HIGH RISK	Snow Storm & Ice Storm Wind Extreme Cold
MODERATE RISK	Inundation Flooding & Fluvial Erosion Infectious Disease Wildfire Extreme Heat
LOW RISK	Drought Earthquake Invasive Species Hail

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Specific Questions for Planning Team

1. **Drought** – any notable impacts from drought conditions in the past? Is it safe to say that you generally expect it will not be a big problem in the future?
2. **Extreme Cold** – any notable impacts from past events?
3. **Hail** – any notable impacts from past events?
4. **Flood / Dam Failure** –
   - Chandler Pond Dam in southeastern Wheelock, owned by the Village of Lyndonville? Any potential impacts for Wheelock? Chandler Pond Farm and several other buildings/residences appear to be in close proximity.
   - Specific problem areas, repetitive loss, etc.? *Will be requesting updates to language copied forward from 2005 HMPs.*
   - Info/thoughts on flood mapping (rough digital maps vs/ FIRMs, FEHs, etc.)?
5. **Snow Storm & Ice Storm** – any additional notable occurrences to add?
6. **Wildfire** – Specific concerns or problem areas? *Will be requesting updates to language copied forward from 2005 HMPs.*

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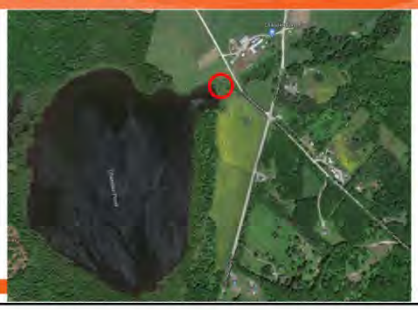
9/23/2020

Chandler Pond Dam



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General Information Needs *(separate worksheet coming soon!)*

1. Identification of any **notable past hazard events and/or specific impacts** to each town that are not already included in the draft Risk Assessment.
   - Anecdotal information, photos, estimated damage figures on local impacts from major storm events (i.e., TS Irene), if available
2. Identification of any **specific problem areas/locations or vulnerable assets** (buildings, infrastructure, people) that need to be addressed through hazard mitigation actions.
   - Include any flood prone roads, bridges, culverts, etc.
   - Need updates to previous (2005) hazard mitigation plans – *especially for flooding/erosion hazards and wildfire*
3. List of **priority concerns or issues relating to future hazard impacts** for each town. For example, impacts that road closures or power outages will have on residents, businesses, etc.

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Critical Facilities & Historic Properties

- Please confirm updated, final list on Google Drive site and/or with NVDA

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Capability Assessment

- **Purpose:** To assess each town's existing authorities, policies, programs, and resources available to support hazard mitigation.
- **Categories:**
  - Planning & Regulatory
  - Administrative & Technical
  - Financial
  - Education & Outreach

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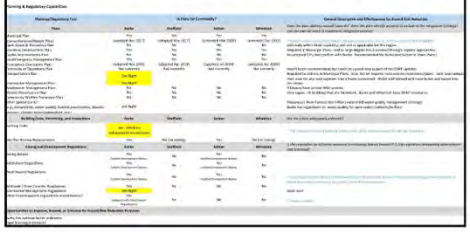
Capability Assessment

- Initial survey evaluation completed with NVDA; individual follow-up with towns **coming soon!**



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Mitigation Strategy

- Mission Statement
- Goal Statements
- Regional Mitigation Actions
- Town Specific Mitigation Actions

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9/23/2020

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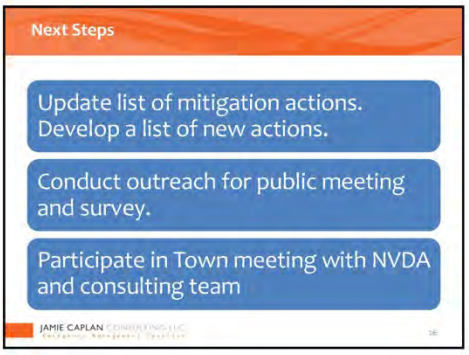

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Public Meetings

PRESS RELEASE
For Immediate Release
October 15, 2020

Contact: Alison Lowe
Northeastern Vermont Development Association
802-424-1418

The Towns of Burke, Sutton, Sheffield and Wheelock Announce Two Opportunities for the Public to Participate in their Regional Hazard Mitigation Planning Process

The Towns of Burke, Sheffield, Sutton, and Wheelock are currently engaged in a planning process to become less vulnerable to disasters caused by natural hazards, and public participation is essential!

Public input is needed! Please take a few moments to complete the online survey and plan to join the Zoom meeting. Everyone is welcome, this includes full and part-time residents.

Hazard Mitigation Plan Survey

- https://www.surveymonkey.com/r/VTMitigation

Public Meeting via Zoom

- Thursday, October 29, 2020 2:00pm-3:00pm
- https://us02web.zoom.us/j/84574827731?pwd=YytpMW16V0tiRzZJUmpubTlwZjJ3UT09
- Meeting ID: 845 7482 7731
- Passcode: 602221

The Hazard Mitigation Plan will identify and assess each Town's natural hazard risks (such as snow and ice storms, high winds, extreme cold and infectious disease) and determine how best to minimize those risks. At the meeting, participants will learn about the process of developing the Hazard Mitigation Plan and have an opportunity to give feedback regarding natural hazards and their impacts. Meeting participants will have the chance to voice their concerns as well as their ideas for mitigating risk in the region and in each Town.

The Northeastern Vermont Development Association (NVDA) is leading the development of the Hazard Mitigation Plan with support from a team representing each Town and a consulting team led by Jamie Caplan Consulting LLC.

The Vermont Division of Emergency Management and Homeland Security will review and approve the Hazard Mitigation Plan. This approval, and each Town's adoption of the plan, make each Town eligible for pre-disaster funding. This funding may be used to mitigate risks associated with natural hazards.

For questions regarding the project, please contact Alison Low at NVDA, alow@nvda.net or 802-424-1418.

10/29/2020

October 29, 2020
Public Meeting - Zoom

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont
Multi-Jurisdiction Hazard Mitigation Plan

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Emergency Management Services

1

Jamie Caplan Consulting LLC

Nationwide experience
- Territory of American Samoa
- County of Maui
- American Indian Tribes
- South Central Region of Connecticut
- Dozens of local governments

Vermont experience
- Kirby
- Lowell
- Lyndon

2

Mitigation Defined

- Any sustained actions taken to reduce or eliminate long term risk to people and property from hazards and their effects.

3

Poll Question 1 (multiple choice)

- Have you mitigated risk to your property?
  - I have removed trees or tree limbs
  - I purchased a generator
  - I purchased flood insurance

4

FEMA's Pre-Disaster Mitigation Funding

- Building Resilient Infrastructure and Communities (BRIC)
  - Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Hazard Mitigation Grant Program (HMGP)
  - Only available after a Presidential Disaster Declaration

5

Mitigating Risk Saves Lives and Money

A FEMA-approved Hazard Mitigation Plan is required to receive Federal Grant Funds for Hazard Mitigation Projects.

Overall Benefit-Cost Ratio	11:1	4:1	4:1	4:1	6:1
Cost ($ billion)	$1	$4	$520	$0.6	$27
Benefit ($ billion)	$13	$16	$2200	$2.5	$160
Riverine Flood	6:1	5:1	6:1	8:1	7:1
Hurricane Surge		7:1			
Wind	10:1	5:1	6:1	7:1	5:1
Earthquake	12:1	4:1	13:1	3:1	3:1
Wildland-Urban Interface Fire		4:1	2:1		2:1

6

10/29/2020

Possible Mitigation Actions

- Property acquisition
- Structure elevation
- Flood risk reduction (culverts, drainage upgrades)
- Retrofitting buildings
- Soil stabilization
- Generators (FEMA only)
- Nature-based solutions and low-impact development prioritized!

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Planning Process

HAZARD MITIGATION COMMITTEE | PUBLIC AND STAKEHOLDER ENGAGEMENT | PUBLIC SURVEY | DRAFT PLAN

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Hazard Mitigation Committee

- Provide supporting data or information.
- Assist in the identification and prioritization of mitigation actions.
- Review and comment on the draft plan.
- Approve final draft for submission to MEMA.

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Survey https://www.surveymonkey.com/r/VTMitigation

- 79 surveys collected
- Biggest hazard concerns
  - Snow Storm/Ice Storm
  - Infectious Disease
  - Extreme Cold
  - Invasive Species
  - Wind
- Improve infrastructure – best way to mitigate risk
- Priority Town Assets
  - Schools
  - Fire Station
  - Food Shelves
  - Town Roads
- Priorities
  - Protect emergency services
  - Protect utilities
  - Protect private property

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Hazard Analysis & Risk Assessment

Key Tasks:

- Hazard Identification
- Hazard Data Collection
- Hazard Profiles
- Vulnerability Assessment
- Findings & Conclusions

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Hazard Identification

- Drought
- Earthquake
- Extreme Cold
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Natural Hazard	Significant Risk for Planning Area?	Rationale for Inclusion/Exclusion from Risk Assessment
Drought	Yes	• History of previous occurrences • Potential for increased frequency, duration, and severity of drought events due to climate change • Potential impacts to public water supplies, individual/private wells, and sources for firefighting
Earthquake	Yes	• Vermont is classified as an area with low to moderate seismic activity • History of relatively minor and infrequent events, however the potential for larger events exists • Expected probability of ground shaking at damaging levels is very low but older, unreinforced masonry buildings or other structures/infrastructure assets not built to modern codes could still be at risk
Extreme Cold	Yes	• High frequency of previous occurrences • Potential life/safety impacts to populations in the planning area with underlying vulnerabilities that could be disproportionately affected (seniors, low moderate income households, older housing stock with no home heating fuel, etc.).

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Hazard Profiles

General Description	A basic description of each hazard, its characteristics, and potential effects.
Location	Describes the geographic areas within the planning area that are affected by the hazard. Some hazards affect the entire planning area universally, while others apply to a specific portion, such as a floodplain or area that is susceptible to wildfires.
Severity/Extent	Describes the potential strength or magnitude of a hazard. Where appropriate, extent is described using an established scientific scale or measurement system.
Previous Occurrences	Provides information on the history of previous hazard events in the planning area, including their impacts on people and property. Events listed may have occurred on a local or regional level.
Probability of Future Occurrences	Describes the likelihood of future hazard occurrences in the planning area. This section also includes a brief summary of any anticipated effects that **climate change** may have on the frequency, duration, or intensity of future hazard events.
Impact on Community and Vulnerability	Describes the hazard's potential impact on the community and its assets (i.e., people, economy, built environment, natural environment) as well as an overall summary of the community's vulnerability to the hazard.

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Hazard Profiles

Primary data sources:

- Vermont State Hazard Mitigation Plan (2018)
- Previous All-Hazards Mitigation Plans (2005)
- NVDA
- State Agencies (DEC, DPS/VEM, VDH, etc.)
- Federal Agencies (NOAA, FEMA, USGS, etc.)
- **YOU!**

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Risk Assessment Summary (DRAFT)

HIGH RISK	Snow Storm & Ice Storm Wind Extreme Cold
MODERATE RISK	Inundation Flooding & Fluvial Erosion Infectious Disease Wildfire Extreme Heat
LOW RISK	Drought Earthquake Invasive Species Hail

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Poll Question 2 (single choice)

- How should your Town prepare for climate change and its impact to natural hazards?
  - Climate change is NOT impacting natural hazards.
  - Storms are increasing in frequency and severity and we should plan accordingly.
  - Storm frequency is NOT changing, we should continue our current path.

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Mitigation Actions

- Mitigation actions answer the question what can be done about the risks identified?

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10/29/2020

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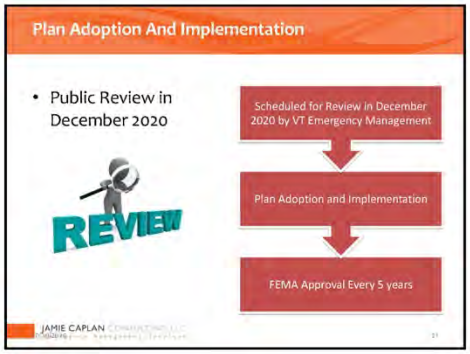

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November 17, 2020

Multi-Jurisdiction Hazard Mitigation Plan for the
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Public Meeting Agenda
November 17, 2020, 6:30pm
ZOOM
https://us02web.zoom.us/j/88382085282?pwd=Mk5vTC9EMGJtUWUzcEczT1RNSUJRdz09
Meeting ID: 883 8208 5282
Passcode: 738582

Introduction to Mitigation Planning

Planning Process

- Role of Hazard Mitigation Committee
- Public Engagement Plan

Hazard Analysis and Risk Assessment

- Hazard Identification
- Hazard Profiles
- Risk Assessment Summary

Mitigation Strategy

- Mission and Goal Statements
- Mitigation Actions

Plan Adoption and Implementation

Plan Review and Next Steps

November 17, 2020
Public Meeting - Zoom

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont
Multi-Jurisdiction Hazard Mitigation Plan

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Emergency Management Services

1

Jamie Caplan Consulting LLC

Nationwide experience
- Territory of American Samoa
- County of Maui
- American Indian Tribes
- South Central Region of Connecticut
- Dozens of local governments

Vermont experience
- Kirby
- Lowell
- Lyndon

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Agenda

- Introduction to Mitigation Planning
- Planning Process
- Hazard Analysis and Risk Assessment
- Mitigation Strategy
- Plan Adoption and Implementation
- Plan Review and Next Steps

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Mitigation Defined

- Any sustained actions taken to reduce or eliminate long term risk to people and property from hazards and their effects.

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FEMA's Pre-Disaster Mitigation Funding

- Building Resilient Infrastructure and Communities (BRIC)
  - Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)
- Hazard Mitigation Grant Program (HMGP)
  - Only available after a Presidential Disaster Declaration

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Mitigating Risk Saves Lives and Money

A FEMA-approved Hazard Mitigation Plan is required to receive Federal Grant Funds for Hazard Mitigation Projects.

Overall Benefit-Cost Ratio	11:1	4:1	4:1	4:1	6:1
Cost ($ billion)	$1[illegible]	$4[illegible]	$520	$0.6	$27
Benefit ($ billion)	$13[illegible]	$16[illegible]	$2200	$2.5	$160
Riverine Flood	6:1	5:1	6:1	8:1	7:1
Hurricane Surge	[illegible]	7:1	[illegible]	[illegible]	[illegible]
Wind	10:1	5:1	6:1	7:1	5:1
Earthquake	12:1	4:1	13:1	3:1	3:1
Wildland-Urban Interface Fire	[illegible]	6:1	2:1	[illegible]	2:1

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11/17/2020

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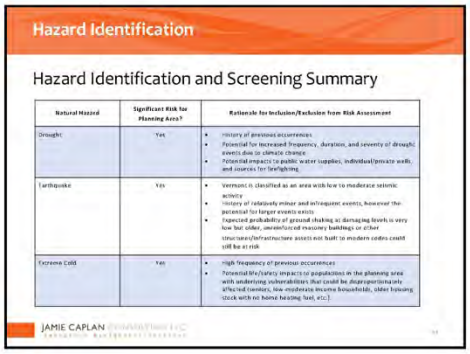

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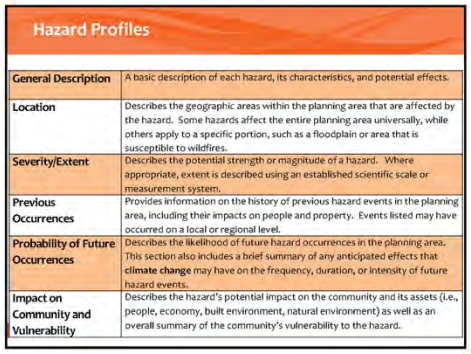

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11/17/2020

Hazard Profiles

Primary data sources:

- Vermont State Hazard Mitigation Plan (2018)
- Previous All-Hazards Mitigation Plans (2005)
- NVDA
- State Agencies (DEC, DPS/VEM, VDH, etc.)
- Federal Agencies (NOAA, FEMA, USGS, etc.)
- **YOU!**

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Risk Assessment Summary (DRAFT)

HIGH RISK	Snow Storm & Ice Storm Wind Extreme Cold Inundation Flooding & Fluvial Erosion
MODERATE RISK	Infectious Disease Wildfire Extreme Heat
LOW RISK	Drought Earthquake Invasive Species Hail

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Mitigation Actions

- Mitigation actions answer the question what can be done about the risks identified?

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Mitigation Strategy

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Mission Statement

- To protect life, property, natural resources and the quality of life in the planning area by reducing the vulnerability to climate change and natural hazards.

East Burke Dam

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Goal Statements

High Hazards
- Mitigate risks due to high hazards such as snowstorms, ice storms, high winds, extreme cold and flooding.

Natural Resources
- Prioritize the protection of natural resources when mitigating risk and restore natural features of rivers, streams and other surface waters.

Infrastructure
- Improve the resilience of the built environment, including buildings, roads and bridges, and utilities, to natural hazards and climate change.

Capacity
- Increase the capacity of the region to mitigate risk to natural hazards and climate change through municipal planning, public education, and regional collaboration.

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NVDA Actions

- Support Towns interested in expanded broadband services.
- Assist Towns with updating their infrastructure inventory on the VOBCIT database.
- Support Towns with disseminating information about the Heat Squad and other energy saving mitigation measures.
- Support Towns with NFIP adoption and/or maintenance. Support CRS for Towns if they enter the program.
- Support regional public education campaigns for hazard mitigation.
- Support Towns with annual Hazard Mitigation Committee meetings and updates to this Plan.

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Mitigation Actions

1. Local Plans and Regulations
2. Structure and Infrastructure Projects
3. Natural Systems Protection
4. Education and Awareness Programs

- Generators
- Bridge or culvert work
- Code or bylaw adoption or joining the NFIP
- Education and outreach
- Regional and State partnerships
- Engineering or modeling analysis
- Reverse 911 or emergency communication
- Put-up snow fences

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Actions Common for all Towns

Support	Support regional education campaign and expand the Town's capacity for hazard mitigation with local resources such as websites, listservs, and newsletters.
Expand	Expand current efforts to install a Reverse 911 system.
Install	Install generators at critical facilities.
Replace	Replace undersized or failing culverts identified in the Town's VOBCIT.

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Plan Adoption And Implementation

- Public Review in December 2020

Scheduled for Review in December 2020 by VT Emergency Management

Plan Adoption and Implementation

FEMA Approval Every 5 years

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Plan Review

- Chapter 1. Introduction
  - Changes since 2005
- Chapter 2. Planning Area Profile
  - Regional information with Town specifics
- Chapter 3. Planning Process
  - Who was involved
  - Studies reviewed
- Chapter 4. Risk Assessment
  - Hazard profiles
  - Summary of Risk
- Chapter 5. Capability Assessment
  - Plans, Administration, Finances, Education
  - National Flood Insurance Program
- Chapter 6. Mitigation Strategy
  - Goals
  - Mitigation Actions for each Town
- Chapter 7. Plan Implementation and Maintenance
  - Method and schedule for implementation

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Benefits of Mitigation Planning

- Identify cost-effective actions to reduce risk
- Focus resources on greatest vulnerabilities
- Build partnerships
- Increase awareness of hazards and risk
- Communicate priorities
- Align with other town and regional objectives

FEMA $

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11/17/2020

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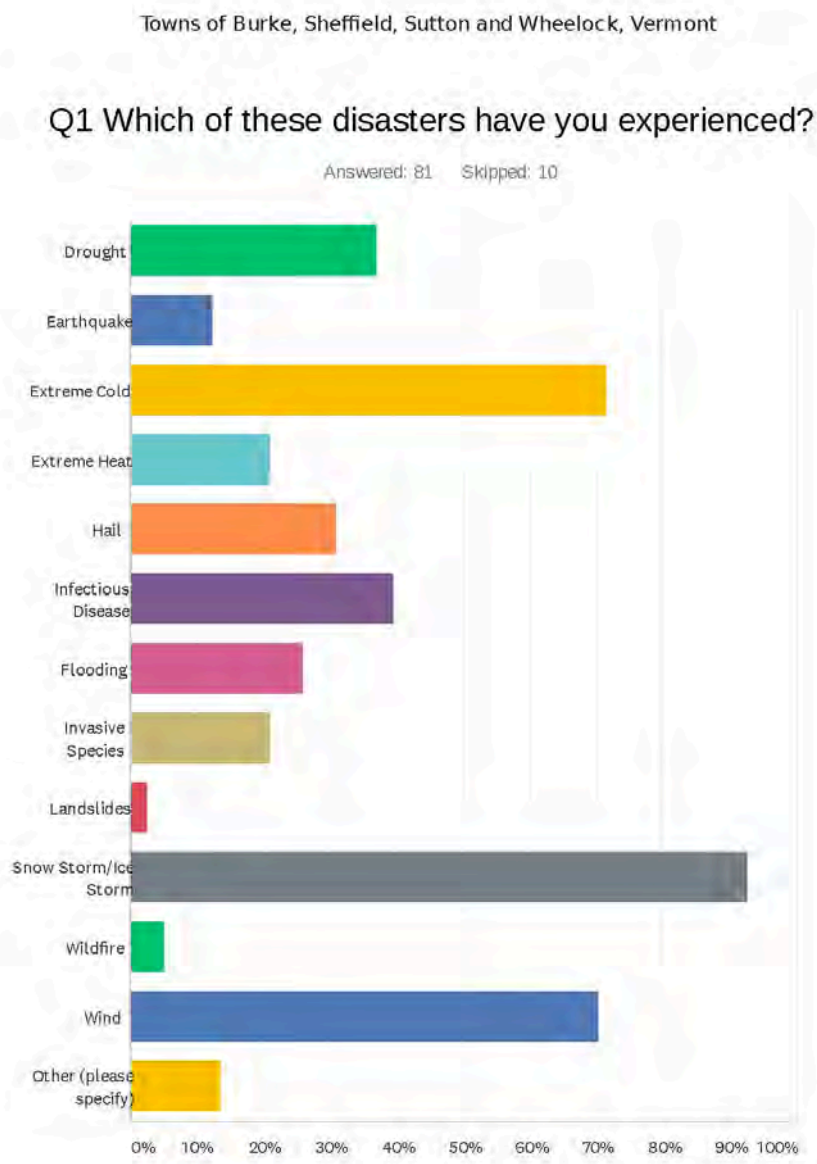
Public Preparedness Survey Results



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Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

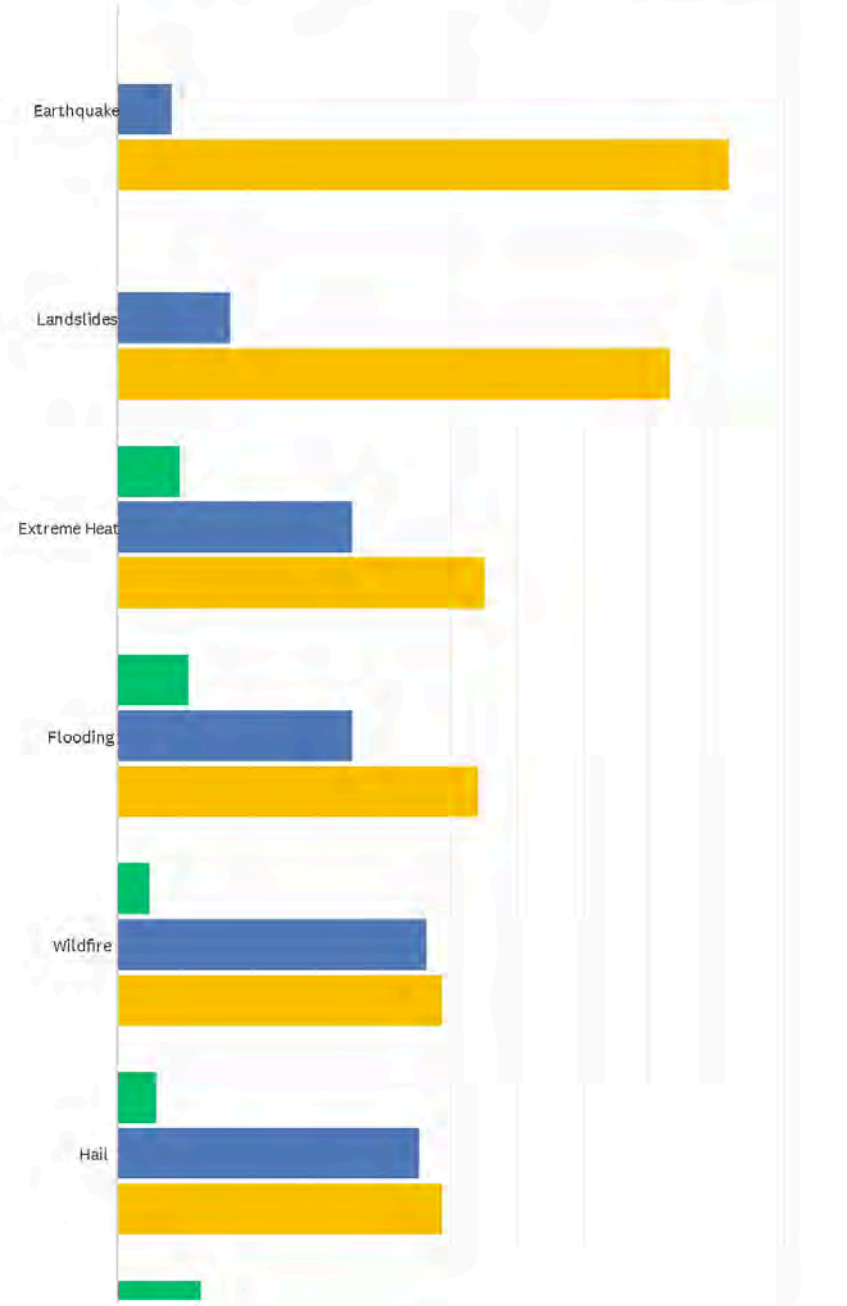
ANSWER CHOICES	RESPONSES	
Drought	37.04%	30
Earthquake	12.35%	10
Extreme Cold	71.60%	58
Extreme Heat	20.99%	17
Hail	30.86%	25
Infectious Disease	39.51%	32
Flooding	25.93%	21
Invasive Species	20.99%	17
Landslides	2.47%	2
Snow Storm/Ice Storm	92.59%	75
Wildfire	4.94%	4
Wind	70.37%	57
Other (please specify)	13.58%	11
Total Respondents: 81		

#	OTHER (PLEASE SPECIFY)	DATE
1	Hurricane	11/12/2020 11:35 AM
2	None thankfully	10/16/2020 12:43 PM
3	Nothing rose to the level of disaster.	10/16/2020 12:39 PM
4	Hurricane, Tropical Storm	10/5/2020 10:51 AM
5	Ticks	10/2/2020 7:43 PM
6	None	9/19/2020 8:20 PM
7	Lightning and road wash out or impassable due to mud season. Lightning hit our neighborhood which fried electrical lines and motors in house (washer, dryer, deep well pump, microwave, phone) it hit a five mile radius.	9/19/2020 8:10 PM
8	Excessive vehicular speeding	9/8/2020 7:57 AM
9	In 30 years in Wheelock none of the above were at the disaster level.	9/3/2020 8:05 PM
10	Power outages often	9/3/2020 12:50 PM
11	Very heavy rains that ruin roads	9/2/2020 10:45 AM

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q2 How concerned are you about each of these hazards?

Answered: 88 Skipped: 3



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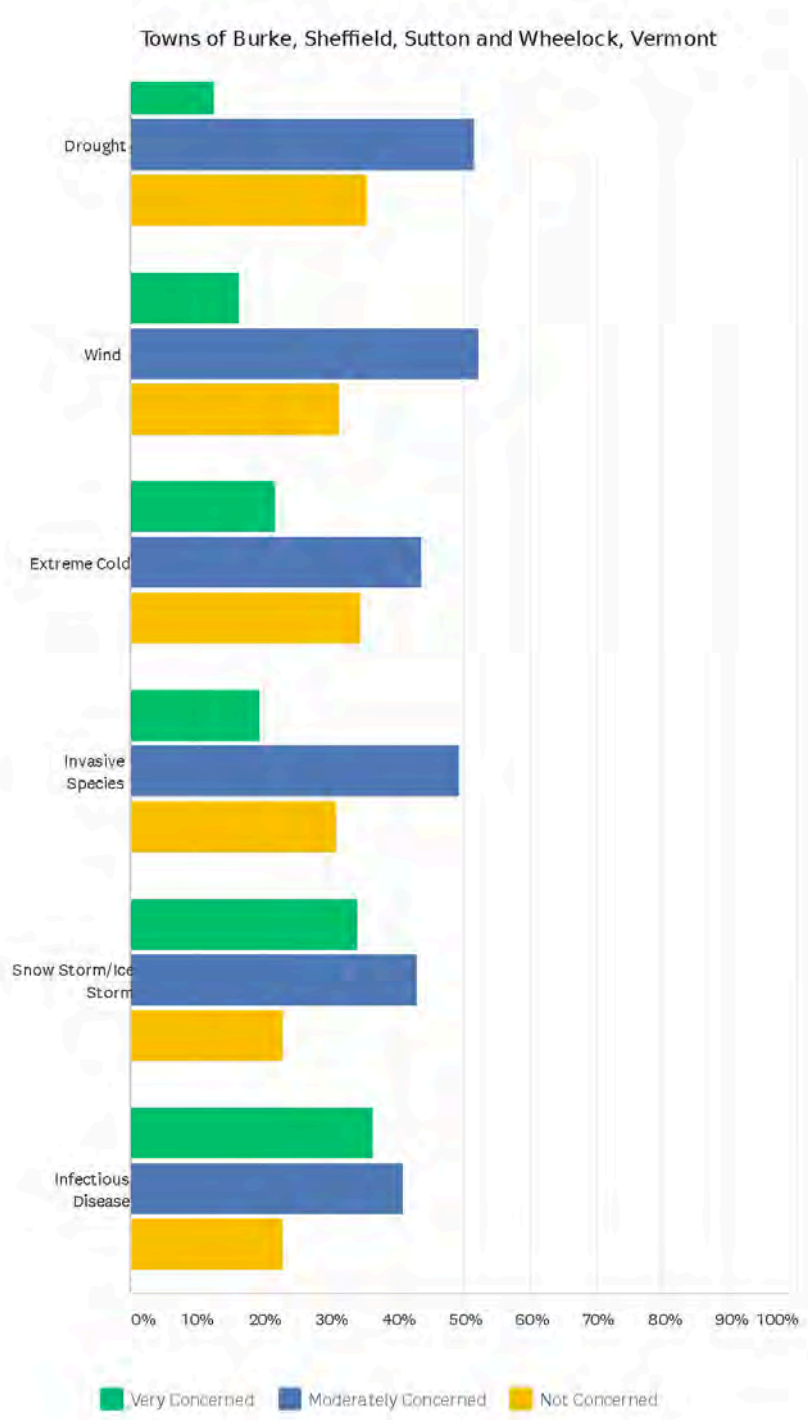
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont
Drought
Wind
Extreme Cold
Invasive Species
Snow Storm/Ice Storm
Infectious Disease
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Very Concerned
Moderately Concerned
Not Concerned

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Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

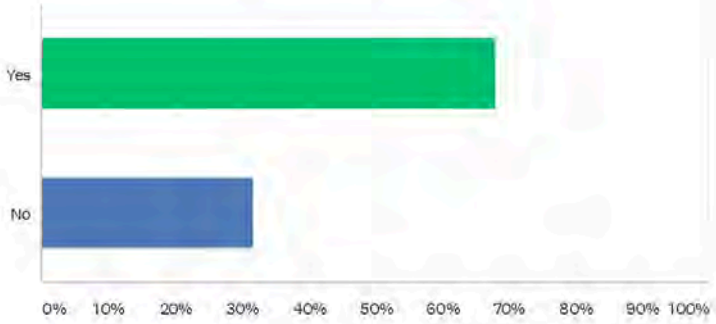
	VERY CONCERNED	MODERATELY CONCERNED	NOT CONCERNED	TOTAL	WEIGHTED AVERAGE
Earthquake	0.00% 0	8.24% 7	91.76% 78	85	2.92
Landslides	0.00% 0	16.87% 14	83.13% 69	83	2.83
Extreme Heat	9.41% 8	35.29% 30	55.29% 47	85	2.46
Flooding	10.59% 9	35.29% 30	54.12% 46	85	2.44
Wildfire	4.88% 4	46.34% 38	48.78% 40	82	2.44
Hail	5.81% 5	45.35% 39	48.84% 42	86	2.43
Drought	12.64% 11	51.72% 45	35.63% 31	87	2.23
Wind	16.28% 14	52.33% 45	31.40% 27	86	2.15
Extreme Cold	21.84% 19	43.68% 38	34.48% 30	87	2.13
Invasive Species	19.54% 17	49.43% 43	31.03% 27	87	2.11
Snow Storm/Ice Storm	34.09% 30	43.18% 38	22.73% 20	88	1.89
Infectious Disease	36.36% 32	40.91% 36	22.73% 20	88	1.86

#	OTHER (PLEASE SPECIFY)	DATE
1	Road maintenance	10/16/2020 12:43 PM
2	Poor planning	10/8/2020 11:31 AM
3	1. Mud season and drainage blocked it washes out our roads. 2. Fast snow melt washes out the roads or trees fall over in soft ground.	9/19/2020 8:10 PM
4	Microburst storms.	9/19/2020 12:36 PM
5	Flat-landers	9/19/2020 12:25 PM
6	Illegal dumping and promotion of Vermont as a chosen waste disposal state (i.e. Coventry). Tainted water supply from contaminated well(s). Fireworks permitted during times of drought/no snow cover.	9/14/2020 2:52 PM
7	The worry with flooding is due to washing out bridges. This has happened previously making it difficult to get to my residence. The extreme ice and snow often falls trees that break power lines leaving my residence without power during extreme cold temperatures.	9/5/2020 2:10 PM
8	Town roads washing out from heavy snow melt or heavy rain storms. Small bridges impassable due to storms or age some are single lane.	9/3/2020 12:50 PM

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q3 Have you been unable to travel due to severe weather impacting roadways?

Answered: 88 Skipped: 3



ANSWER CHOICES	RESPONSES	
Yes	68.18%	60
No	31.82%	28
TOTAL		88

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q4 If you answered yes, which roads where impassable? Please list all.

Answered: 56 Skipped: 38

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

#	RESPONSES	DATE
1	Nelson Hill Road Route 122	11/17/2020 6:50 PM
2	Burroughs Road, Peak Road, Cold Hill Road, South Wheelock Road, Standard Mountain Road	11/13/2020 1:41 PM
3	South Wheelock Road	11/13/2020 1:38 PM
4	My own hill.....Peak Rd	11/12/2020 3:17 PM
5	Route 2 on icy days	11/12/2020 11:47 AM
6	Burroughs Road Sutton Hill Road South Wheelock Road	11/12/2020 11:35 AM
7	Sutton Road Vermont Rt. 122	11/12/2020 11:31 AM
8	South Wheelock Road	11/11/2020 4:05 PM
9	Freezing rain, road flooded.	10/21/2020 10:42 AM
10	Buckler Road Wheelock Hubbard Hill Lyndon	10/21/2020 10:39 AM
11	Dirt and paved.	10/21/2020 10:35 AM
12	Very infrequently it has been too icy to get down Jills Hill Road.	10/16/2020 12:37 PM
13	South Wheelock	10/14/2020 1:29 PM
14	Allard Hill Road	10/14/2020 1:26 PM
15	Route 122	10/14/2020 1:22 PM
16	Southern Vermont Route 30 when 10 inch ran washed away many roads	10/8/2020 2:14 PM
17	South Wheelock Road Minister Hill Road Red Schoolhouse Road Peak Road Vertical Mile Road Minister Hill Road - should be maintained all year! Pave South Wheelock Road!	10/8/2020 11:46 AM
18	Lersux Road, Wheelock	10/8/2020 11:42 AM
19	Starrad Mountain Road	10/8/2020 11:37 AM
20	Ice on mountain top roads	10/8/2020 11:31 AM
21	Blakely Road	10/6/2020 11:18 AM
22	All roads due to ice and fallen trees.	10/6/2020 11:14 AM
23	south wheelock roads	10/6/2020 10:54 AM
24	Peak Road	10/5/2020 2:27 PM
25	Peak Road, Buchler Road	10/5/2020 10:51 AM
26	Gonyaw, Stannard Mountain	10/2/2020 7:43 PM
27	Peak road, South Wheelock Road, Burroughs Road	9/29/2020 11:54 AM
28	Peake Road South Wheelock Road	9/20/2020 8:00 PM
29	Junction Rt 5/122/114	9/20/2020 7:55 PM
30	Leroux Road South Wheelock Road	9/20/2020 7:49 PM
31	Cold Hill Road South Wheelock Road	9/20/2020 7:46 PM
32	Usually the roads maintained by the different towns.	9/20/2020 1:01 PM
33	South Wheelock	9/19/2020 8:24 PM
34	Bachelor Road, Fall Brook, Bean Pond Road, Peak Road, Standard Mountain Road, Sutton Road, South Wheelock Road, Vertical Mile	9/19/2020 8:10 PM
35	Sutton Road 1986	9/19/2020 8:04 PM
36	Allard Hill Road, Wheelock	9/19/2020 12:40 PM

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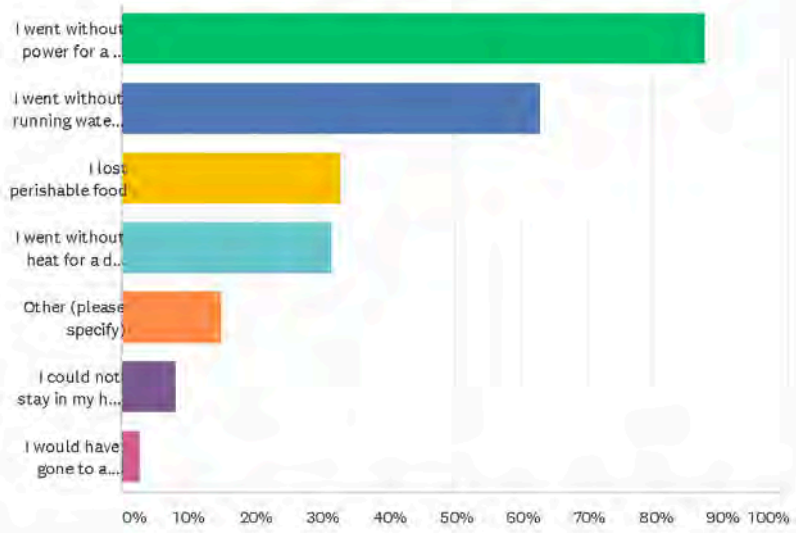
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

37	Town and State roads both to varied count.	9/19/2020 12:25 PM
38	Standard Mountain Road.	9/19/2020 12:21 PM
39	South Wheelock Road bridge was impassable due to flooding for many months.	9/14/2020 2:52 PM
40	SOUTH WHEELOCK ROAD BEAN POMD ROAD	9/13/2020 12:41 PM
41	Bean Pond Road	9/9/2020 7:48 AM
42	None	9/8/2020 7:57 AM
43	back roads leading to highways	9/7/2020 11:52 AM
44	South Wheelock Road and Stannard Mountain Road	9/6/2020 10:37 PM
45	South Wheelock road had a spot impassable due to a bridge being washed out. Minister hill road was completely iced over as well which made the road to dangerous to attempt until copious amounts of sand was applied.	9/5/2020 2:10 PM
46	South Wheelock Road, Stannard Mountain Road, Hwy 5 between L'ville and St. Johnsbury	9/4/2020 9:46 AM
47	Interstates 91, 93, and others	9/4/2020 7:59 AM
48	Leroux Road in Wheelock	9/3/2020 8:05 PM
49	Aldrich Lane, Sutton Road, Rte. 122	9/3/2020 4:24 PM
50	Our town road and Lyndon town road the main road to Wheelock and south wheelock standard mountain road, route 122 flooding or road slide and everyone during a heavy snow storms sometimes it takes 3 days to clear roads.	9/3/2020 12:50 PM
51	Stannard Mountain Road Pretty much every Wheelock dirt road in mud season...which "forward thinker" decided to use that grant to StayMat South Wheelock Road when we could have paved it?	9/3/2020 12:36 PM
52	There have been storms that made all road, even 122, impassable.	9/2/2020 11:26 PM
53	Rte 122: flooding	9/2/2020 12:27 PM
54	S. Wheelock road	9/2/2020 12:03 PM
55	Wheelock Roads, Burroughs, Peak Danville Roads, Tampico, Stanton Lyndon/St. J Houghton Bridge Route 5 St. J and Lyndon	9/2/2020 11:50 AM
56	Peak Rd. Minister Hill Rd.	9/2/2020 10:45 AM

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q5 Regarding your experience with extreme weather events or natural disasters, which of the following statements are true for you?

Answered: 73 Skipped: 18



ANSWER CHOICES	RESPONSES	
I went without power for a day or longer	87.67%	64
I went without running water for a day or longer	63.01%	46
I lost perishable food	32.88%	24
I went without heat for a day or longer	31.51%	23
Other (please specify)	15.07%	11
I could not stay in my home for a day or longer	8.22%	6
I would have gone to a shelter if one was available	2.74%	2
Total Respondents: 73		

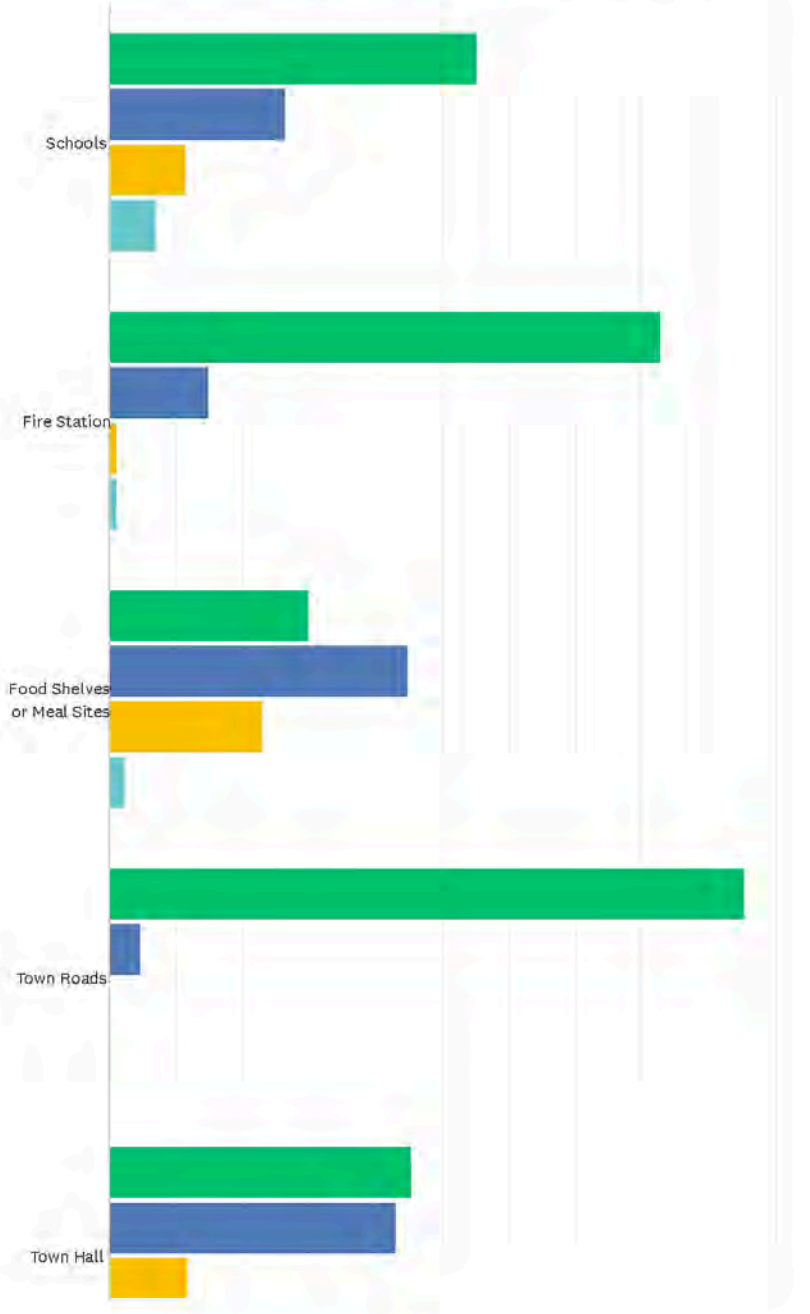
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

#	OTHER (PLEASE SPECIFY)	DATE
1	I would if absolutely necessary.	11/12/2020 3:17 PM
2	Have generator for house	10/8/2020 2:14 PM
3	On solar and off grid	10/8/2020 11:37 AM
4	Off the grid	9/19/2020 8:20 PM
5	Power goes out multiple times in spring and fall. Sometimes winter and summer. No power = no heat, no water, no cell phones if lines down - no landline phone	9/19/2020 8:10 PM
6	Ice storm was in Worcester County MA (above)	9/14/2020 2:52 PM
7	our generator provided power, wood stove provided heat	9/14/2020 11:11 AM
8	I run electric heat but was able to use a back up wood stove.	9/5/2020 2:10 PM
9	It is very common to loose power every fall and spring. Our land line Phone is alwaysgoing out and some seasons I call to have repaired every heavy rain storm or wet snow storms	9/3/2020 12:50 PM
10	I live off-grid and maintain at least one plow truck because independence is the only think I can count on; I have no trust in my Wheelock Town officials any more.	9/3/2020 12:36 PM
11	A big concern is lack of good tree cutting near the utility lines.	9/2/2020 10:45 AM

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q6 Which town assets are the most important to you?

Answered: 88 Skipped: 3



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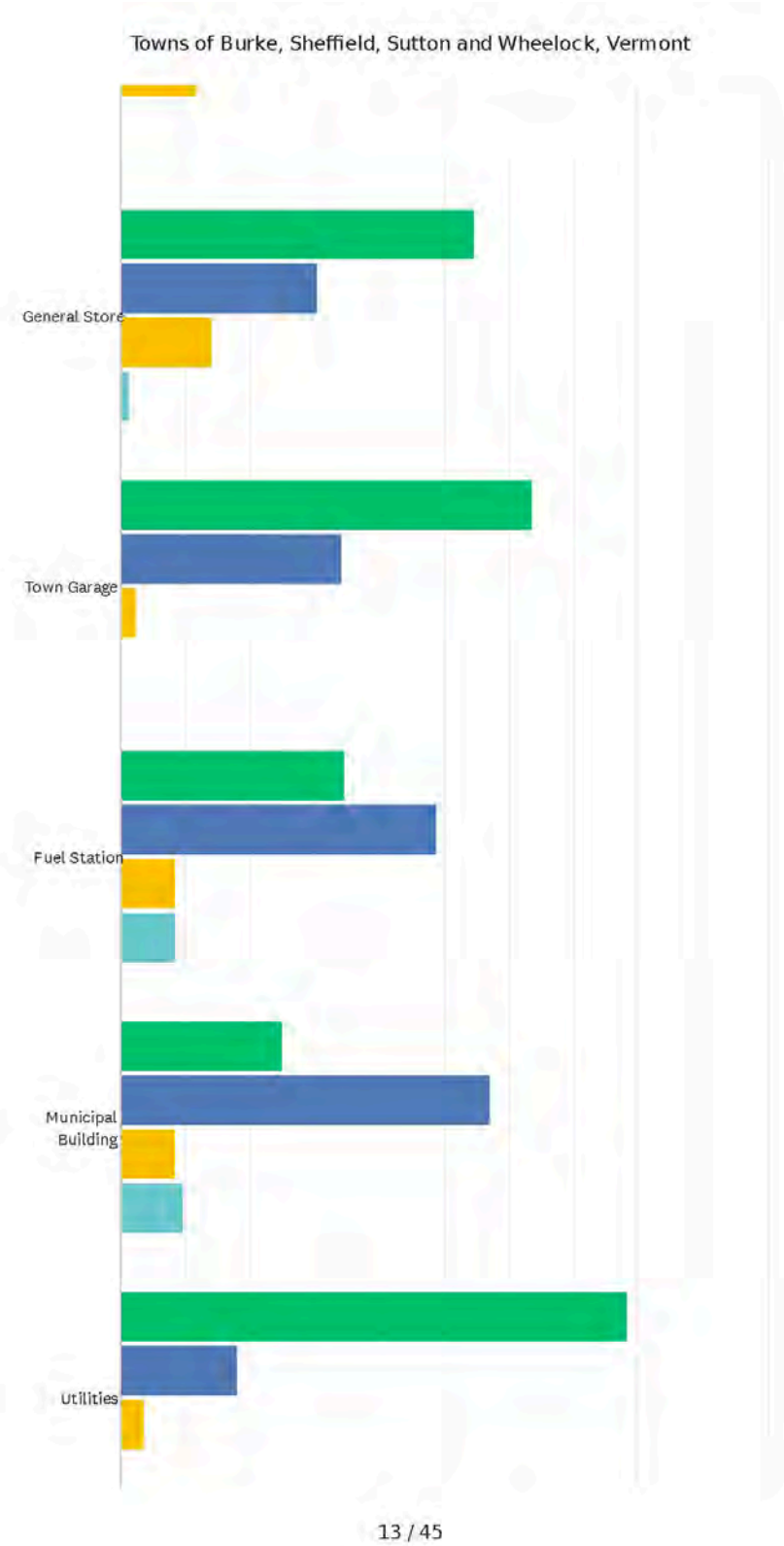
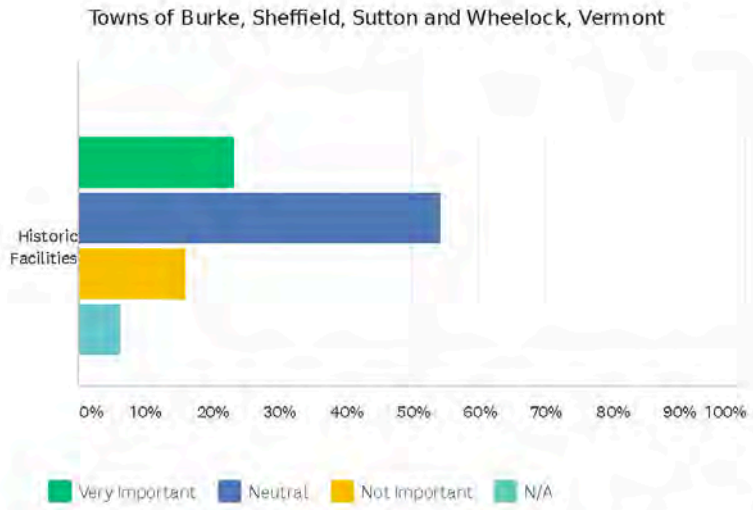

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont
General Store
Town Garage
Fuel Station
Municipal Building
Utilities
13 / 45

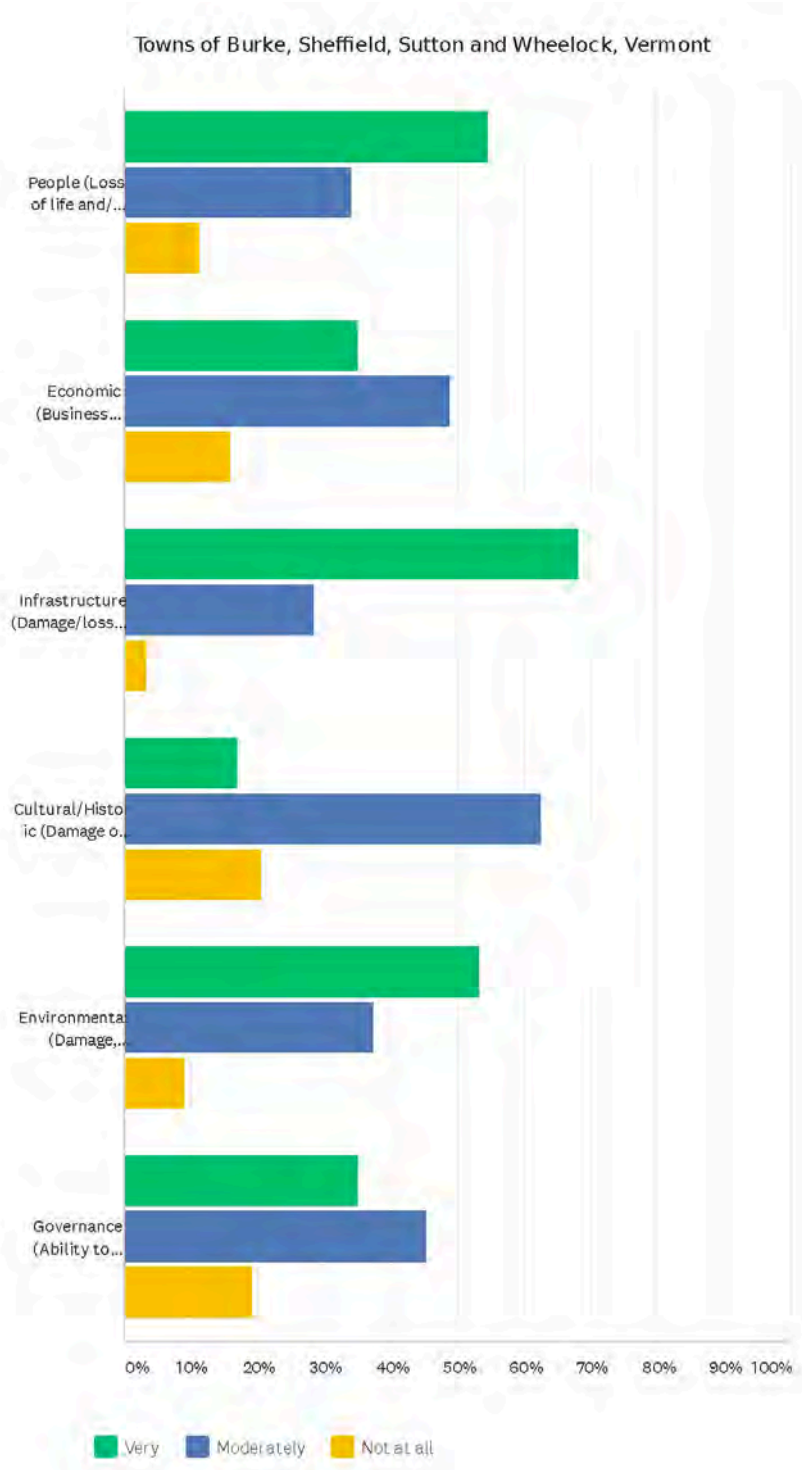


	VERY IMPORTANT	NEUTRAL	NOT IMPORTANT	N/A	TOTAL
Schools	55.17% 48	26.44% 23	11.49% 10	6.90% 6	87
Fire Station	82.76% 72	14.94% 13	1.15% 1	1.15% 1	87
Food Shelves or Meal Sites	29.89% 26	44.83% 39	22.99% 20	2.30% 2	87
Town Roads	95.40% 83	4.60% 4	0.00% 0	0.00% 0	87
Town Hall	45.35% 39	43.02% 37	11.63% 10	0.00% 0	86
General Store	54.65% 47	30.23% 26	13.95% 12	1.16% 1	86
Town Garage	63.53% 54	34.12% 29	2.35% 2	0.00% 0	85
Fuel Station	34.52% 29	48.81% 41	8.33% 7	8.33% 7	84
Municipal Building	25.00% 21	57.14% 48	8.33% 7	9.52% 8	84
Utilities	78.31% 65	18.07% 15	3.61% 3	0.00% 0	83
Historic Facilities	23.46% 19	54.32% 44	16.05% 13	6.17% 5	81

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q7 In terms of vulnerability to natural hazards, how concerned are you about the following categories?

Answered: 88 Skipped: 3


Towns of Burke, Sheffield, Sutton and Wheelock, Vermont
People (Loss of life and/...
Economic (Business...
Infrastructure (Damage/loss...
Cultural/Histo ic (Damage o...
Environmenta (Damage,...
Governance (Ability to...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Very
Moderately
Not at all

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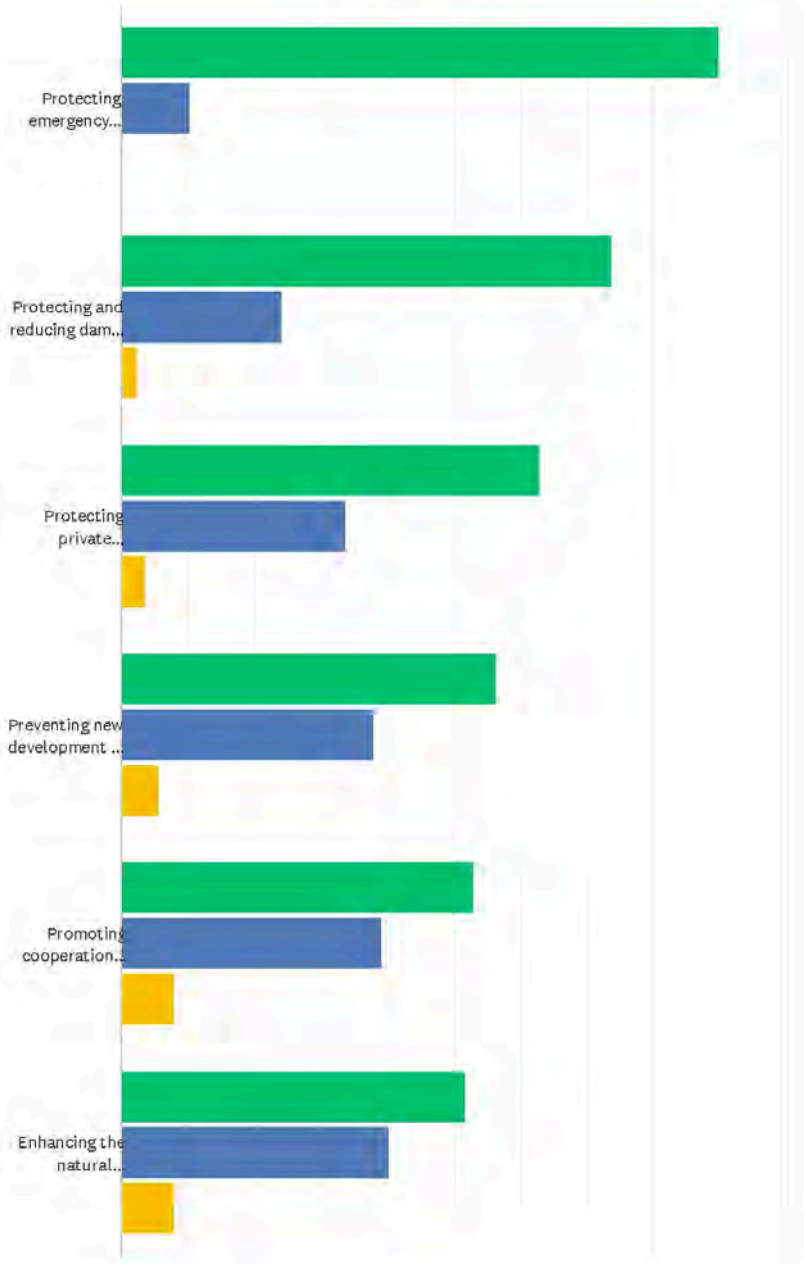
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

	VERY	MODERATELY	NOT AT ALL	TOTAL
People (Loss of life and/or injuries)	54.55% 48	34.09% 30	11.36% 10	88
Economic (Business interruptions/closures, job losses, etc.)	35.23% 31	48.86% 43	15.91% 14	88
Infrastructure (Damage/loss or roads, bridges, utilities, schools, etc.)	68.18% 60	28.41% 25	3.41% 3	88
Cultural/Historic (Damage or loss of libraries, museums, historic properties, etc.)	17.05% 15	62.50% 55	20.45% 18	88
Environmental (Damage, contamination or loss of forests, trees, etc.)	53.41% 47	37.50% 33	9.09% 8	88
Governance (Ability to maintain order and/or provide public amenities and services.)	35.23% 31	45.45% 40	19.32% 17	88

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q8 Let us know your priorities regarding planning for natural hazards in your town.

Answered: 87 Skipped: 4



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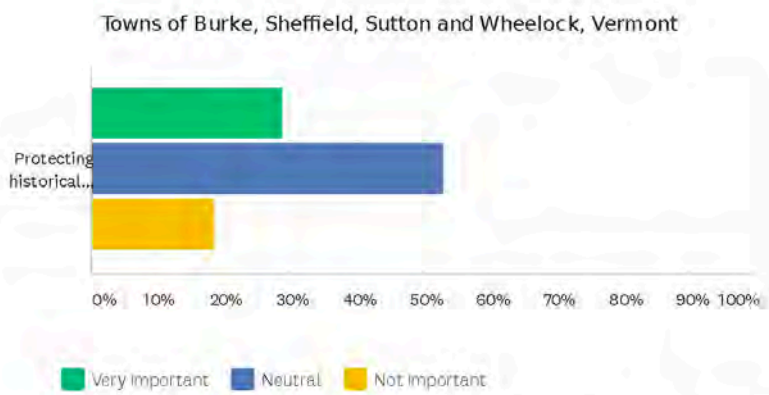
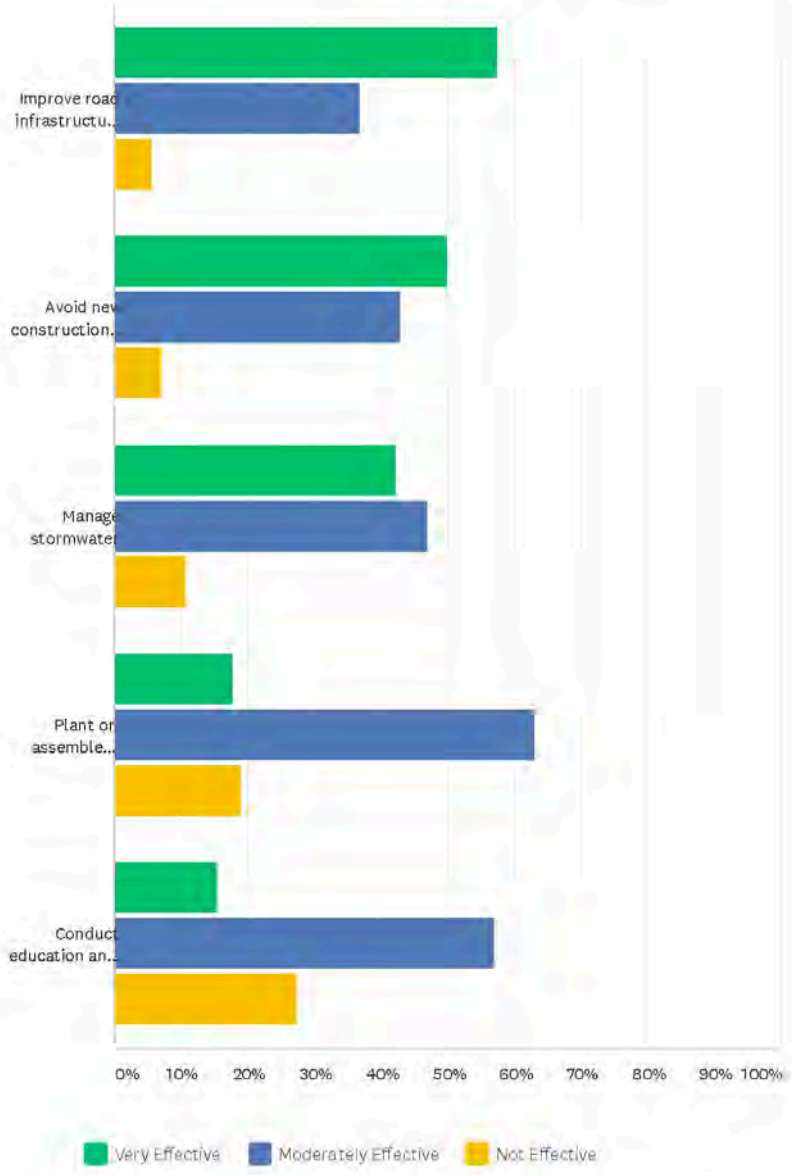


	VERY IMPORTANT	NEUTRAL	NOT IMPORTANT	TOTAL
Protecting emergency services (fire, police, and ambulance.)	89.66% 78	10.34% 9	0.00% 0	87
Protecting and reducing damage to utilities	73.56% 64	24.14% 21	2.30% 2	87
Protecting private property	62.79% 54	33.72% 29	3.49% 3	86
Preventing new development in high hazard areas	56.32% 49	37.93% 33	5.75% 5	87
Promoting cooperation among public agencies, citizens, non-profit organizations, volunteers, and businesses	52.87% 46	39.08% 34	8.05% 7	87
Enhancing the natural environment	51.72% 45	40.23% 35	8.05% 7	87
Protecting historical properties	28.74% 25	52.87% 46	18.39% 16	87

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q9 In your opinion, how effective are each of the following actions at mitigating (reducing) risk in your town?

Answered: 87 Skipped: 4



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Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

	VERY EFFECTIVE	MODERATELY EFFECTIVE	NOT EFFECTIVE	TOTAL
Improve road infrastructure (i.e. bridges, culverts)	57.47% 50	36.78% 32	5.75% 5	87
Avoid new construction in areas subject to flooding and/or erosion	50.00% 42	42.86% 36	7.14% 6	84
Manage stormwater	42.35% 36	47.06% 40	10.59% 9	85
Plant or assemble windbreaks to protect structures and roads	17.86% 15	63.10% 53	19.05% 16	84
Conduct education and awareness programs	15.48% 13	57.14% 48	27.38% 23	84

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q10 What are some actions your town could take to reduce or eliminate the risk of future natural hazard damages?

Answered: 37 Skipped: 54

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

#	RESPONSES	DATE
1	Improve infrastructure and roads Construct a community center that is capable of serving as a Red Cross shelter Increase emergency services, add fire hydrants and dry hydrants	11/17/2020 6:58 PM
2	Remove dead trees overhanging roads.	11/13/2020 1:42 PM
3	Maintain roads, bridges. Trim trees where needed.	11/13/2020 1:36 PM
4	i am really not familiar enough with the whole area of my town to answer this in any meaningful way. I am lucky to live so close to a black top highway. In the past the town has taken care of hazardous areas as promptly as possible.	11/12/2020 3:28 PM
5	Clean and replace culverts Clear leaning trees from over roads Ditching	11/12/2020 11:37 AM
6	Better road conditions	11/11/2020 4:07 PM
7	Your town officials already know	10/16/2020 12:44 PM
8	Vote republican	10/16/2020 12:40 PM
9	You can not do anything to prevent natural damages!	10/8/2020 2:04 PM
10	Leave the mountain tops alone. Save trees. Don't allow building next to waterways, ponds or lakes.	10/8/2020 11:32 AM
11	Ditch work and water run-off.	10/6/2020 11:15 AM
12	clearing trees from power lines	9/29/2020 11:56 AM
13	Better cleaning of ditches. Better road grading and surfacing. Better material on roads.	9/20/2020 8:02 PM
14	Survey electric lines and cut suspect trees.	9/20/2020 7:57 PM
15	Upgrades to infrastructure so they would withstand disasters. Employ people with experience. Work with other towns to share information/experience on what is effective.	9/20/2020 1:17 PM
16	Facebook Meeting	9/19/2020 8:29 PM
17	Better road maintenance use stay mat or calkins plant mix for road surfaces it stays put during heavy rains/washout and requires less grading. Cut back brush from roadside so full road can be used. Fix ditches/culverts for water run off.	9/19/2020 8:13 PM
18	Improve road drainage into ditch.	9/19/2020 8:05 PM
19	Excavate and maintain ditches.	9/19/2020 8:01 PM
20	Make sure road culverts are free from debris.	9/19/2020 12:33 PM
21	We don't seem to drain or build our roads to drain very well. Our road person seems to have their hands full with normal maintenance, and possibly a regional road improvement crew (or educational resource) could be shared among the towns. I do not mean to be critical and it could be we do not spend enough or a Catch 22 situation where people will not further support a highway department perceived to be only declining.	9/14/2020 3:18 PM
22	maintain/fix roads - culverts, ditch roads better	9/14/2020 11:16 AM
23	CUT TREE AND BRANCHES OVER POWER LINES	9/13/2020 12:43 PM
24	Maintain power lines. Ditch roadsides.	9/11/2020 4:34 PM
25	A more robust plan to trim along the power lines. The emergency service is great and I applaud all the work the do in dangerous conditions but what I don't see is the preventive measures prior to and outage. It may be there and I'm just unaware of that campaign.	9/5/2020 2:20 PM
26	Nature will do what it does, so I am okay with that. We really need to make sure power and communication is protected, repaired ASAP, and people are safe. We can always rebuild later. Care and well being of people comes first..	9/4/2020 6:09 PM
27	Put money aside every year to be prepared for emergencies and planning efforts.	9/4/2020 8:02 AM
28	Protect river corridors and prevent further development in same.	9/3/2020 8:11 PM

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Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

29	Change what is being done to the roads. First make sure they are up to grade for width and drainage. The road surface could be changed to stay mat or plant mix from Caulkins that would cut down on erosion and dust. If used would cut down on road grading which could save the town money from machinery and labor. Upgrade power and phone access land line or cell phone very spotty around Vermont.	9/3/2020 1:10 PM
30	Invest in an EDUCATED, LITERATE, PROACTIVE Wheelock road foreman and fund and require regular professional development of our road crew so they can research and manage grants to support improvement of our infrastructure, e.i. run-off mitigation, culvert and bridge repair...as well as understand best practices in grading, ditching, driveway permitting, vehicle maintenance. And for God sake, when you only get two applicants for a road position, stop just choosing the less-bad candidate and consider and fix WHY people don't want to work for Wheelock.	9/3/2020 12:47 PM
31	Plow all of the roads before 7am	9/2/2020 11:29 PM
32	Can't think of anything...	9/2/2020 1:12 PM
33	Don't build in flood plain or other endangered areasReas abutting rivers and streams	9/2/2020 12:32 PM
34	Improving our town garage into a facility that is not dangerous to the environment or the people who are employed there.	9/2/2020 12:05 PM
35	Having more resources, such as more and better paid and trained road staff (or sharing road maintenance duties with Sheffield) and more preventative maintenance. A better town garage to store equipment and operate out of. Ensure that utility lines are free of blow down treats (I realize this is the utilities responsibility, but Wheelock could do a better job of reporting the issues, especially since the emerald ash borer is coming our way).	9/2/2020 11:58 AM
36	Upkeep of deteriorating roads, bridges and culverts	9/2/2020 11:47 AM
37	Public education. Town website, Flood regs, more $ for road crew	9/2/2020 10:51 AM

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q11 Where are the highest risk areas in your town? Be as specific in your response as possible.

Answered: 33 Skipped: 58

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

#	RESPONSES	DATE
1	All mountain roads are high risk especially the dirt roads. Older bridges and construction along Millers Run are potential flood risks. Old or dead trees along the roadways damaged in storms or dying of natural causes can limit response. Minimal landline phone service and internet service can be a risk for reporting issues	11/17/2020 6:58 PM
2	Peak Road below Rich Radley. Dead Trees both sides. Standard Mountain Road above Chain Sawer tree has been there well over a year or we can wait until it hurts someone.	11/13/2020 1:42 PM
3	See m answer in No 10 above.	11/12/2020 3:28 PM
4	Low areas pronto to flooding	11/12/2020 11:32 AM
5	South Wheelock Road	11/11/2020 4:07 PM
6	I don't think we have any.	10/16/2020 12:40 PM
7	Route 122 by River	10/14/2020 1:24 PM
8	The Brook.	10/8/2020 2:04 PM
9	Wheelock Center	10/8/2020 11:43 AM
10	Roads	10/6/2020 11:15 AM
11	Class 4 roads	10/6/2020 11:09 AM
12	it's wheelock- anywhere really.	9/29/2020 11:56 AM
13	Lipper Stannard Mountain Road Twin Bridges off Rt 122 in Village	9/20/2020 8:02 PM
14	Roads	9/20/2020 7:47 PM
15	Roads not being able to withstand severe weather. Lack of services.	9/20/2020 1:17 PM
16	Town Hall needs replacement make it rental property	9/19/2020 8:29 PM
17	Standard Mountain Road, South Wheelock to Wheelock Road, Peak Road, Vertical Mile Road, Route 122, Sutton Road, Bachler Road	9/19/2020 8:13 PM
18	Rain water running down wheel tracks in the roads	9/19/2020 8:05 PM
19	River Roads - Vertical Mile Sutton Road - Peak Stanard Mountain	9/19/2020 8:01 PM
20	Invasive species seen from roads.	9/19/2020 12:18 PM
21	Near the rivers and bridges and on the steep hills. People also dump stuff on the sides of the roads or in pull offs and there should be more enforcement.	9/14/2020 3:18 PM
22	along the streams/rivers in town	9/14/2020 11:16 AM
23	Downtown Lyndonville has a large flood area where the river often floods the fields and the roads. That's usually at the split on route 5 leaving Lyndonville and the split going to East Burke.	9/5/2020 2:20 PM
24	Dirt roads – many need to be paved especially when they lead to or run past school areas.	9/4/2020 9:49 AM
25	I don't know	9/4/2020 8:02 AM
26	South Wheelock road along the south branch and coming down from Stannard Mtn. Also Route 122 along the Millers Run.	9/3/2020 8:11 PM
27	Standard mountain pass road, south wheelock road, wheelock to south wheelock road, route 122 valley along the river. Wheelock to sutton road. Our whole town road system is very vertical and difficult with mud season some roads can't be used until fill is brought in or snow is removed.	9/3/2020 1:10 PM
28	Different areas are at risk for different hazards, so I'm not sure how to evaluate the highest risk areas.	9/3/2020 12:47 PM
29	Along Millers Run (river)	9/2/2020 1:12 PM
30	Areas abutting rivers and streams. Rte 122 Standard Mt. Rd.	9/2/2020 12:32 PM

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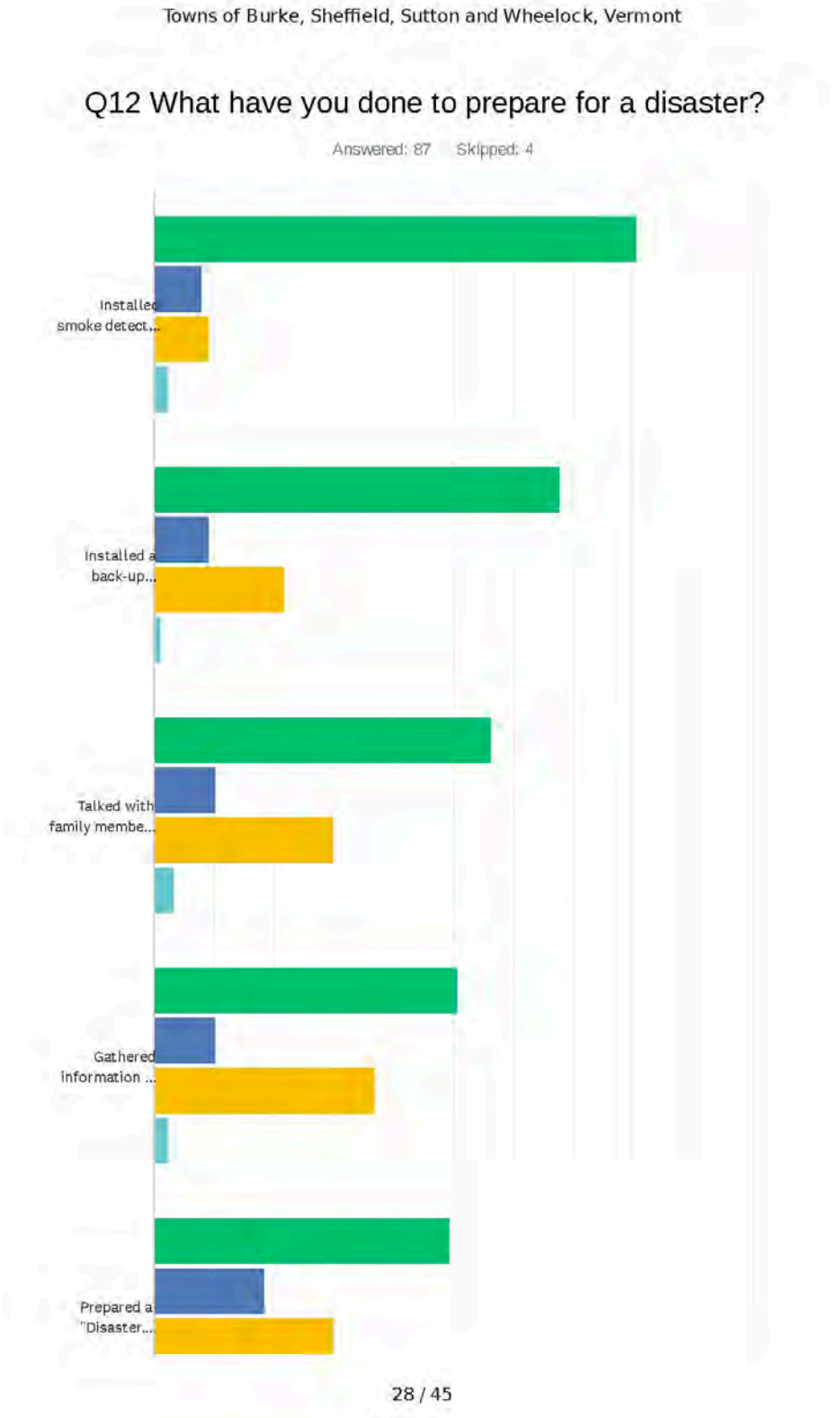
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

31	Downtown due to the flood risk.	9/2/2020 12:05 PM
32	For flooding, south of town along 122, also Stannard Mt. Road. Road damage due to heavy rains is universal. Not having zoning is an open invitation for residents to create more risks and damage the environment.	9/2/2020 11:58 AM
33	Not sure. We can't even get to West Wheelock without going through Stannard & I think maybe Greensboro too. We need to get the Garage out of the Floodplain. We need a place for one fire truck in Wheelock village. We need to upgrade roads & culverts on the most traveled roads: South Wheelock Rd/Stannard Mtn Rd and Peak Rd. We are vulnerable because of the bridge on Rt 122 between our village and Lyndonville. Mutual aid is most likely to come from Lyndonville, but they have a lot of flood concerns there too!	9/2/2020 10:51 AM


Towns of Burke, Sheffield, Sutton and Wheelock, Vermont
Q12 What have you done to prepare for a disaster?
Answered: 87 Skipped: 4
Installed smoke detect...
Installed a back-up...
Talked with family membe...
Gathered information ...
Prepared a "Disaster...
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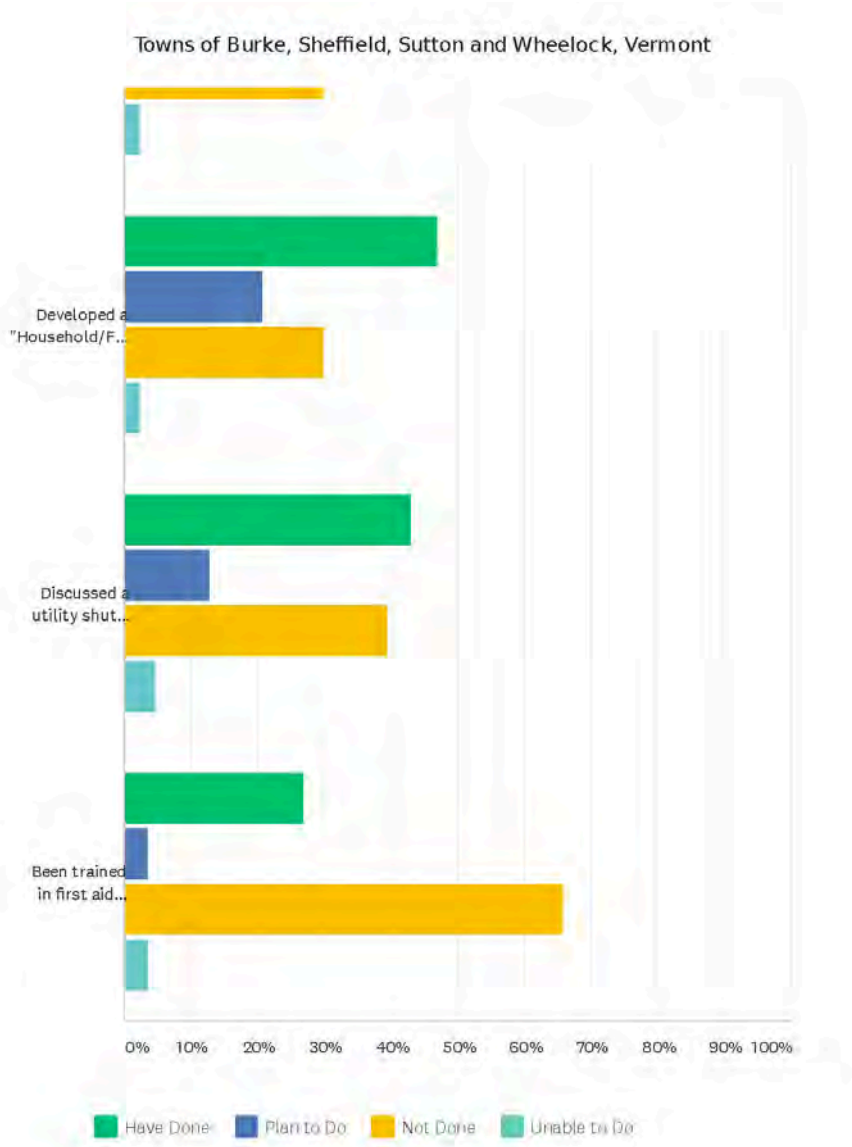
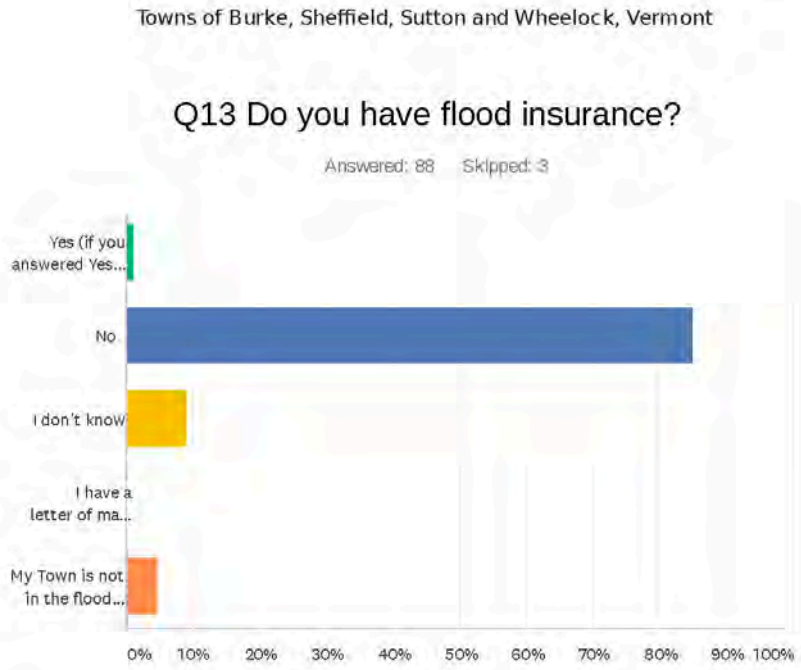

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont
Developed a "Household/F...
Discussed a utility shut...
Been trained in first aid...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Have Done
Plan to Do
Not Done
Unable to Do

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

	HAVE DONE	PLAN TO DO	NOT DONE	UNABLE TO DO	TOTAL
Installed smoke detectors and carbon monoxide detectors on each level of our house.	80.46% 70	8.05% 7	9.20% 8	2.30% 2	87
Installed a back-up generator or have a generator for temporary power.	67.82% 59	9.20% 8	21.84% 19	1.15% 1	87
Talked with family members about what to do in case of a natural disaster.	56.32% 49	10.34% 9	29.89% 26	3.45% 3	87
Gathered information on natural disasters or emergency preparedness.	50.57% 44	10.34% 9	36.78% 32	2.30% 2	87
Prepared a "Disaster Supply Kit."	49.43% 43	18.39% 16	29.89% 26	2.30% 2	87
Developed a "Household/Family Emergency Plan."	47.13% 41	20.69% 18	29.89% 26	2.30% 2	87
Discussed a utility shutoff procedure in the event of a natural disaster.	43.02% 37	12.79% 11	39.53% 34	4.65% 4	86
Been trained in first aid or CPR in the last year.	27.06% 23	3.53% 3	65.88% 56	3.53% 3	85

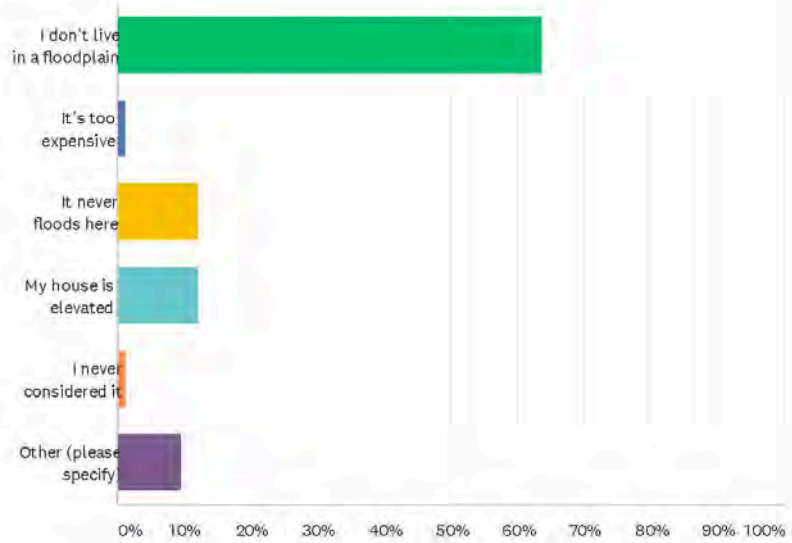


ANSWER CHOICES	RESPONSES	
Yes (if you answered Yes, please go to Question 14 next)	1.14%	1
No	85.23%	75
I don't know	9.09%	8
I have a letter of map amendment	0.00%	0
My Town is not in the flood insurance program	4.55%	4
TOTAL		88

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q14 If "No", why not?

Answered: 83 Skipped: 8



ANSWER CHOICES	RESPONSES	
I don't live in a floodplain	63.86%	53
It's too expensive	1.20%	1
It never floods here	12.05%	10
My house is elevated	12.05%	10
I never considered it	1.20%	1
Other (please specify)	9.64%	8
TOTAL		83

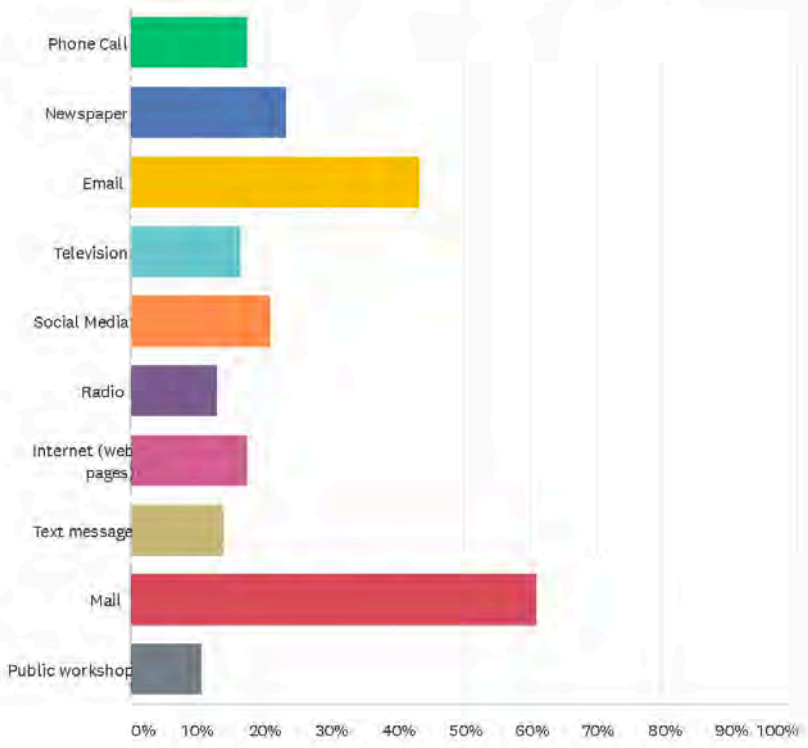
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

#	OTHER (PLEASE SPECIFY)	DATE
1	No development exists, tree farm	10/16/2020 12:45 PM
2	Live at 2000' elevation.	10/6/2020 11:10 AM
3	Don't need it!	9/20/2020 7:53 PM
4	I built high up	9/19/2020 8:01 PM
5	We rent our place here so not sure if the landlord has it.	9/6/2020 1:49 PM
6	mountain side	9/4/2020 7:22 AM
7	Our house is at 1600 feet...no flooding hazard, however, we have had severe rainstorms wipe out the driveway.	9/2/2020 12:02 PM
8	Wheelock needs to join the NFIP	9/2/2020 10:53 AM

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q15 What are the most effective ways for you to receive information about how to make your home and town more resistant to natural hazards?

Answered: 85 Skipped: 6



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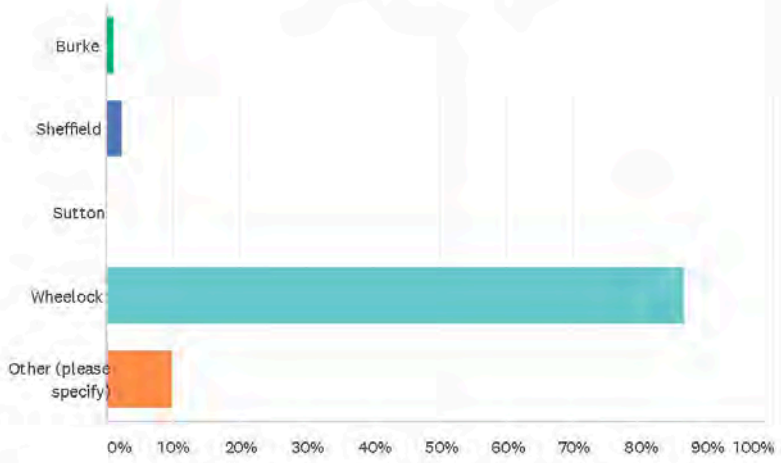
Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

ANSWER CHOICES	RESPONSES	
Phone Call	17.65%	15
Newspaper	23.53%	20
Email	43.53%	37
Television	16.47%	14
Social Media	21.18%	18
Radio	12.94%	11
Internet (web pages)	17.65%	15
Text message	14.12%	12
Mail	61.18%	52
Public workshop	10.59%	9
Total Respondents: 85		

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q16 Where do you live?

Answered: 91 Skipped: 0



ANSWER CHOICES	RESPONSES	
Burke	1.10%	1
Sheffield	2.20%	2
Sutton	0.00%	0
Wheelock	86.81%	79
Other (please specify)	9.89%	9
TOTAL		91

#	OTHER (PLEASE SPECIFY)	DATE
1	St. Johnsbury	11/12/2020 11:53 AM
2	South hero	11/12/2020 11:49 AM
3	Lyndonville	11/12/2020 11:29 AM
4	Maryland - Waterford Tree Farm National Historic Site	10/16/2020 12:45 PM
5	Danville, land in Wheelock	9/19/2020 8:26 PM
6	Walden	9/19/2020 12:23 PM
7	Standard.	9/19/2020 12:19 PM
8	We live out of state, but soon enough Wheelock.	9/14/2020 3:44 PM
9	Hyde Park, VT 2nd home in Wheelock	9/11/2020 4:35 PM

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

Q17 Please add any comments you would like to make regarding hazard mitigation and disaster preparedness.

Answered: 25 Skipped: 66

Towns of Burke, Sheffield, Sutton and Wheelock, Vermont

#	RESPONSES	DATE
1	The town of Sheffield needs a Separate building that can serve as a shelter with backup generator, serve to house local emergency services, and serve to support the community.	11/17/2020 7:01 PM
2	I have been fortunate to have folks check on me and help when needed. I am remembering Stelve Amos in, particular. Friends also call to see if I am alright..	11/12/2020 3:35 PM
3	preparation is important	11/12/2020 11:53 AM
4	IN ORDER TO HAVE GOOD ROADS YOU NEED A HIGHWAY CREW THAT KNOWS WHAT THEY ARE DOING	11/12/2020 11:44 AM
5	Water runoff from the road into our yard.	10/14/2020 1:24 PM
6	Spending a lot of money for nothing!	10/8/2020 2:05 PM
7	The money wasted on this survey could have gone to the Town Hall. Most disasters are created and/or perpetuated by humans. We do not need more development in Northeast Vermont.	10/8/2020 11:34 AM
8	Ditch work.	10/6/2020 11:16 AM
9	Clearing power lines during summer/spring/fall would help us all out during winter winds.	9/29/2020 11:58 AM
10	Own property in Wheelock	9/20/2020 7:58 PM
11	Every state is different and every town within the state is different. So our needs for our town may certainly look different than those of a surrounding town. I think it would be great, if not being done so already, is that surrounding towns work together on a preparedness plan like some agencies do already. Some services may be available in one town but not another and it could lessen a financial burden if those services could be shared.	9/20/2020 1:17 PM
12	We have a large population of elderly and people living alone. Some may need help with food/meds/oxygen during power/road issues.	9/19/2020 8:14 PM
13	Have Wheelock land.	9/19/2020 12:19 PM
14	FEMA is a joke if they continue to allow building in flood plains and such. It is no wonder the nation is in debt when we keep providing relief for idiocy.	9/14/2020 3:44 PM
15	police enforcement of vehicular speeding via tax dollars already being spent	9/8/2020 8:01 AM
16	I have had disaster training and was formerly in the armed forces, but many are not aware that they may not be able to leave there homes for several days or longer in a disaster.	9/5/2020 2:24 PM
17	I do my best to BE prepared.....have someone to call (if possible) and have someone nearby who can most likely check on me and help me.	9/4/2020 6:15 PM
18	Thank you for the survey!	9/4/2020 9:51 AM
19	If we were not to leave the house at all we could survive for about 1 week. With no water, no power, no food. Meaning we have all those items in backup for one week. After that I would need to get water. Which I could do with a little work.	9/4/2020 7:22 AM
20	I have talked to the town selectman about also knowing which residents need electricity and phone access for health reasons or seniors living alone.	9/3/2020 1:17 PM
21	NA	9/3/2020 12:48 PM
22	Our town road crew has not maintained the roads. There are some hazardous areas even now and roads that have washed out. The ditches are not maintained. We need more oversight.	9/2/2020 2:22 PM
23	Years ago, in the summertime, i bought a generator. Smartest move, ever!...We connect the refrigerator & the computers (which we alternate with microwave or toaster, or coffee maker when required). We also keep a ton or (ice-tea sized) water bottles for flushing & for potable water use. We have a wood stove for power outages in the winter. We are all set for any power outage, preferably not lasting more than 2-3 days !	9/2/2020 1:19 PM
24	Thanks for creating and tabulating this survey.	9/2/2020 12:02 PM
25	Thank you for putting this Mitigation Plan Update project together.	9/2/2020 10:53 AM

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Appendix B: Mitigation Actions Sorted by Goal Statement

Town of Burke

1. High Hazards

Action #	Action	Hazards Addressed
7	Adopt and enforce state level building codes.	Earthquake, Inundation Flooding & Fluvial Erosion, Snow Storm & Ice Storm, Wind
8	Mitigate flood risk in the river corridors along the Passumpsic River including the East and West branches of the river, and the Dishmill Brook Watershed.	Inundation Flooding & Fluvial Erosion
21	Consider joining FEMA's Community Rating System (CRS). The Town may currently qualify for CRS points that would make it worthwhile.	Inundation Flooding and Fluvial Erosion

2. Natural Resources

Action #	Action	Hazards Addressed
13	Implement project recommendations within the East and West River Corridor Plans.	Inundation Flooding & Fluvial Erosion
14	Conduct land evaluations and site analysis to prioritize conservation easements.	Inundation Flooding & Fluvial Erosion, Wildfire
15	Establish a Town Bylaw that renewable energy resources will be considered for all new Town owned facilities and for current facilities that undergo construction or retrofit.	All

16	Develop a bylaw to ensure that new development incorporate low-impact development standards that minimize impairment of watersheds and source protection areas.	Drought, Extreme Heat, Inundation Flooding & Fluvial Erosion
17	Implement an intensive water quality monitoring program to evaluate phosphorus, nitrogen, sediment, and E. coli sources in the Basin. Use sampling results to identify pollution sources in the basin and work with basin partners to address these.	Invasive Species
18	Contact landowners in priority areas with important floodplain protection or restoration opportunities to encourage participation in conservation and restoration programs.	Inundation Flooding & Fluvial Erosion, Invasive Species
19	Complete outreach to farmers to improve nitrogen management on farms through the use of Adapt N software, pre-sidedress nitrate testing, and demonstrating the use of shorter duration corn with legume cover crops.	Drought, Invasive Species

3. Infrastructure

Action #	Action	Hazards Addressed
1	Install generators at the Town Hall, Town Garage, and the Fire Stations.	Snow Storm & Ice Storm, Wind
4	Identify the best location for relocating the new Town Garage (out of the special flood hazard area). Complete a feasibility study for the new location and demolish the old facility.	Inundation Flooding & Fluvial Erosion
5	Annually update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool (VOBCIT).	Earthquake, Inundation Flooding & Fluvial Erosion
6	Replace undersized or failing culverts identified in the Town's VOBCIT.	Inundation Flooding & Fluvial Erosion

9	Secure a long-term supply of gravel to protect roadways.	Inundation Flooding & Fluvial Erosion, Snow Storm & Ice Storm
10	Update the town's road ordinance and policies to include "complete street" principles and stormwater management.	Inundation Flooding & Fluvial Erosion
12	Identify the best possible locations for fire stations in West Burke and East Burke out of special flood hazard areas. Complete feasibility studies and develop a plan to build a new fire stations in these ideal locations and demolish the old structures.	Inundation Flooding & Fluvial Erosion
20	Encourage underground placement of utility lines whenever possible to avoid high wind, snow, and ice damage that may result in power outages and road closures.	Snow Storm & Ice Storm, Wind

4. Capacity

Action #	Action	Hazards Addressed
2	Expand current efforts to install a Reverse 911 system.	All
3	Support regional education campaign and expand the Town's capacity for hazard mitigation with local resources such as websites, listservs, and newsletters.	All
11	Improve the efficiency and weatherization of Burke's housing stock to minimize severe winter weather impacts.	Snow Storm & Ice Storm

Town of Sheffield

1. High Hazards

Action #	Action	Hazards Addressed
2	Expand current efforts to install a Reverse 911 system.	All
5	Conduct analysis to determine if joining the National Flood Insurance Program (NFIP) is in the best interests of the Town.	Inundation Flooding and Fluvial Erosion
8	Develop a MOU with the local school district to use the school auditorium for an emergency shelter.	All
13	Develop a Flood Mitigation Plan for the Village.	Inundation Flooding & Fluvial Erosion
15	Query DEC local river engineer to perform a hydraulic analysis of the drainage structures/systems in various subdivisions for adequacy and to provide corrective actions proposals.	Inundation Flooding & Fluvial Erosion

2. Natural Resources

Action #	Action	Hazards Addressed
1	Review state's river-corridor map and consider the implications of protecting these areas mapped in order to mitigate risks to public safety, critical infrastructure, historic structures, and municipal investments.	Inundation Flooding and Fluvial Erosion
16	Study the need for land planning to properly manage upland areas to mitigate flood risk.	Inundation Flooding & Fluvial Erosion

3. Infrastructure

Action #	Action	Hazards Addressed
3	Retrofit or replace insufficient roads, bridges, culverts, and ditches identified in the Sheffield Road, Bridge, Culvert, and Ditching Backlog of Maintenance and Repair Listing.	All
6	Conduct a town study of the condition, needs, and replacement/upgrade schedule of facility requirements for the fire station, town garage, town offices, and emergency/shelter center.	All
7	Install standby generators in attached sheds on, two critical facilities, the Emergency Operations Center (Town offices) and the Town Hall.	Snow Storm & Ice Storm, Wind
9	Annually update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool (VOBCIT).	Earthquake, Inundation Flooding & Fluvial Erosion
14	Perform an investigation and study to: install a new under/overpass on I-91 to reconnect Drake place Road with VT Route 122, and enlarge the New Duck Pond Road I-91 underpass to state road standards.	All
17	Investigate the possibility and cost of burying critical power and communication utilities with the village proper	Snow Storm & Ice Storm, Wind

4. Capacity

Action #	Action	Hazards Addressed

4	Support regional education campaign and expand the Town's capacity for hazard mitigation with local resources such as websites, listservs, and newsletters.	All
10	Collaborate with the Town of Wheelock to purchase a fire fighting vehicle that can access highly wooded areas.	Wildfire
11	Develop an agreement with the American Red Cross to assist with disaster planning and education.	All
12	Commission a study on how to include off-the-grid homeowners on the internet and emergency alerting systems.	All

Town of Sutton

1. High Hazards

Action #	Action	Hazards Addressed
1	Expand current efforts to install a Reverse 911 system.	All

2. Natural Resources

Action #	Action	Hazards Addressed
10	Identify and protect river corridors that are subject to fluvial erosion.	Inundation Flooding & Fluvial Erosion

3. Infrastructure

Action #	Action	Hazards Addressed
4	Assign road crew to NVDA training regarding minimizing sedimentation of brooks and wetland areas.	Inundation Flooding & Fluvial Erosion
5	Develop a Capital Budget and Plan that, at a minimum, addresses a multi-year roads budget, including an analysis of how best to fund major maintenance/ improvement projects and scheduled equipment replacements. This should include completing Act 64 "Drainage and Erosion Assessment."	All

8	Annually update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool (VOBCIT).	Earthquake, Inundation Flooding & Fluvial Erosion

4. Capacity

Action #	Action	Hazards Addressed
2	Support regional education campaign and expand the Town's capacity for hazard mitigation with local resources such as websites, listservs, and newsletters, consisting of a minimum of quarterly communications.	All
3	Public education on weatherization, heating systems and renewable energy projects.	Extreme Cold, Extreme Heat
6	Increase capacity of the Fire Department to minimize the impact of hazardous material incidents.	Wildfire
7	Develop a system for quarterly communication with residents regarding hazard mitigation.	All
9	Investigate installation of additional fire hydrants in Sutton Village.	Wildfire

Town of Wheelock

1. High Hazards

Action #	Action	Hazards Addressed
3	Renew Village Center designation which requires bringing buildings up to code.	Earthquake, Inundation Flooding & Fluvial Erosion, Snow Storm & Ice Storm, Wind
7	Adopt the State's River Corridor bylaws as a way to address local flooding and fluvial erosion.	Inundation Flooding & Fluvial Erosion

2. Natural Resources

Action #	Action	Hazards Addressed
8	Maintain quality and adequacy of potable water at each of the significant sites on the 5049 Wheelock Fire District 1 Water System. (Significant sites includes Wheelock Village Store (food and gas), Town Hall and Town Garage).	Drought, Wildfire
11	Form an Energy Committee.	All
18	Prioritize the use of renewable energy.	All
19	Maintain healthy water courses and water bodies. Protect Chandler Pond, Flagg Pond and Bean Pond, as well as the Miller's Run and other streams, from the adverse effects of commercial development. Further residential development adjacent to these natural attributes should be minimal.	Drought, Inundation Flooding & Fluvial Erosion, Invasive Species
21	Develop a program to plant new trees and shrubs in areas prone to fluvial erosion.	Drought, Inundation Flooding & Fluvial Erosion, Invasive Species

22	Emerald Ash Borer: Conduct a survey of ash trees in town rights of way to identify trees susceptible to death and toppling over from damage caused by the invasive species, Emerald Ash Borer. Develop an action plan.	Invasive Species
24	Emerald Ash Borer: Public information campaign.	Invasive Species
26	Conduct land evaluations and site analysis to prioritize conservation easements and erosion prevention measures.	Inundation Flooding & Fluvial Erosion, Wildfire

3. Infrastructure

Action #	Action	Hazards Addressed
1	Install a generator at the fire station in South Wheelock.	Snow Storm & Ice Storm, Wind
4	Protect the Historic District from natural hazards by establishing a long-term repair and maintenance plan for Town facilities including Town Hall and Garage to decrease vulnerability to high winds, snow loads, heavy rains, power outages, flooding, and other natural hazards.	All
5	Upgrade the Town Hall to meet emergency shelter requirements.	All
6	Identify best new location for Town Garage out of the floodplain and move the Garage campus to that location. Complete a feasibility study for the new location and tear down the old facility.	Inundation Flooding & Fluvial Erosion
9	Develop and maintain long-range plan for capital improvement projects.	All
12	Fix bridge on Stannard Mountain Road near Blakely Road.	All

13	Fix Twin Bridges, built in 1927, over Miller's Run Brook on Peak Rd. near Rte. 122.	All
14	Fix Bridge, built in 1928, over S. Branch Brook, Minister Hill Rd. corner S. Wheelock Rd.	All
15	Develop and implement a 5-year plan for repair and replacement of culverts, bridges, roads.	All
16	Annually update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool (VOBCIT) and the Online Road Erosion Inventory (REI) regarding Municipal Roads General Permit program (MRGP).	Earthquake, Inundation Flooding & Fluvial Erosion

4. Capacity

Action #	Action	Hazards Addressed
2	Collaborate with the Town of Sheffield to develop an agreement with the American Red Cross for opening a shelter during a disaster.	All
10	Support regional hazard mitigation education campaign and expand the Town's capacity for hazard mitigation with local resources such as websites, listservs, and newsletters.	All
17	Expand current efforts to install a Reverse 911 system.	All
20	Add a generator to the Town Hall to establish it as a shelter.	All
23	Collaborate with the Town of Sheffield to purchase a fire fighting vehicle that can access highly wooded areas.	Wildfire
25	Continue representation from Wheelock on the Communications Union District Board of NEKBroadband.org.	All

Appendix C: Plan Implementation and Maintenance Supporting Materials

Plan Update Evaluation Worksheet

Plan Section	Considerations	Explanation
Planning Process	Should the town invite any additional stakeholders to participate in the planning process? What public outreach activities have occurred? How can public involvement be improved?	
Risk Assessment	What disasters has the town, or the region experienced? Should the list of hazards be modified? Are new data sources, maps or studies available? If so, what have they revealed, and should the information be incorporated into the plan update? Has development in the region occurred and could it create or reduce risk?	
Capability Assessment	Has the town adopted new policies, plans, regulations, or reports that could be incorporated into this plan? Are there different or additional administrative, human, technical, and financial resources available for mitigation planning? Are there different or new education and outreach programs and resources available for mitigation activities?	
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimate accurate? Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or removed from the plan?	

Plan Section	Considerations	Explanation
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update? Are there new funding sources to consider? Have elements of the plan been incorporated into other planning mechanisms?	
Implementation Plan	Was the plan monitored and evaluated as anticipated? What are needed improvements to the plan implementation procedures?	

Mitigation Action Progress Worksheet

Mitigation Action Progress Worksheet				
Progress Report Period	From Date		To Date	
Action/Project Title				
Responsible Department				
Contact Name				
Contact Phone/Email				
Project Description				
Project Goal				
Project Objective				
Project Cost				
Project Status				
Date of Project Approval	Date of Project Start	Anticipated Date of Completion	Project Canceled	Project Delayed
Explanation of Delay or Cost Overruns				
Project Report Summary				
What was accomplished for this project during this reporting period?				
What obstacles, problems, or delays did the project encounter?				
Plans for next reporting period.				