

Town of Monkton, Vermont



Single Jurisdiction All-Hazards Mitigation Plan

Final Plan Adoption Date: / /2023

FEMA Approval Date: / /2023

2024 Monkton LHMP Executive Summary

The Town of Monkton began work on updating its All-Hazards Mitigation Plan in 2023 and town officials and citizens met to conduct a hazards inventory and risk assessment matrix, identify locations where hazards are known to the community, and identify potential mitigation projects associated with the hazards identified.

The 2023-2024 committee identified the following hazards (and risk scores) as Monkton’s highest vulnerabilities, based on probability, warning time, geographic impacts, property damage, and other concerns:

- **Severe Ice Storm (6.75)**
- **Severe Heat (6.00)**
- **Invasive Species (6.00)**
- **Highway Accidents (6.00)**
- **Structure Fire (6.00)**
- **Severe Snow Storm (5.25)**
- **Severe Cold (5.25)**
- **High Winds (5.25)**
- **Infectious Disease Outbreak (5.25)**
- **Flash Flooding & Fluvial Erosion (5.25)**



For each high-vulnerability hazard type, the committee described previous occurrences and extent, current vulnerability, future probability, and identified mitigation goals and actions.

| Identified Hazard | Primary Mitigation Goal |
|-----------------------------|---|
| Ice Storm | Ensure that essential services can function during disaster. |
| Severe Heat | Protect the health and safety of the public. |
| Invasive Species | Reduce impacts to residents and local industry and provide for the outdoor recreational safety of the public. |
| Structure Fire | Protect the health and safety of the public. |
| Highway Accident | Ensure that highway improvements result in safer conditions. |
| Severe Snow Storm | Ensure that essential services can function during disaster. |
| Severe Cold | Protect the health and safety of the public. |
| High Winds | Ensure that essential services can function during disaster. |
| Infectious Disease Outbreak | Protect the health and safety of the public. |
| Flash Flooding | Protect the safety of the public, properties and public infrastructure. |

The committee documented mitigation activities undertaken since the previous hazard mitigation plan adoption in 2017

The committee also developed a prioritized list of future mitigation actions and projects, with care taken to include only those projects which could be considered reasonable and feasible based primarily on capacity, cost, and political feasibility. These include:

| Hazard | Future Mitigation Actions |
|------------------------------------|--|
| Ice Storm | Provide education materials for individual safety. Work with utility companies to remove dead and dying trees from rights-of-way. Verify back-up power and facilities at all potential town shelter. |
| Severe Heat | Provide education materials for individual safety. Implement cooling options at town shelters, including the fire station. Notify community about available shelters during periods of extreme heat. Develop a hot weather emergency plan with clear triggers and actions. |
| Invasive Species | Continue timely roadside mowing to reduce the spread of wild parsnip. Support community efforts to eradicate invasive species from lakes, streams, and municipal property. Provide workshops and educational materials on preventing introduction, safe handling and removal of invasive species. Have tools that can be borrowed for removal of invasive species. Support citizen training for identification, surveillance, and removal methods. |
| Structure Fires | Continue installing dry hydrants throughout town; Maintain and upgrade municipal fire trucks and equipment Provide fire education materials for individual and family safety. |
| Highway Accident | Maintain County Sheriff's patrols to reduce speeding. Maintain and install additional speed radar signs. Maintain and install fog lines on class 3 roads. |
| Severe Snow Storm | Provide education materials for individual safety. Work with utility companies to remove hazard trees from rights-of-way. Provide back-up power for the School and Town Office. |
| Severe Cold | Provide education materials for individual safety. Maintain municipal shelter facilities Develop and support neighbor-networks to check on each other. |
| High Winds | Remove dead and dying trees from rights-of-way Provide education materials for individual safety. |
| Infectious Disease Outbreak | Follow Department of Health guidance and provide education materials. Develop and support neighbor-networks to check on each other. |
| Flash Flooding | Provide education materials for individual safety. Replace and upsize failing culverts. |

A Hazard Mitigation Plan is dynamic and should not be static. To ensure that the plan remains current and relevant, it is important that it be updated periodically. The hazard mitigation plan should be reviewed by all new town officials and revised and updated in its entirety every 5 years.

The Town of Monkton will monitor and evaluate its hazard mitigation goals, strategies and actions annually as the Town Budget is created. In updates of the Municipal Plan by the planning commission, the concepts, goals and strategies from this hazard mitigation plan should be incorporated and used to inform the development municipal strategies.

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**Requirement 44 CFR § 201.6(c)(1)
(Document the planning process)**

1. Planning Process

1.1. Current Plan Development Process

The Town of Monkton received a Hazard Mitigation Assistance grant from FEMA in 2023. The town issued a Requests for Proposals on March 24, 2023 and selected the Addison County Regional Planning Commission (ACRPC) as a consultant to update the Local Hazard Mitigation Plan and submit it to FEMA for approval.

The Town of Monkton Selectboard passed a motion confirming their intent to work through the process of writing an All-Hazards Mitigation Plan at a meeting of the Town Selectboard on April 13, 2023. At the confirmation of funding availability, the Selectboard Chair further showed their support of the plan by gathering the following residents of Monkton into a mitigation planning committee, which met on November 30, 2023:

- Stephen Pilcher – Monkton Selectboard Chair
- Robert Howard – Assistant Chief, Monkton Volunteer Fire Department
- Wendy Sue Harper- Monkton Planning Commission Co-Chair
- Stanley Wilbur- Monkton Town Administrator

The committee met January 25, 2024 to begin a hazards inventory and risk assessment matrix and to flesh out locations where hazards are known to the community. The committee met again on **February 15 and March 21, 2024** to identify potential mitigation projects associated with the hazards identified. Following the **April 25, 2024** meeting, a draft Town of Monkton, VT Hazard Mitigation Plan was created by staff at the Addison County Regional Planning Commission (ACRPC) and circulated to committee members. At that meeting a copy of the draft hazard mitigation plan was provided for the town office along with a comment sheet so residents visiting the office could review and make comments. Committee meetings were held in the Monkton town offices and were open to the public. No specific notice was given to the public other than inclusion on the town office events calendar.

Input on the draft plan was requested from town residents during open meetings of the town Planning Commission and the Town Selectboard where copies of the draft plan were available for review. The town also made the plan available on its website www.monktonvt.com to reach a broader distribution.

The final plan draft was sent to the Town Selectboard for their **August 27, 2024** regular meeting. Input on the draft plan was requested from the Town Selectboard and Planning Commission during open meetings. The town also made the plan available on its website <https://monktonvt.com/> to reach a broader distribution. A copy of the draft plan was sent via e-mail to the surrounding towns of Starksboro, Bristol, New Haven, Ferrisburgh, Charlotte, and Hinesburg town clerks for distribution to appropriate town officials on August 28 2024 with a request for review and edits by September 20, 2024. No comments were received.

Based on comments from the complete public process, the draft plan was further edited and forwarded to Vermont’s State Hazard Mitigation Officer for comments and preliminary approval on August 19, 2024. **Suggested edits were identified by the SHMO on XXXXXXDATE.**

Appropriate edits were made and the draft plan received tentative selectboard approval before being sent back to the SHMO for a second review before being passed on to FEMA reviewers. Comments were received back from FEMA reviewers on **XXXXXXDATE**.

Changes were made to the draft plan based on FEMA recommendations and an updated draft was completed on **XXXXXXDATE**. Upon completion of this draft, the plan was returned to FEMA for Approval Pending Adoption (APA) status. Upon receipt of the FEMA APA, the resulting document was adopted by the Monkton Selectboard on **XXXXXXDATE**.

1.2. Opportunities for Public Involvement

Multiple opportunities for public comment were made available during the planning process:

- A planning committee was appointed from volunteers and town officers at an open meeting of the Town Selectboard.
- A set of posters with overview information about the Hazard Mitigation Plan and an interactive chart for communities to rank their own vulnerability priorities was displayed at the Town Hall and Library in the month leading up to Town Meeting, Saturday **March 2, 2024 (Appendix 1)**
- A survey of residents linked to the poster was posted and sent out to community members to solicit feedback and increase planning awareness
- A copy of the draft plan was made available along with a comment sheet at the Town Office on **August 27, 2024**. The Town Clerk encouraged the public to read and comment on the draft plan via Front Porch Forum and public meeting warnings. (No comments received).
- All known organizations operating within town were contacted with a draft of the plan and asked for feedback (**Appendix 1**)- no comments were received.
- Meetings of both the Town Selectboard and the Town Planning Commission were open for public comment throughout the planning and draft phases of this plan. (Comments were received from town residents and incorporated)

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|---|
| Requirement 44 CFR § 201.6(b)(2) (Stakeholder Involvement) |
|---|

1.3. Opportunities for Additional Comment

Additional opportunities for regional and state-level comments in the draft stage were provided throughout the planning process.

- A copy of the draft plan was posted on the ACRPC website www.acrpc.org for regional review and notice was given during the August 2024 ACRPC full commission meeting as to its availability. Commissioners were asked to review and pass along comments to (Andrew L’Roe) at ACRPC. No comments received.
- The September 2024 ACRPC newsletter included an announcement that a draft plan was available for public review and comment. That draft was posted in the ACRPC office and was available for public input during normal business hours with a comment sheet attached. No comments received.

- The neighboring Town Clerks of Starksboro, Bristol, New Haven, Ferrisburgh, Charlotte, and Hinesburg were notified of the posting via e-mail on August 28, 2024. The clerks were instructed to share the notice with the select boards, planning commissions and the general public. Comments were requested to be sent to Andrew L’Roe at ACRPC. No comments were received.
- A copy of the draft plan was provided to the State Hazard Mitigation Office for comments on XXXXXXXXDATE. Comments were received on XXXXXXXXDATE
- An updated copy was sent to DEMHS for submission to FEMA on XXXXXXXXDATE
- FEMA Region 1 staff was sent a draft for comment on XXXXXXXXDATE
- FEMA reviewers returned the draft plan XXXXXXXXDATE for further edits which were completed and the edited plan sent back.

1.4. Extent of Review

Throughout the plan development process information from the following documents and sources were incorporated into the plan either as data or to inform the committee's prioritization process:

- 2023 and 2024 Local Emergency Management Plan
- 2020-2028 Monkton Town Plan (support for the committee's prioritization process and section 2 narrative)
- 2022 Addison County Regional Plan (Goals related to public safety as well as energy and transportation resilience)
- 2018 State of VT Hazard Mitigation Plan (provided a listing of statewide hazard concerns)
- 2023 Draft State of VT Hazard Mitigation Plan
- 2022 Report of the State Fire Marshall (provided data to inform structure and wild fire risks)
- Federal Emergency Management Agency, www.fema.gov (provided official data on declared disasters)
- The Vermont Weather Book by David Ludlum (provided historic accounts of disasters for Section 4.3)
- National Climatic Data Center website (provided information for Section 4.3)
- FEMA FIRMS dated 11/1985 (incorporated into maps)
- VT Center for Geographic Information data layers (incorporated into map products)
- State of Vermont Tier II reports, 2020-2022 (reviewed for Section 4.3)
- Monkton Annual Town Reports 2013-2023
- NOAA Storm event database (<https://www.ncdc.noaa.gov/stormevents/>) for previous hazard occurrence

2. Local Background

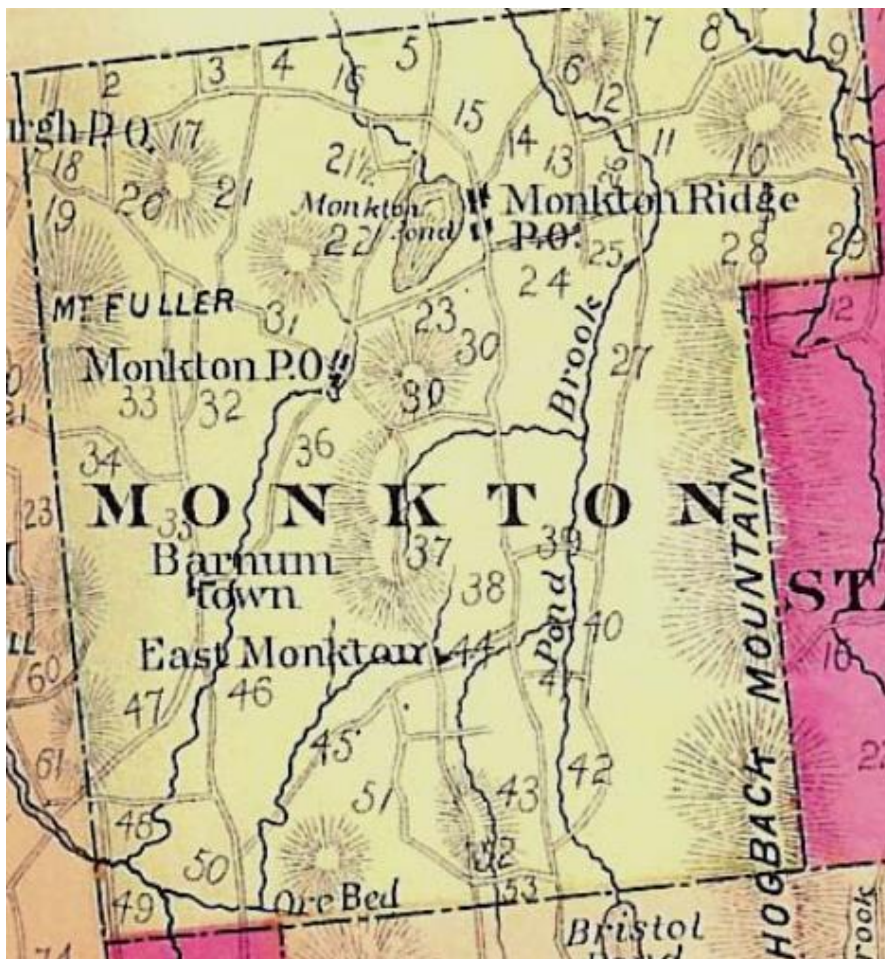
2.1. Community Background

The Town of Monkton, Vermont comprises roughly 37 square miles or 23,000 acres of land in the Lake Champlain Valley. Like much of the eastern Champlain Valley, the town's landscape is generally rolling hills, with some fine forestlands and areas of excellent, productive agricultural soils. Monkton contains large areas of ecologically significant wetlands and a single large lake: Cedar Lake.

The north and east side of town are drained by Pond Brook, which flows north from Bristol Pond (Lake Winona) in Bristol and eventually joins the Lewis Creek in Hinesburg.



The southeastern third of town is drained by tributaries into Little Otter Creek from mouth to headwaters and tributaries including Mud Creek, Monkton Swamp Creek, and Marsh Creek



Monkton has two generally recognized village centers; Monkton Ridge and Monkton Boro. Monkton Ridge is the designated village center overlooking Monkton Pond. Monkton Boro, located at the junction of Hollow Road, Boro Hill Road and Monkton Road is the original town center and housed the first town hall. Historically there were two additional hamlets, an area at the intersection of Monkton Rd and Old Stage Road is known as Barnumtown, and East Monkton at the intersection of Boro Hill Road and Hardscrabble Road.

Map from *Gazetteer and Business Directory of Addison County, Vt., for 1881-82* compiled by Hamilton Child (Syracuse, New York: the Journal Office, 1882)

Population

There has been a steady increase in Monkton's population from the late 1950's. Monkton has seen a steady increase in population from a low of about 520 in 1950 to 2,079 residents in 2020. This increase has followed the increases in Chittenden and Addison Counties and has been facilitated by the modernization of the road system during this period.

There are more than 920 employed Monkton residents, many working primary jobs in locations outside of the municipality. More than a third of these are employed in Burlington and surrounding areas (Burlington City, South Burlington, Winooski, Essex Junction), while another third or more are employed in other Addison County (Middlebury, Vergennes, Bristol, Ferrisburgh, and New Haven), and around 5% in other Chittenden County municipalities (Hinesburg, Shelburne). Another 150 individuals work in Monkton but live outside the town.

Housing and New Development

Since 1985, development in Monkton has been almost exclusively residential, with a steady increase in telecommuting and home-based small businesses. The residential development that has occurred has been predominately single-family homes scattered throughout the town.

In Monkton, most homes are single-family wood structures. While much of Vermont's population is housed in pre-1950s housing, the Town of Monkton has seen a rapid increase in housing with an average of over 10 new homes built each year in the past two decades. Of the 902 housing units in Monkton, approximately 92% are single family homes 2% multi-family and 4% seasonal camps. Of the single-family homes, nearly 9% are mobile homes, generally more susceptible to disaster than permanent structures.

New Construction by E911 Site Type (1/1/2018 - 12/31/2023)



Most of the town is still a mix of wetland, forest and active farmland and several large properties have been set aside in permanent conservation easements. The majority of the undeveloped land in town is enrolled in the Current Use program in which owners pay property taxes commensurate with the value of products generated from the land. The program exchanges this tax relief for a temporary easement which helps keep much of the land in Monkton undeveloped.

Public Infrastructure and Personnel

The Town of Monkton contains no State or Federally numbered Highways though two town highways (Bristol Road/Silver Street, and Monkton Road) see considerable commuter traffic. As a corridor between rural Addison County and the more populated Chittenden County to the north, the Town of Monkton receives an inordinate amount of traffic in relation to its population.

When the original town hall fell into disrepair in 1859, a new building was constructed in Monkton Ridge, a junction of 5 town roads overlooking Cedar Lake. This designated village area houses the new Town Hall and Russell Memorial Library, and the Monkton Friends Methodist Church. It also contains the former Monkton General Store which is now Alderman's of Vermont Chocolate, a short-term rental and catering business, a real estate business and fine cabinet-furniture business, as well as a small cluster of single-family residences.

The Monkton Central School is located strategically between the "Boro" and the "Ridge" and serves approximately 130 elementary students up to the 6th grade. Beginning in 7th grade, students attend the Mount Abraham Union High School in nearby Bristol.

Monkton has its own Highway Department with a full-time Road Foreman and three additional employees. The department is responsible for summer maintenance, winter snow removal and maintenance, and reconstruction of town highway infrastructure. Monkton has a maintenance facility and various pieces of road maintenance and construction equipment which are factored into a capital equipment replacement fund.

Highway expenditures are the largest item within the town (non-school) budget. The annual budget hovers at approximately \$1,000,000, of which almost 60% is raised through taxes. About half of the budget pays for winter maintenance with small portions going toward bridge and highway construction. In 2024, \$70,000.00 was authorized from the town general fund for the Highway Capital Projects Fund. Monkton is also a member municipality of the Addison County Regional Planning Commission Emergency Mutual Aid Agreement.

Local and Regional Emergency Services

There is a dedicated group of volunteers in the Monkton Volunteer Fire Department with equipment housed in the Firehouse on States Prison Hollow Road east of Monkton Ridge. In addition to fire equipment, the fire station also serves as the Monkton Post Office and town emergency shelter. The annual budget, including fire station maintenance, for 2024 was set at \$124,300, a steady increase from 2022 and earlier levels. The Monkton Selectboard has allocated one-time American Rescue Plan Act (ARPA) funding to the Monkton Volunteer Fire to build community resilience, including: \$150,000 to support the purchase of a new fire truck and \$67,086 to update equipment and make improvements to the Monkton Fire Station.

During 2023 the Monkton fire department responded to 45 emergency calls. These calls included fires, automobile accidents, carbon monoxide detector activations, medical assists, and downed power lines. The department is currently made up of 12 active members who attend weekly meetings and trainings. They rely on mutual aid departments, especially during the day while the majority of members are working outside of town. Assistance comes from neighboring fire departments, as well as Monkton First Response, Monkton Highway Department, Bristol Rescue Squad, and Vergennes Area Rescue Squad.

The Bristol Rescue Squad (BRS), a local non-profit organization based in neighboring Bristol, responds to emergency calls in Monkton. Bristol Rescue Squad currently has 35 volunteers, and part- and full-time staff. BRS bills for its services, receives additional funding from towns serviced, and accepts donations. In 2024 BRS was allocated \$8,748 by the town. An additional \$600 was allocated to the Vergennes Area Rescue Squad (VARs)

There are no medical facilities in Monkton, but many doctors, nurses and dentists are available a short distance north or south of town. The University of Vermont Medical Center is located about 20 miles north in Burlington, while Porter Hospital is located 20 miles south in Middlebury, Addison County Home Health and Hospice can make home visits, and the Community Health Services of Addison County has an OpenDoor Clinic in Middlebury.

The Addison County Sheriff's Department provides Civil Process for the entire county. The Vermont State Police provide service for motor vehicle regulation and criminal law enforcement. Monkton also funds a sheriff patrol contract for \$23,000-\$30,000 each fiscal year. The town budget allocated \$33,500 in 2024.

The Town has identified the town Selectboard Chair as its Emergency Manager and uses a Local Emergency Management Plan (LEMP) to coordinate response to larger incidents. The LEMP identifies the Town Office and Fire Station as emergency operations centers and the Fire Station and school as community shelters.

Utilities and Energy Facilities

Electrical power is provided throughout Monkton by Green Mountain Power. The Vermont Electric Power Company (VELCO), a private corporation owned by the power companies in the state, owns most of the bulk power transmission system in Vermont, including a 115 kV electric transmission line that runs through Monkton between New Haven and Burlington.

Vermont Gas Systems (VGS) installed a major natural gas transmission pipeline through Monkton as a feeder to towns south of Monkton. A Memorandum of Understanding signed by the town and VGS has the option to install a limited gas distribution network that would service the Village District, making gas available to approximately 10 percent of Monkton households should they choose. Currently there is no date as to when or if this distribution system will be installed, and the Monkton Energy Committee encourages use of renewable energy systems rather than incorporating natural gas, a system reliant on fossil fuel combustion.

The majority of town residents, rely on drilled wells for their drinking water. Well yields vary from plentiful to extremely low and highly problematic. A map of wellheads is available in the Town Clerk's Office. Other residents rely on a mix of groundwater and surface water in wells that are relatively shallow dug wells or springs. Such wells are susceptible to natural contamination and pollutants such as leaking petroleum or industrial tanks, road salt, failing septic systems and agricultural chemicals.

Some groundwater wells produce water containing nuisance substances such as iron, manganese, hardness minerals, hydrogen sulfide gas and sulfate reducing or iron fixing bacteria. The Clarendon Springs rock strata that undulate under the length of the Champlain Valley contains high levels of radionuclides producing radionuclides in some wells in Monkton. Flyovers and well testing were done in 1976 looking at northeast Monkton for possible uranium extraction. Subsequent studies have found that most wells in Monkton do not exceed gross alpha standards.

Zoning Regulations

Requirement 44 CFR § 201.6(c)(3)
(existing land use and development ordinances)

The town of Monkton enforces a set of Zoning Regulations, most recently adopted through a Unified Planning Document in 2023. The Town of Monkton Zoning Regulations are intended to provide for orderly community growth and to further the purposes established in the Monkton Town Plan. The regulations require that dwellings comply with all applicable State and Federal health and safety regulations. Where these regulations impose a greater restriction upon the use of a structure or land than are required by any other statutes, ordinances, rules, regulation, permit, easement or agreement, the provisions of these regulations shall control.

The Zoning Regulations contain a set of Flood Hazard Area Regulations in order to promote the public health, safety, and general welfare, to prevent increases in flooding caused by the uncontrolled development of lands in areas of special flood hazard, and to minimize losses due to floods. These regulations apply to all lands in the Town of Monkton identified as areas of special flood hazard on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), dated 1 November 1985, and any revisions.

The Planning Commission (PC) is responsible for establishing zoning regulations. The Development Review Board (DRB) reviews subdivision requests and decides on exceptions to those regulations in the form of variances and conditional and special use permits. The Zoning Administrator receives, reviews, and issues standard building applications, and may only issue a required Certificate of Occupancy following inspection when a structure is completed.

Land Use and Development Ordinances

Two distinct planning regions within the town have been identified with concomitant guidelines for future planning in these areas. These include the:

Village/Residential Planning Region: This area houses the traditional compact neighborhoods historic to Monkton, while capturing the vibrant community center of the Monkton Central School and Morse Park. Besides the school, this planning region includes commercial and civic amenities and services. It has denser residential development patterns than other areas of town. Monkton Pond is included in this region, although protected from further shoreline development by an overlay district.

Rural/Residential Planning Region: The rural-residential planning area currently encompasses all land outside of the Village/Residential Planning Region. This region houses medium and low-density residential areas, clustered and scattered housing, and all of Monkton's agricultural, forest and other open space land.

The Town is divided into the following zoning districts

High Density Village District (R 1 -V): This district is comprised of the areas where the land has reasonably good access to the existing network of highways in the town and where it is appropriate to continue to allow limited expansion of commercial uses and high-density residential structures traditionally associated with rural “villages.” This district may be appropriate for multi-unit and multi-family dwellings.

Medium Density Rural Agricultural District (RA 2 MD): These are areas in town which have historically been deemed suitable for residential and commercial uses based on 2-acre zoning. These areas are situated outside of the geographical area occupied by the village center.

Low Density Rural Agricultural District (RA 5 LD): These lands are outside the Village District and are typically well suited for agricultural, and other compatible uses such as conservation and certain types of outdoor recreation. It forms much of the landscape that gives Monkton its character. Maximum residential density is based upon overall dwellings per number of acres, not on minimum lot sizes.

Rural Agricultural District Village (RA 5 V): This district does not tend to have good soil characteristics, but is located in the areas of the Town with a Village atmosphere and has reasonably good access to the existing network of highways. Carefully conceived conditional uses that take into account the soil limitations and the existing abutting uses may be allowed in a conditional use basis.

Conservation District, Prohibited (CON-P): This includes areas unsuitable for development due to topographical, soil, or wetland conditions. Uses on this land will be limited to agriculture, forestry, outdoor recreation and wildlife refuge. PUDs are not allowed in these conservation districts.

Overlay Districts:

Monkton Pond Overlay District (POND): This area includes the areas surrounding Monkton Pond, bounded on the inside by the pond and on the outside by Pond Road, Rotax Road, Davis Road, Monkton Ridge and Monkton Road. Any building development within this zone shall be by conditional use and shall not unnecessarily impede the view of the pond from the surrounding roads.

Natural Heritage Protection Overlay District (NAT): These areas have been identified as containing critical wildlife transit corridors, or fragile or endangered plant or wildlife communities.

Ridgeline Overlay District (RLA): The ridgelines and hillsides of Monkton are an important scenic, natural, environmental and ecological asset and protecting them is in the public good. This District includes areas unsuitable for development due to steep topography, erodible or shallow soils, fractured bedrock areas with high groundwater recharge potential. Lands in this District contain stream headwaters, more fragile habitat, and are often part of forest blocks central to maintaining forest integrity. The Ridgeline Overlay District is determined by measuring the distance from the nearest public highway (Classes 1, 2 or 3) to the top of the ridge.

Flood Hazard Overlay District (FLHD): includes areas throughout Monkton designated as areas of special flood hazard on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), dated November 1, 1985, as amended. The federally determined special flood hazard area 1% (aka 100-year) floodplain zones are surrounding Cedar Lake, Pond Brook from Bristol Pond, Lewis Creek and Little Otter Creek, and several tributaries. These areas are limited in size and contain other constraints for development and thus will remain sparsely developed.

**Requirement 44 CFR § 201.6(c)(3)(ii)
(NFIP Participation and Compliance)**

The Town has been a participating member of the National Flood Insurance Program since 1985 and as such, has adopted zoning by-laws designating Flood Hazard Areas including associated regulations for administering those areas. The Monkton Zoning Administrator is tasked with administering the NFIP program in Monkton which includes reviewing each application to determine whether a proposed development should be governed by the flood hazard bylaws. Those applications which the program administrator finds are proposed within the mapped floodplain fall under the floodplain bylaws and are sent to the ZBA for evaluation and approval or rejection based on the requirements of the bylaws.

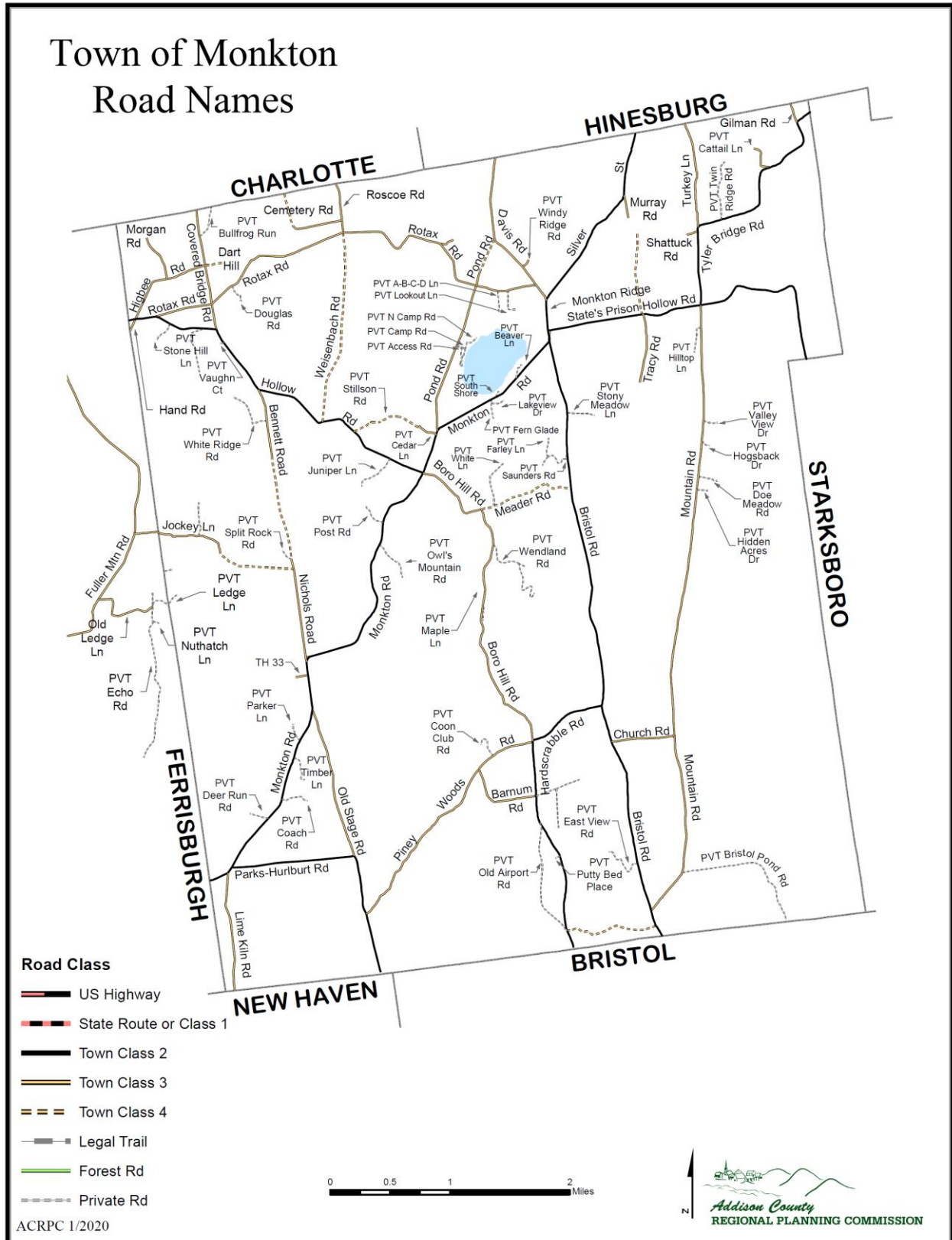
The most current floodplain maps were adopted 11/1/1985 and are available on paper copy only. Fortunately, much of the mapped floodplain is associated with large areas of wetlands rather than floodplain. The availability of alternate sites and the adoption of flood hazard regulations have thus far discouraged development along these low-lying areas due to difficulties in disposing of septage and the costs of complying with floodplain regulations. There are no “repetitive loss” or “severe repetitive loss” properties in the Town of Monkton.

**Requirement 44 CFR § 201.6(c)(2)(ii)
(NFIP Repetitive Damage)**

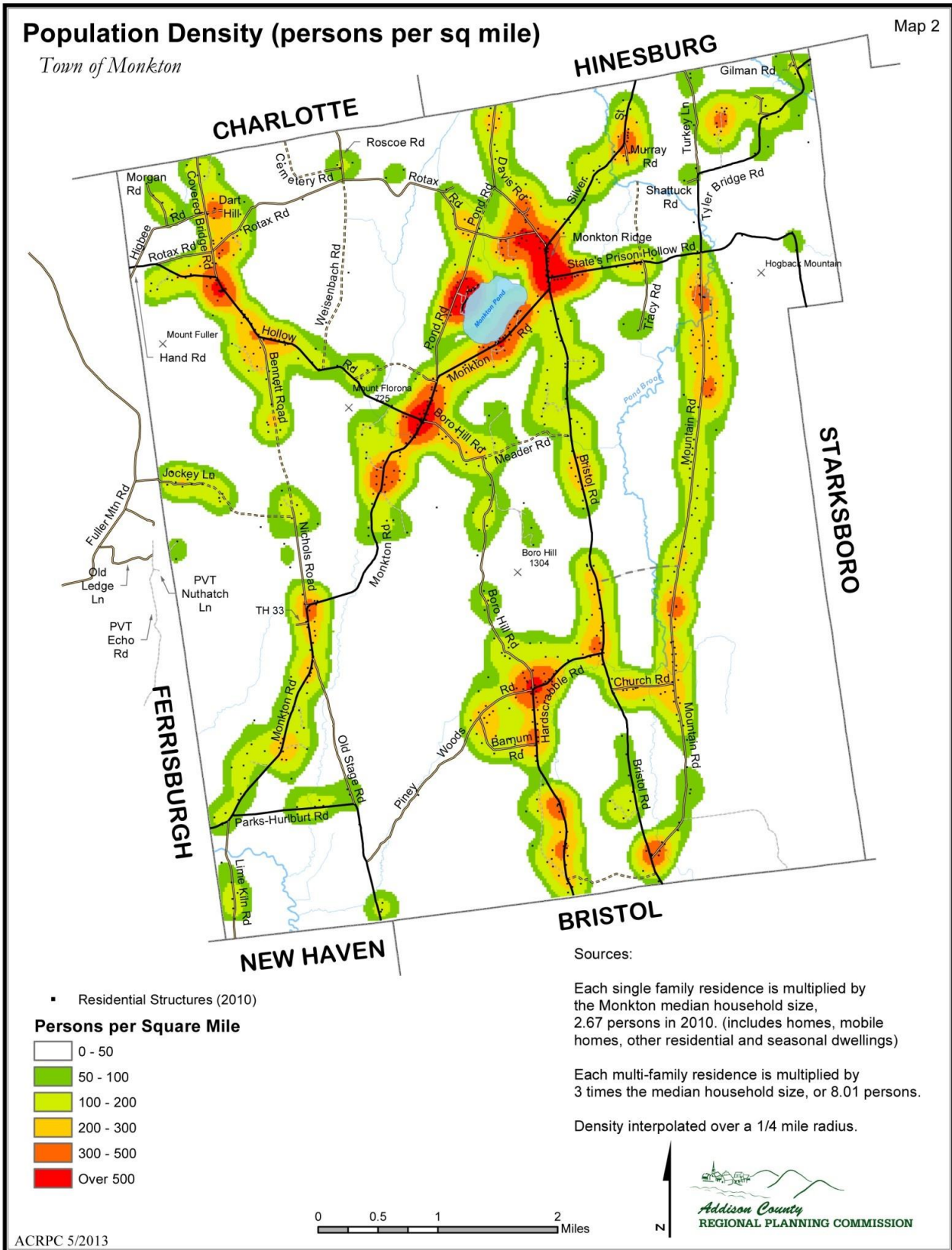
The town has also adopted river corridor bylaw protections. River corridors are established by the Vermont Agency of Natural Resources and include the Statewide River Corridors on larger streams, as well as and the area within 50 feet from the top of slope along any stream without a defined corridor.

The Zoning Administrator implements the substantial improvement/substantial damage provisions of the town’s floodplain management regulations by prohibiting substantial improvement and post-event repairs that will result in any increase in flood levels. All new construction and substantial improvements require the granting of a conditional use permit. the Development Review Board uses available base flood elevation data as criteria for approval. See **Appendix 2** for flood maps and **Appendix 3** for current flood hazard zoning language.

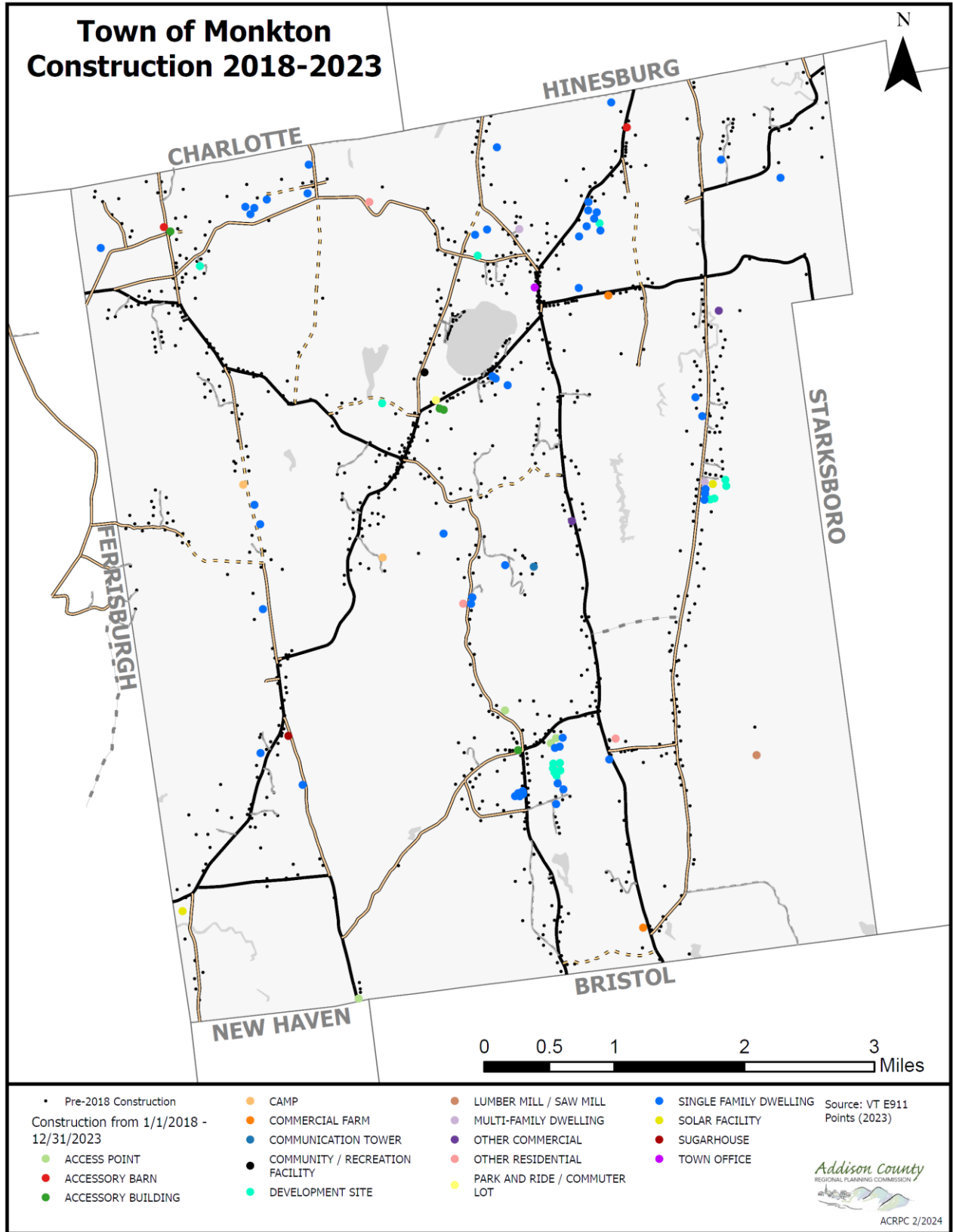
2.2. Community Maps
2.2.1. Municipal Road Names Map



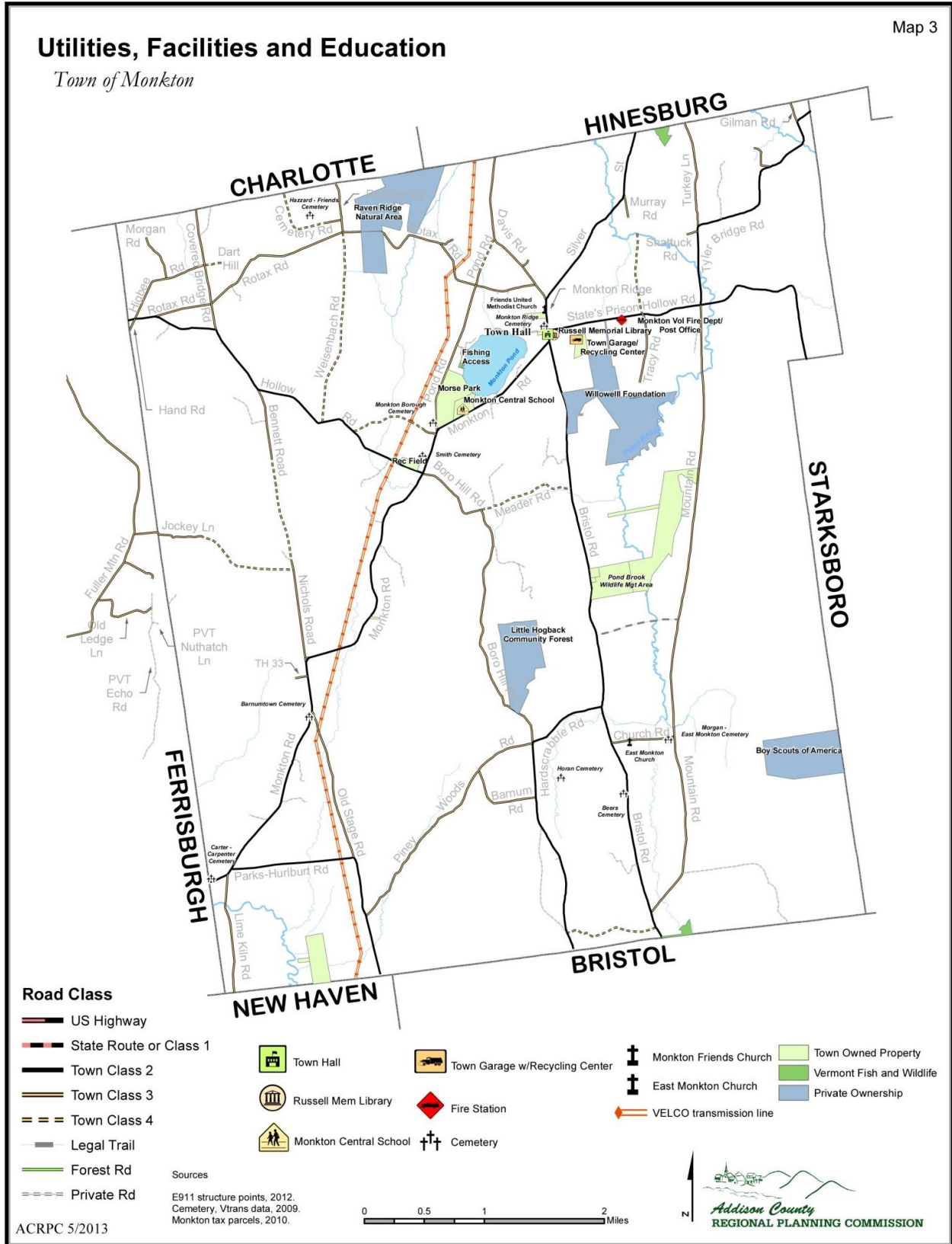
2.2.2. Population Density Map



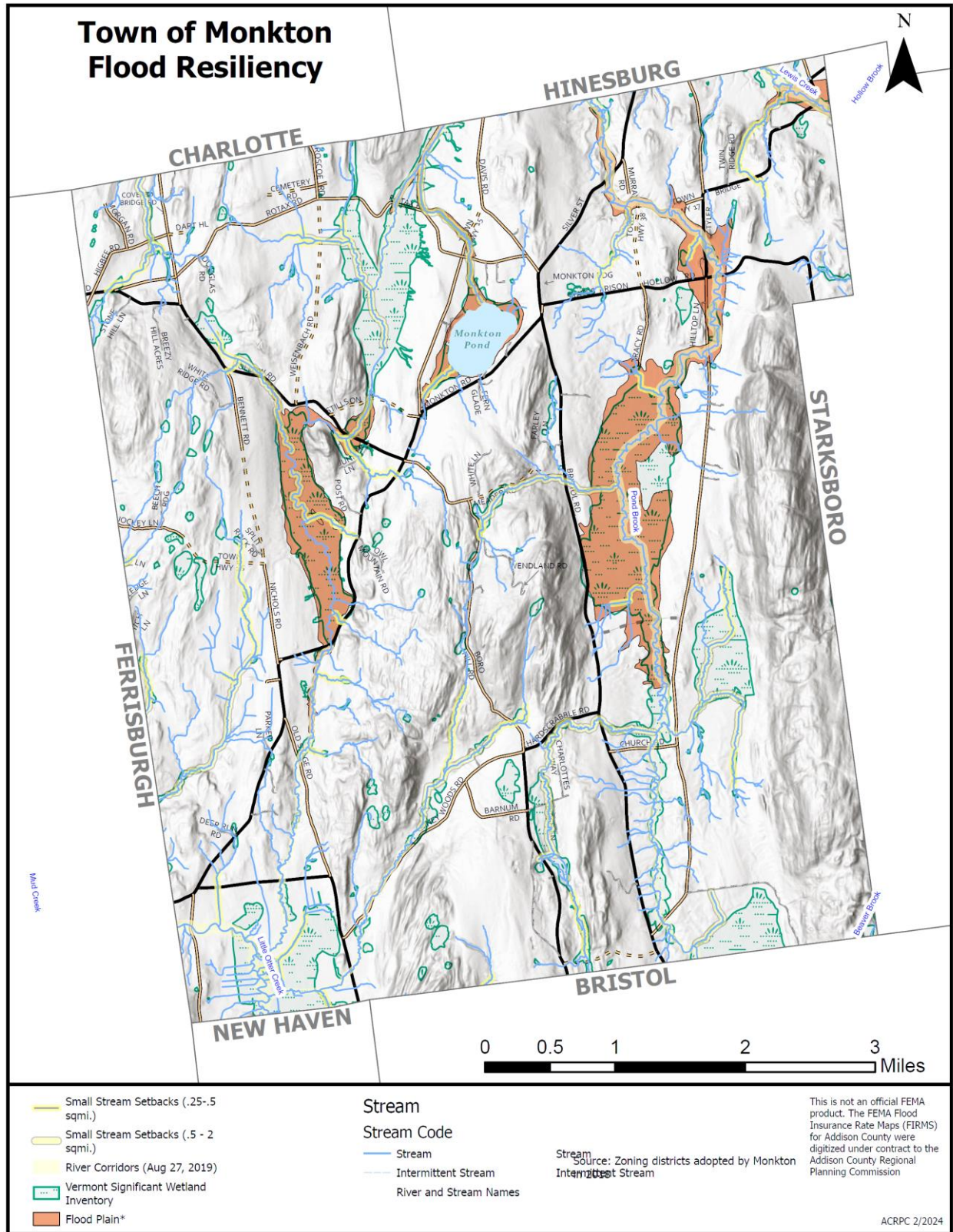
2.2.3. New Construction and Development Map



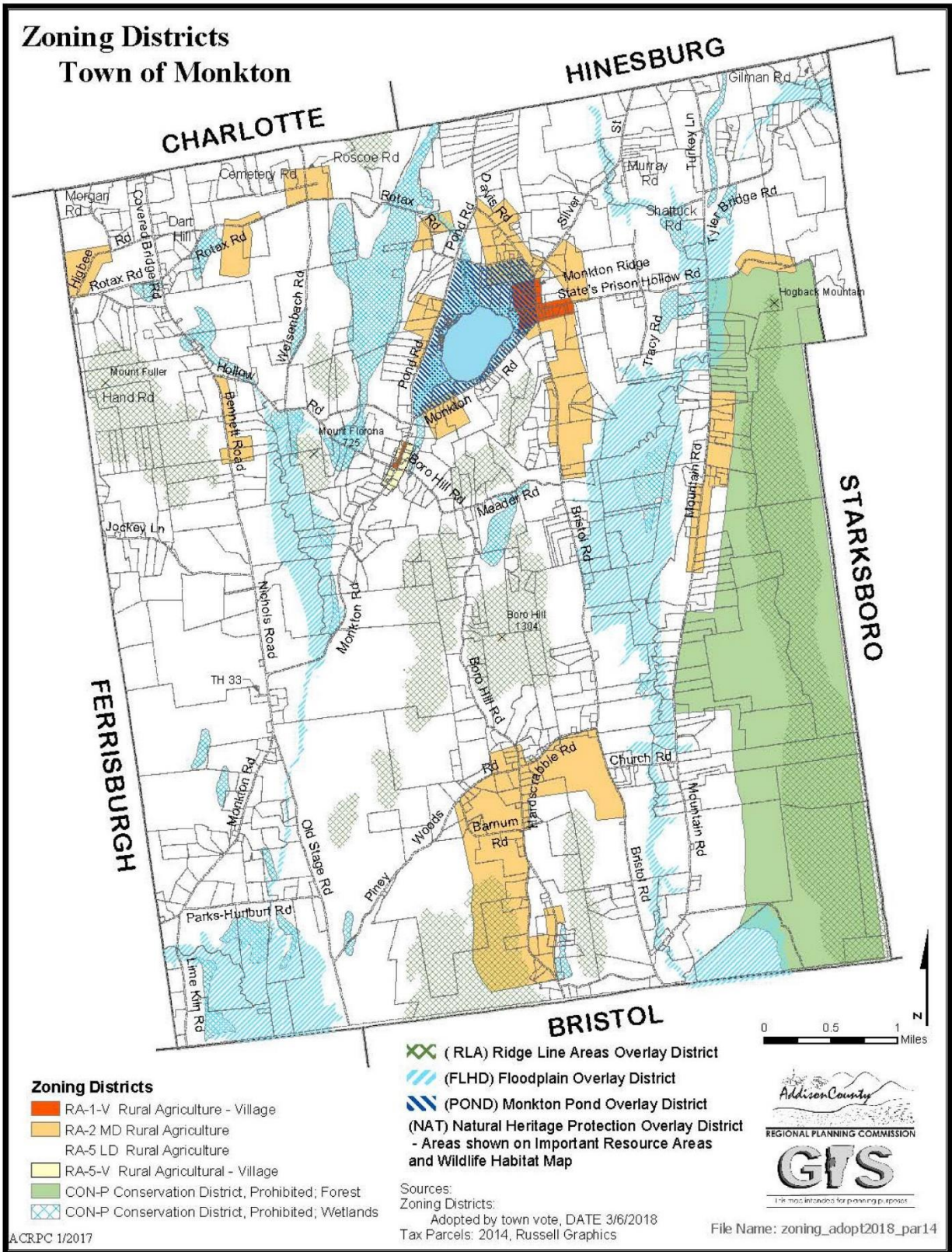
2.2.4. Utilities, Facilities, & Transportation Map



2.2.5. Flood Resiliency Map



2.2.6. Land Use and Zoning Map



3. Existing Adopted Plans Which Support Hazard Mitigation

3.1. 2023 Monkton Local Emergency Management Plan

Adopted annually and before May 1st each year and includes all required elements:

- Emergency Management (EM) Planners
- Municipal Emergency Operations Center (EOC)
- Municipal Resources
- Public Information and Warning
- Vulnerable Populations
- Shelters
- Local and Regional Contacts

3.2. 2020-2028 Monkton Town Plan Goals related to hazards and safety

Guiding Principles:

- Ensure a safe, well-maintained transportation network that considers the needs of a diversity of users, including pedestrians and cyclists.

Housing:

- Offer a diversity of safe, affordable, housing options for a diversity of residents.
- Recommended Action: Support fire department efforts for chimney and wood-burning safety.

Utilities and Facilities

- Provide the needed services to create a safe, healthy community in which to live, work and play.

Education and Childcare:

- Support safe, affordable, high quality childcare in Monkton for Monkton residents.

Transportation:

- Provide a safe, accessible, multi-modal transportation network that meets the needs of all stakeholders and reduces reliance on personal automobiles.

Natural Resources and Environment:

- The Planning Commission encourages town residents to safely remove [Invasive Species] from their private property, and acknowledges the essential work of the roadcrew in mowing a wider swath on the road side to help control the plants that grow there. It also appreciates town residents that work to remove them from town roadsides.

Water Resources:

- Ensure Monkton residences have access to safe, healthy potable water.
- Become a flood resilient community as identified in 24 V.S.A. § 4302.
- Identify, protect and manage the quality and quantity of groundwater, including groundwater recharge areas.
- Identify, protect and manage our wetlands, outflows, rivers and streams for flood resiliency and wildlife refuge.

3.3. 2018 Addison County Regional Plan

Goals that support hazard mitigation:

- Work to restore and maintain stream equilibrium by developing and implementing river corridor plans.
- Reduce flooding and related damages through appropriate mitigation techniques.
- Encourage watershed-based cooperation and educate towns and the general public about water quality and stream dynamics
- Provide communities the support they need to be proactive in reducing flood and erosion hazards by adopting appropriate zoning regulations to limit development in hazardous areas.
- Encourage proper maintenance and sizing of bridges, culverts and other structures to accommodate flow from storm events and to mitigate flood hazards.
- Reduce the loss of life and injury resulting from all hazards.
- Mitigate financial losses incurred by municipal, residential, industrial, agricultural and commercial establishments due to disasters.
- Reduce the damage to public infrastructure resulting from all hazards.
- Recognize the connections between land use, storm-water, road design/ maintenance and the effects from disasters.
- Ensure that mitigation measures are sympathetic to the natural features of the region's rivers, streams and other surface waters; historic resources; character of neighborhoods; and the capacity of the community to implement them.
- Encourage hazard mitigation planning as a part of the Municipal Planning Process.
- Encourage municipalities and landowners to consider VT Agency of Natural Resources riparian guidelines for habitat and flood protection.

3.4. 2018 State of Vermont Hazard Mitigation Plan

Identified Goals and Strategies that support Hazard Mitigation:

- Protect, restore and enhance Vermont’s natural resources to promote healthy, resilient ecosystems.
 - Promote land management standards for State and private lands
 - Improve headwater storage
 - Reduce negative impacts of instream work
 - Improve flood resilience of agricultural lands
 - Promote drought resilience
 - Connect water quality, flood resilience and native habitat connectivity through co-benefits
- Enhance the resilience of our built environment – our communities, infrastructure, buildings, and cultural assets.
 - Locate new development outside of hazardous areas
 - Develop resilient design and construction standards
 - Incorporate flood resilience in transportation planning, engineering and programming
 - Assess seismic vulnerability
 - Identify and protect vulnerable structures and critical infrastructure
 - Reduce structural vulnerability to landslide hazards
 - Protect cultural and historic resources
 - Establish a statewide conservation and buyout program
 - Improve dam resilience
- Develop and implement plans and policies that create resilient natural systems, built environments, and communities.
 - Ensure State programs support hazard mitigation goals
 - Develop solutions to fund hazard mitigation
 - Improve incentives for local hazard mitigation planning and action
 - Improve local hazard mitigation planning
- Create a common understanding of – and coordinated approach to – mitigation planning and action.
 - Improve local leaders' understanding of hazard mitigation
 - Increase public knowledge and literacy of hazards and mitigation
 - Improve community resilience and local engagement

4. Community Risk Assessment

**Requirement 44 CFR § 201.6(c)(2)(i)
(Description of all natural hazards)**

4.1. Risk Prioritization Process

The Town of Monkton's Hazard Mitigation Planning Committee reviewed the following hazards in its Hazard Inventory/Risk Assessment, examining each of the 2018 State Hazard Mitigation Plan assessed hazards:

- Inundation Flooding,
- Fluvial Erosion
- Severe Snow Storm
- Ice Storm
- Tornado or High Winds
- Severe Cold
- Invasive Species
- Landslide
- Wildfire
- Drought
- Hail
- Infectious Disease outbreak
- Severe Heat
- Earthquake
- Dam Failure

While completely human-caused hazards were removed in the most recent State of Vermont's 2018 hazard mitigation plan, the Monkton committee felt that two additional hazards should be included in the assessment due to community concerns and potential impacts:

- Highway Accident
- Hazardous materials spill or release

Monkton's Hazard Mitigation Planning Committee then assessed the town's vulnerability to each hazard for each of the following factors:

- **Probability**, or likely frequency of occurrence from historical trends and future projections
- **Warning**, or the projected time available to give notice to the majority of the population
- **Geographic impacts**, or how much of the population is expected to be impacted
- **Potential impacts**, or the potential severity of damages and disruption to lives and property.

Overall Vulnerability was then calculated by taking the total score of Warning, Geographic Impact, and Property Damage and multiplied by Probability. This score was divided by 4 to increase the scoring legibility and rank hazards on a 12-point scale.

In an effort to validate the risk assessment completed by the Steering Committee, community input was solicited through both an online survey and interactive display at Town Meeting Day to solicit input. The priority scores indicated by community members were very similar to those determined by the steering committee and comments supported including the additional hazards (See **Appendix 1**).

4.1.1 Hazard Inventory/Risk Assessment Parameters

Probability: Frequency of Occurrence

| | |
|------------------|------------------------------------|
| 1= Unlikely | <1% in a given year |
| 2= Occasionally | 1%-10% probability in a given year |
| 3= Likely | >10% but <100% in any given year |
| 4= Highly Likely | 100% probability in a given year |

Warning: Time available to give notice to the majority of the population

| |
|-----------------------|
| 1= More than 12 hours |
| 2= 6-12 Hours |
| 3= 3-6 hours |
| 4= <3 hours (minimal) |

Geographic Impacts: How much of the population is expected to be impacted

| | |
|------------------------------------|--|
| 1= Isolated Locations/neighborhood | <20% of population impacted |
| 2= Moderate impact | >20% and <75% of population impacted |
| 3= Community-wide | >75% of population impacted within community |
| 4= Region-wide | Level 2 & 3 impacts in surrounding communities |

Potential Impact: Severity of damages and disruption to lives and property

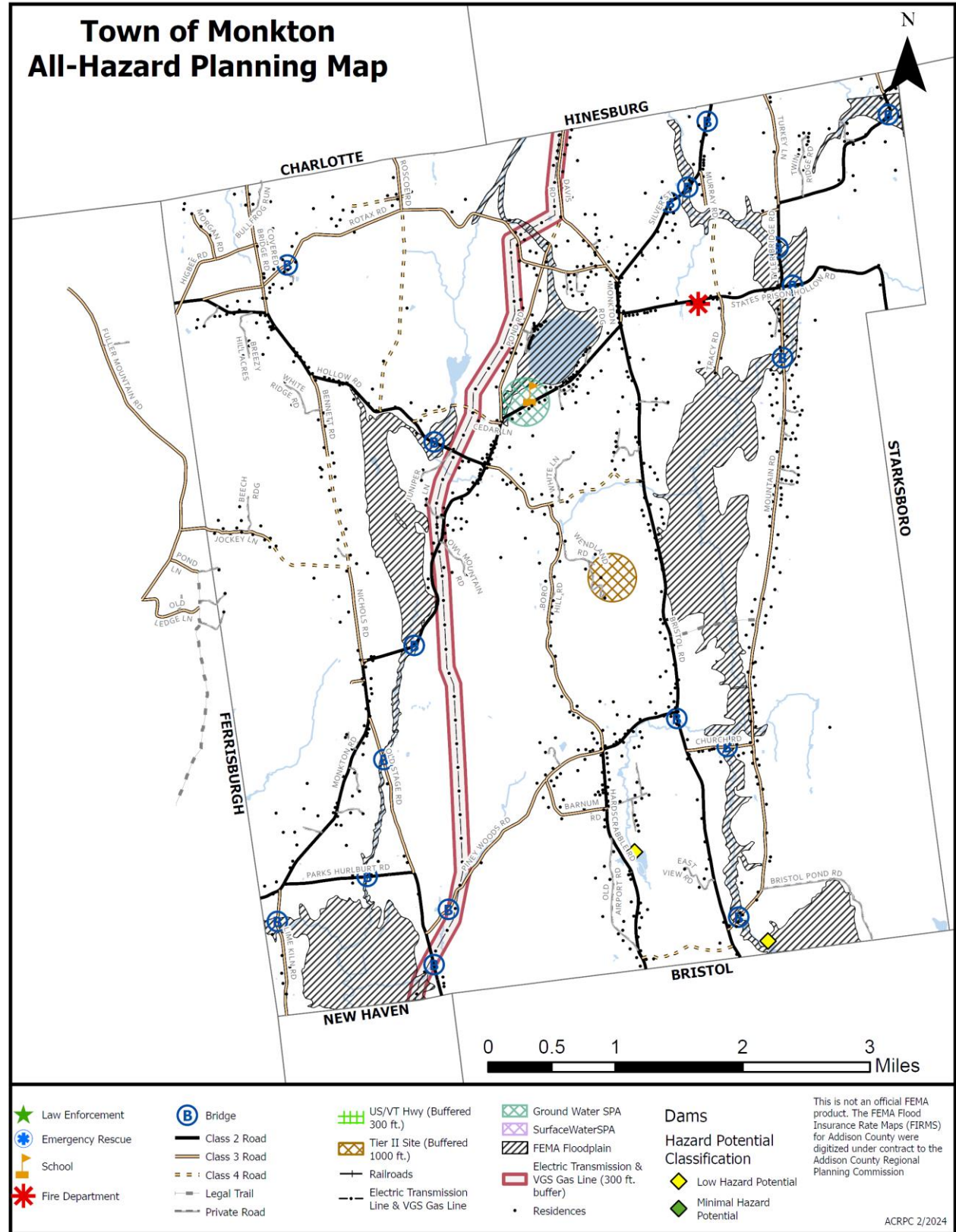
| | |
|---------------|---|
| 1= Negligible | Isolated property damage, minimal disruption to infrastructure |
| 2= Minor | Isolated moderate to severe property damage, brief disruption to infrastructure |
| 3= Moderate | Severe damages at neighborhood level, temporary closure of infrastructure |
| 4= Major | Severe damages town-wide, temporary to long-term closure of infrastructure |

Vulnerability: Total score of Warning, Geographic Impact, and Property Damage, multiplied by Probability (and divided by 4 to increase legibility of scale)

Community Priority:

| | |
|-------------------|---------------------------------|
| Highest Priority | Vulnerability score > 6 |
| High Priority | Vulnerability score > 4 and ≤ 6 |
| Moderate Priority | Vulnerability score > 3 and < 4 |
| Low Priority | Vulnerability score ≤ 3 |

4.1.2. All-Hazards Planning Map



4.1.2 Town of Monkton Risk Assessment Results 2024

| Req. evaluation | Hazard | Hazard Impact | Potential Occurrence Location | Probability | Warning Time | Geographic Extent | Potential Impact | Total Vulnerability Score | Community Priority | Community Priority |
|-----------------|---|--|---|--------------------|----------------------|-----------------------|--------------------|----------------------------------|--------------------|--------------------|
| | | | | 1(Unl)- 4(High) | 1(Long)- 4(Short) | 1(Little)- 4(Wide) | 1(Negl)- 4(Maj) | Prob. x Other Factors (/4) | | |
| * | Severe Ice storm | Closed Roads, Property Damage and Power Outage | Whole town | 3 | 1 | 4 | 4 | 3 | 6.75 | High |
| * | Severe Heat | Health Risk | Whole town | 3 | 1 | 4 | 3 | 3 | 6.00 | High |
| * | Invasive Species | Property Damage, Health Risks | Whole town | 4 | 1 | 3 | 2 | 3 | 6.00 | High |
| * | Structure Fire | Property damage, Injury | Individual Structures | 4 | 4 | 1 | 1 | 2 | 6.00 | High |
| | Highway Accident | Human injury, property damage | Along roads | 4 | 4 | 1 | 1 | 2 | 6.00 | High |
| * | Severe Snow Storm | Closed Roads, Property Damage and Power Outage | Whole town | 3 | 1 | 4 | 2 | 2 | 5.25 | High |
| * | Severe Cold | Health risk | Whole town | 3 | 1 | 4 | 2 | 2 | 5.25 | High |
| * | High Winds | Property Damage and Power Outage | Southwest Exposures | 3 | 2 | 2 | 3 | 2 | 5.25 | High |
| * | Infectious Disease Outbreak | Health risk | Whole town | 3 | 1 | 4 | 2 | 2 | 5.25 | High |
| * | Intense Rainstorms causing Flash Flooding & Fluvial Erosion | Property damage and road closure | Areas immediately adjacent to rivers and streams | 3 | 3 | 1 | 3 | 2 | 5.25 | Mod. |
| * | Lightning Storm | Fire Damage | High structures and ridges | 2 | 2 | 3 | 2 | 2 | 3.50 | Mod. |
| * | Dam Failure | Property and Road Damage | Areas below Beaver Dam on Bristol Pond & Kaolin dam on Hardscrabble Rd, | 2 | 4 | 1 | 2 | 2 | 3.50 | Mod. |
| * | Wildfire | Structure Fires and Property Damage | Residential areas with forest and grassland | 2 | 4 | 1 | 2 | 1 | 3.50 | Mod. |
| * | Drought | Loss of Drinking Water, Crop damage | Farms and Residences served by private wells | 2 | 1 | 4 | 2 | 1 | 3.50 | Mod. |
| * | Inundation Flooding | Water Damage | Low-lying Areas adjacent to rivers and streams | 2 | 2 | 1 | 1 | 2 | 3.00 | Mod. |

| Req. evaluation | Hazard | Hazard Impact | Potential Occurrence Location | Probability | Warning Time | Geographic Extent | Potential Impact | Total Vulnerability Score | Community Priority Score | Community Priority Category |
|-----------------|---------------------------|----------------------------------|--|----------------|------------------|-------------------|------------------|----------------------------|--------------------------|-----------------------------|
| | | | | 1(Unl)-4(High) | 1(Long)-4(Short) | 1(Little)-4(Wide) | 1(Negl)-4(Maj) | Prob. x Other Factors (/4) | | |
| * | Earthquake | Structure and Property Damage | Whole town | 1 | 4 | 4 | 1 | 2 | 2.25 | Low |
| * | Tornado | Property Damage and Power Outage | Southwestern corner of town | 1 | 4 | 1 | 3 | 1 | 2.00 | Low |
| * | Ice Jams | Property damage and road closure | Along rivers | 1 | 3 | 1 | 1 | 1 | 1.25 | Low |
| * | Hail | Property and Crop Damage | Whole town | 1 | 3 | 1 | 1 | 1 | 1.25 | Low |
| * | Landslides | Structure and Property Damage | Steep slopes along Hardscrabble, Piney Woods and Boro Hill Roads | 1 | 3 | 1 | 2 | 1 | 1.50 | Low |
| | Hazardous Materials Spill | Health risk/contamination | Along roads, Natural Gas Pipeline, and Tier II sites | 1 | 1 | 1 | 1 | 2 | 0.75 | Low |

4.2 Risk Prioritization Results

The committee calculated the following hazards as the highest in terms of overall vulnerability:

- **Severe Ice Storm (6.75)**
- **Severe Heat (6.00)**
- **Invasive Species (6.00)**
- **Highway Accidents (6.00)**
- **Structure Fire (6.00)**
- **Severe Snow Storm (5.25)**
- **Severe Cold (5.25)**
- **High Winds (5.25)**
- **Infectious Disease Outbreak (5.25)**

Five additional hazards received a moderate vulnerability score:

- **Lightning Storm (3.50)**
- **Dam Failure (3.50)**
- **Wildfire (3.50)**
- **Drought (3.50)**
- **Inundation Flooding (3.00)**

4.3 Hazards: Location, Extent, Previous Occurrences, Future Probability and Vulnerability

Addison County has experienced just over a dozen federally-declared disasters over the past decades (see Figure 1 and Table 1). Most of these have been due to severe storms and associated flooding.

The Town of Monkton has avoided most of the physical effects and financial damage of these disaster events. The costliest storm events were windstorms in 2007 and a series of wind storms between 2010-2020, along with flooding in 2013.

The town received some public assistance following these events, but the individual assistance damage threshold was not met.

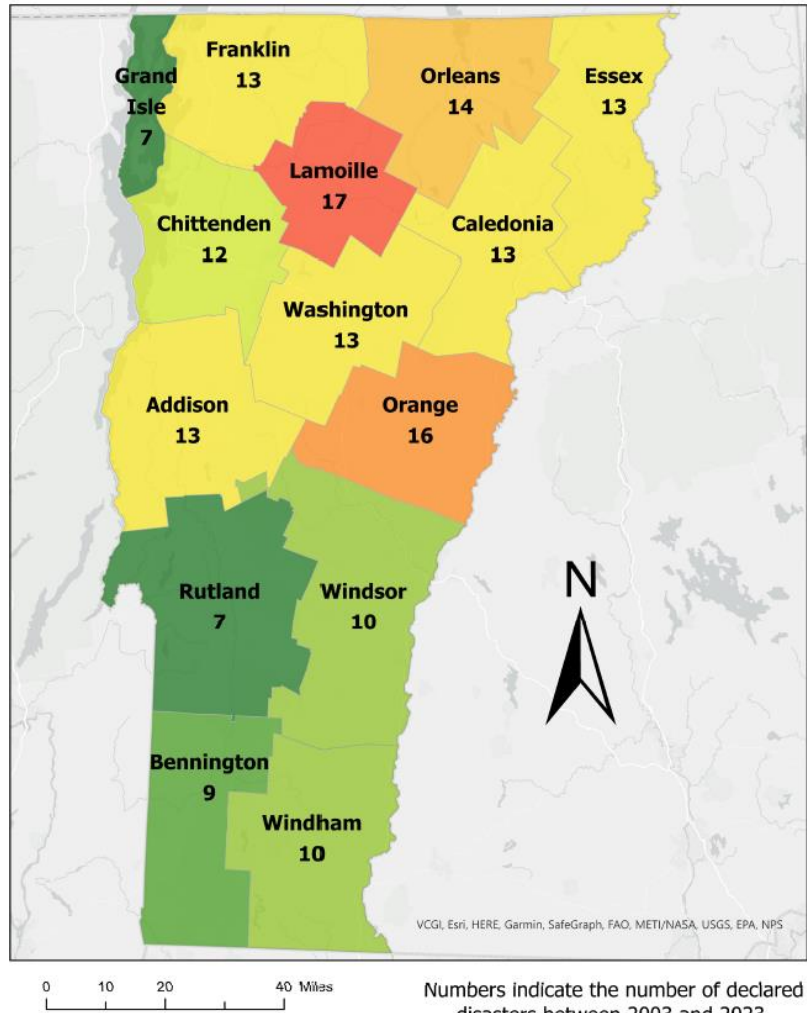


Figure 1. Federally Declared Disasters in Vermont by County, 2003-2023

Table 1. Federally declared disasters and costs affecting Addison County and Town of Monkton

| Year | Incident Date | Description | Declaration # | County Cost | Monkton Cost |
|-------------|-------------------------------|--|----------------------|--------------------|---------------------|
| 2023 | Jul 7- 21, 2023 | Severe Storms, Flooding, Landslides, and Mudslides | DR4720 | Unavailable | Unavailable |
| 2022 | Dec 22- 24, 2022 | Severe Storms and Flooding | DR4695 | Unavailable | Unavailable |
| 2021 | July 29 - July 30, 2021 | Severe Storms and Flooding | DR4621 | Unavailable | Unavailable |
| 2020 | Jan 20, 2020 - May 11, 2023 | Vermont COVID -19 Pandemic | DR4532 | Unavailable | Unavailable |
| 2019 | April 15, 2019 | Severe Storms and Flooding | DR4445 | Unavailable | Unavailable |
| 2019 | October 31- November 1, 2019 | Severe Storms and Flooding | DR4474 | Unavailable | Unavailable |
| 2017 | Oct 29 - Oct 30, 2017 | Severe Storms and Flooding | DR4356 | Unavailable | Unavailable |
| 2017 | June 29 - Jul 1, 2017 | Severe Storms and Flooding | DR4330 | Unavailable | \$0.00 |
| 2015 | June 9, 2015 | Severe Storms and Flooding | DR4232 | \$893,310.63 | \$0.00 |
| 2015 | December 9 - 12, 2014 | Severe Winter Storms | DR4207 | \$184,715.05 | \$0.00 |
| 2012 | May 29, 2012 | Severe Storm, Tornado and Flooding | DR4066 | \$172,847.70 | \$0.00 |
| 2011 | August 26-September 2, 2011 | Hurricane Irene | EM3338 | Unavailable | \$0.00 |
| 2011 | August 27-9/2/2011 | Tropical Storm Irene | DR4022 | \$1,175,911.20 | \$0.00 |
| 2011 | April 23- May 9, 2011 | Severe Storms and Flooding | DR1995 | Unavailable | |
| 2008 | June 14-17, 2008 | Severe Storms and Flooding | DR1778 | \$1,114,515.70 | \$0.00 |
| 2008 | July 21-August 12, 2008 | Severe Storms and Flooding | DR1790 | \$2,273,481.42 | \$0.00 |
| 2004 | August 12- September 12, 2004 | Severe Storms and Flooding | DR1559 | \$430,551.00 | \$0.00 |
| 2001 | March 5-7, 2001 | Snowstorm | EM3167 | \$138,333.08 | |
| 2000 | July 14-18, 2000 | Severe Storms and Flooding | DR1336 | \$738,127.27 | Unavailable |
| 1998 | January 6-16, 1998 | Ice Storms | DR1201 | \$662,388 | Unavailable |
| 1998 | July 17-August 17, 1998 | Severe Storms and Flooding | DR1228 | \$2,146,484 | Unavailable |
| 1996 | January 19- February 2, 1996 | Storms, Flooding | DR1101 | \$130,529 | Unavailable |
| 1993 | April 24- May 26, 1993 | Flooding, Heavy Rain, Snowfall | DR990 | \$17,639 | Unavailable |
| 1989 | August 4-5, 1989 | Severe Storms, Flooding | DR840 | \$31,033 | Unavailable |
| 1977 | September 6, 1977 | Drought | EM3053 | \$ Unavailable | Unavailable |
| 1976 | August 5, 1976 | Severe Storms, High Winds, Flooding | DR518 | \$ Unavailable | Unavailable |
| 1973 | July 6, 1973 | Severe Storms, Flooding, Landslides | DR397 | \$ Unavailable | Unavailable |

The following hazard types have been identified, evaluated and listed in order of priority as identified by the Monkton Hazard Mitigation Committee as shown in their risk assessment. Other hazards identified in Vermont’s state hazard mitigation plan did not rise to the same level of concern by the local planning committee. Hazard types are listed in their order of priority with highest perceived vulnerability described first.

- Requirement 44 CFR § 201.6(c)(2)(i)**
(Hazard information- Location, Extent, Previous Occurrences)
- Requirement 44 CFR § 201.6(c)(2)(ii)**
(Hazard Impacts, Vulnerability)
- Requirement 44 CFR § 201.6(c)(d)(3)**
(Development in hazard-prone areas)

4.3.1 Severe Ice Storm (Vulnerability Score: 6.75)

Location

Severe winter storms are common throughout Vermont and can occur in any part of Monkton. Generally, ice storms strike within a particular elevation band depending on temperatures with higher elevations experiencing snow and lower elevations experiencing rain. Monkton’s range of elevations means it can the town can experience significant ice storm events. Areas along Covered Bridge Road, Boro Hill Road, Piney Woods Road, Old Stage Road, and Parks-Hurlburt Road have been identified as areas where ice storms can cause the most issues.

Extent

Because winter storms are extremely temperature and elevation dependent, they are notoriously difficult to predict. When conditions conducive to ice build-up are predicted, the National Weather Service issues a Winter Storm Warning with emphasis on ice accumulation. Major impacts to Monkton residents are loss of power and an occasional downed tree or branches in the road.

Previous Occurrences

The National Climatic Data Center reports that the Addison County region has experienced two major Ice Storm events over the past 25 years. During that period, an estimated \$850,000 in total property damages were recorded in the region. The highest recorded damages were incurred during the January 1998 Ice Storm which impacted most of the northeastern US and resulted in ice accumulations of up to ¾ inch, a loss of power for up to 2.5 weeks, and \$750,000 in damages within Addison County. The committee identified the 1998 ice storm as the worst that had occurred in the region while acknowledging that Monkton residents were largely spared its impact. Addison County had a high

The Sperry-Piltz Ice Accumulation Index, or “SPIA Index” – Copyright, February, 2009

| ICE DAMAGE INDEX | * AVERAGE NWS ICE AMOUNT (in inches) <small>*Revised-October, 2011</small> | WIND (mph) | DAMAGE AND IMPACT DESCRIPTIONS |
|------------------|---|------------|--|
| 0 | < 0.25 | < 15 | Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages. |
| 1 | 0.10 – 0.25 | 15 - 25 | Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous. |
| | 0.25 – 0.50 | > 15 | |
| 2 | 0.10 – 0.25 | 25 - 35 | Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation. |
| | 0.25 – 0.50 | 15 - 25 | |
| | 0.50 – 0.75 | < 15 | |
| 3 | 0.10 – 0.25 | > = 35 | Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days. |
| | 0.25 – 0.50 | 25 - 35 | |
| | 0.50 – 0.75 | 15 - 25 | |
| | 0.75 – 1.00 | < 15 | |
| 4 | 0.25 – 0.50 | > = 35 | Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days. |
| | 0.50 – 0.75 | 25 - 35 | |
| | 0.75 – 1.00 | 15 - 25 | |
| | 1.00 – 1.50 | < 15 | |
| 5 | 0.50 – 0.75 | > = 35 | Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed. |
| | 0.75 – 1.00 | > = 25 | |
| | 1.00 – 1.50 | > = 15 | |
| | > 1.50 | Any | |

wind event on December 22-23, 2022 with downed power lines and road closures, followed by temperatures falling into the single digits, with wind chills of zero to the minus 10's, but Monkton was again largely unaffected.

Since 1970, NOAA has documented winter storm-damage events across Addison County each year, primarily between November and April:

| | January | February | March | April | May | June | July | August | September | October | November | December |
|----------------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|
| Ice Storm | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Blizzard | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Heavy Snow | 0 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Winter Storm | 28 | 38 | 42 | 10 | 0 | 0 | 0 | 0 | 0 | 1 | 14 | 42 |
| Winter Weather | 54 | 32 | 27 | 12 | 0 | 0 | 0 | 0 | 0 | 7 | 11 | 44 |

*NOAA Storm event database (<https://www.ncdc.noaa.gov/stormevents/>)

In March of 2001, a string of winter storms impacted all of Vermont, including Monkton. On March 5 and 6, 15"-30" of snow fell, followed by 10"-30" on March 22, and another 10-20" on March 30.

Future Probability

Warmer temperatures associated with climate change may result in less snow and a higher likelihood of ice in winter. Climate change predictions indicate increased atmospheric moisture and snowfall as well as the possibility of jet stream alterations producing "bomb cyclones" that might increase sudden deep freezes or ice storms in early spring and late fall. As a result, some winter storms are predicted to increase in severity. Changes in land use and population are not expected to increase the impact of ice storms on community assets or the population.

Vulnerability Summary

The Town of Monkton is a rural community with a dispersed population. Since utility companies prioritize restoration efforts in densely populated areas, Monkton is at risk of extended power outages if power fails due to an ice storm.

The community vulnerability rating for Ice Storm and accompanying widespread power outage is 6.75 and is considered a **HIGH PRIORITY**. Following the 1998 ice storm, utility companies have improved generation and delivery systems which has reduced overall vulnerability to outages.

4.3.2 Severe Heat (Vulnerability Score: 6.00)

The frequency and intensity of hot weather is increasing in Vermont, resulting in greater numbers of heat-related emergency department visits and total deaths.

Location:

Heat waves occur across the entire state, but are generally slightly lower risk in higher elevation mountain communities like Monkton. During the summer, the lake moderates temperatures with cooling on-shore and off-shore breezes that keep some parts of town cooler than other communities further inland.

Extent:

A number of metrics demonstrate the extent of recent increase across the state:

- Days with a maximum temperature **above 95 degrees** Fahrenheit have increased from less than 1 per year (1950-2009) to **at least 2** per year (2010-2022)
- Days with a maximum temperature **above 90 degrees** Fahrenheit have increased from about 4 per year (1950-2009) to **more than 9** per year (2010-2022)
- Days with a **minimum temperature above 70 degrees** Fahrenheit have increased from about 2 per year (1950-2009) to **more than 7** per year (2010-2022)

Previous Occurrences:

Since 1970 across western Addison County, NOAA has seven documented heat events, primarily during July and August and all since the year 2006:

| | January | February | March | April | May | June | July | August | September | October | November | December |
|------------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|
| Heat Event | 0 | 0 | 1 | 0 | 0 | 1 | 3 | 2 | 0 | 0 | 0 | 0 |

*NOAA Storm event database (<https://www.ncdc.noaa.gov/stormevents/>)

The March 2012 event saw record heat across all of Vermont with maximum temperatures 30° to 40° above normal. Some daily records that stood for more than 100 years were broken and several daily records were broken by 10° or more. The Winter of 2011-12 was atypical with temperatures that averaged 4°-5° above normal and snowfall that was 40-60 percent lower than normal. This combination caused snowpacks across the region to be well below normal or even non-existent by mid-March. The ski industry suffered significant revenue loss due to lack of snow, including early spring closures and the Vermont maple sugaring industry lost approximately \$10M statewide.

From June 18-23, 2020 the second longest heatwave in modern history (1900-onward) occurred across portions of New York and Vermont. Temperatures exceeded 90° F for up to six consecutive days in portions of the Champlain Valley.

Future Probability:

Average temperatures in Vermont are projected to increase by an additional 3° to 12° F by 2100, suggesting that Monkton can expect more frequent and harmful hot weather in the future. A number of NOAA projections demonstrate the probability of future temperature increases in the Champlain Valley:

- Days with a maximum temperature **above 95 degrees** Fahrenheit will increase from 2 per year (2010-2022) to **between 3 and 6 per year** (2035-2064)
- Days with a maximum temperature **above 90 degrees** Fahrenheit will increase from 9 per year (2010-2022) to **between 13 and 19 per year** (2035-2064)

Vulnerability Summary:

Changes in climate are expected to increase the probability of Severe Heat incidents and changes in land use and population may increase their impact on community assets or the population. Despite Vermont's northern location, data indicates that Vermont residents experience heat-related illnesses at lower temperatures than residents of other regions. This is likely related to the infrequency of hot weather in Vermont, which has several impacts:

- Vermonters do not experience enough hot weather for their bodies to adapt to hotter conditions;
- Many Vermont homes are not adequately weatherized and do not have air conditioning;
- The State and local communities have not developed plans and policies needed to be prepared for hot weather;
- Adapting behaviors to stay safe during hot weather can be challenging for individuals;
- Vermont has a large population of older adults, who are at higher risk for heat-related illnesses.

The Vermont Department of Health has identified Monkton as having a higher population vulnerability than the state average, due primarily to the percentage of "Adults 65 and Older Living Alone" in Monkton. Other populations disproportionately impacted by heat can include outdoor workers and hobbyists with more exposure to hot conditions, populations that are particularly sensitive to heat exposure (older adults, young children, pregnant women, people that are overweight or have chronic medical conditions, people using drugs, alcohol, or some prescription medicines), and people with limited adaptation resources (living alone, unable to access community cooling sites, or unable to keep their home cool).

Between 2009 and 2019, there were an average of 104 heat-related emergency department visits per year and 12 heat-related deaths across the state. The primary shelter for Monkton, the town fire station, currently has no way to provide cooling. Only the Monkton Town Hall and Library are air-conditioned and neither have a full kitchen or cots for people to sleep on.

Severe Heat are considered a **HIGH PRIORITY** for the Town of Monkton, with an overall vulnerability score of 6.00 determined.

4.3.3 Highway Accidents (Vulnerability Score: 6.00)

Location

Since 2010, there have been more than 260 car accidents documented by state police within the town of Monkton. Most of these have been on the primary routes through town, on Monkton Road (18.8%), Bristol Road (22.6%), Monkton Ridge (4.5%) and Silver Street (5.3%). There have likely been others that were not documented.

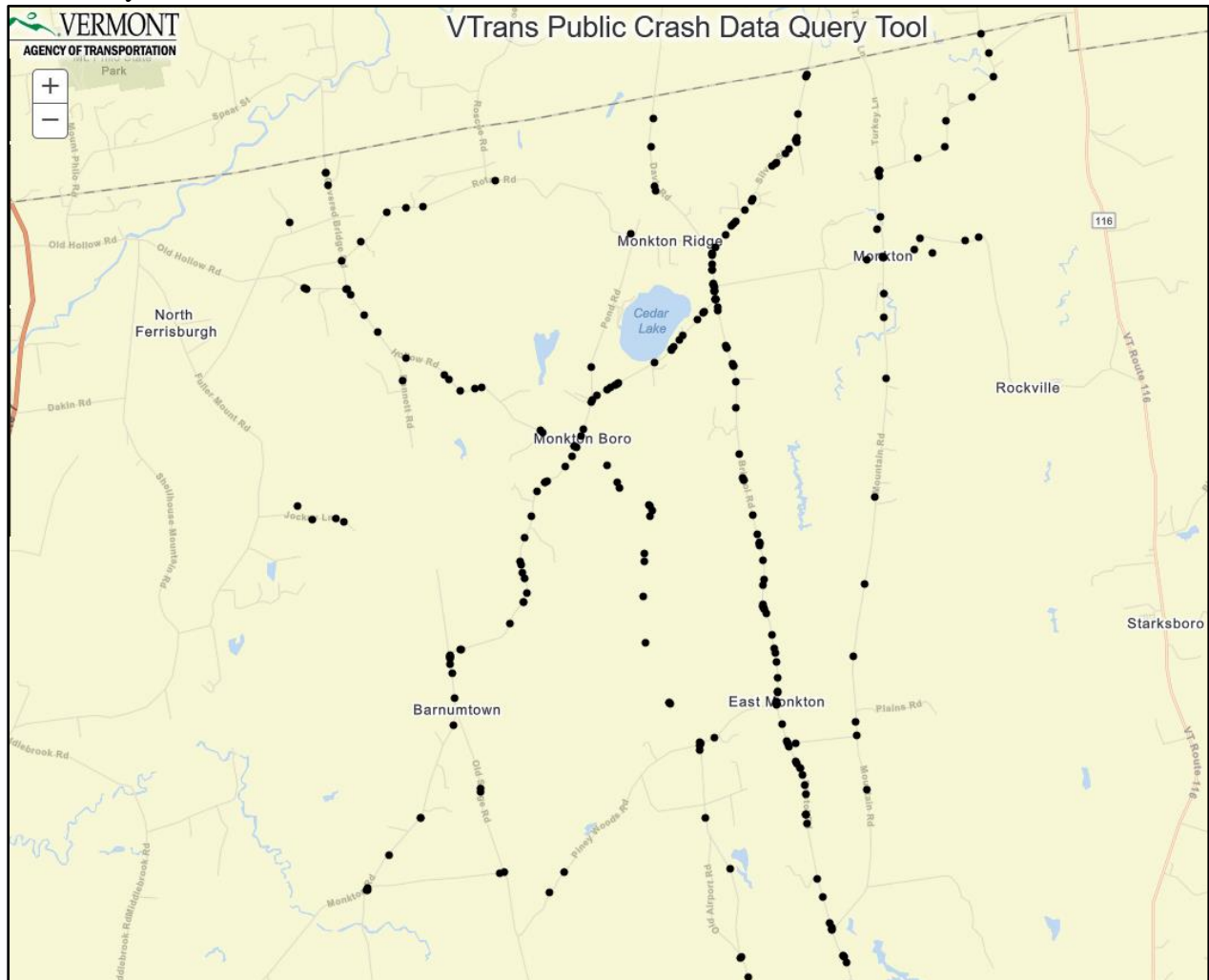


Figure 1. VTrans documented crash locations in Monkton, from 1/2010 to 5/2024, (<https://apps.vtrans.vermont.gov/crashpublicquerytool/>)

The intersections of States Prison Hollow & Tyler Bridge Road, Monkton & Hollow Road, Hardscrabble & Bristol Road, and Monkton & Bristol Road were areas of high numbers of crashes, though most of these were due to cars being rear-ended.

Extent:

Most accidents occurred during daylight hours (64%) and in clear weather, though freezing precipitation was the weather condition in 12% of crashes. The majority of crashes were single vehicle accidents with most resulting only in property damage, with no fatalities, though nearly 80 (29.3%) resulted in injuries. Only 4 (1.5%) involved Heavy Trucks, and most were sideswipes.

Previous Occurrences:

Car accidents in Monkton have averaged 1 or 2 per month, with slightly higher rates in the winter months, but declining overall in recent years.

Figure 2. Car crashes by Year

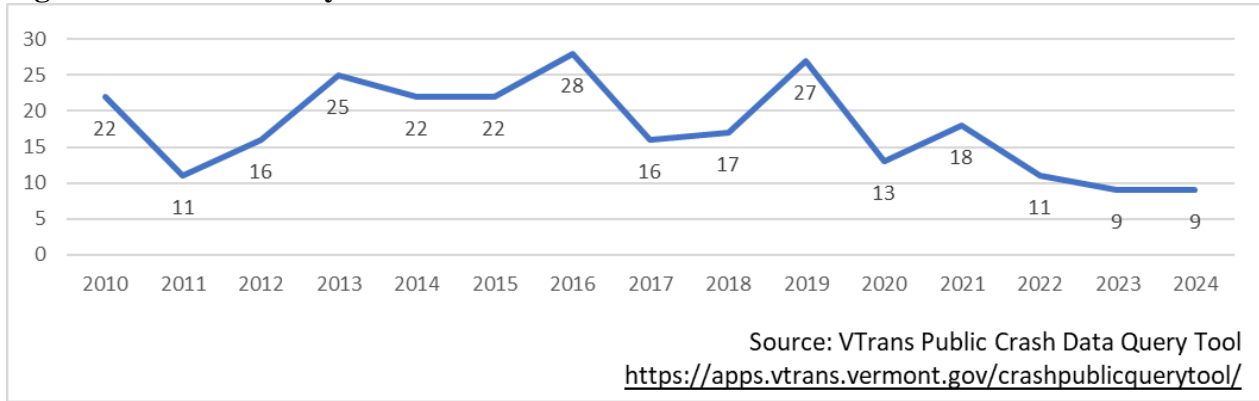
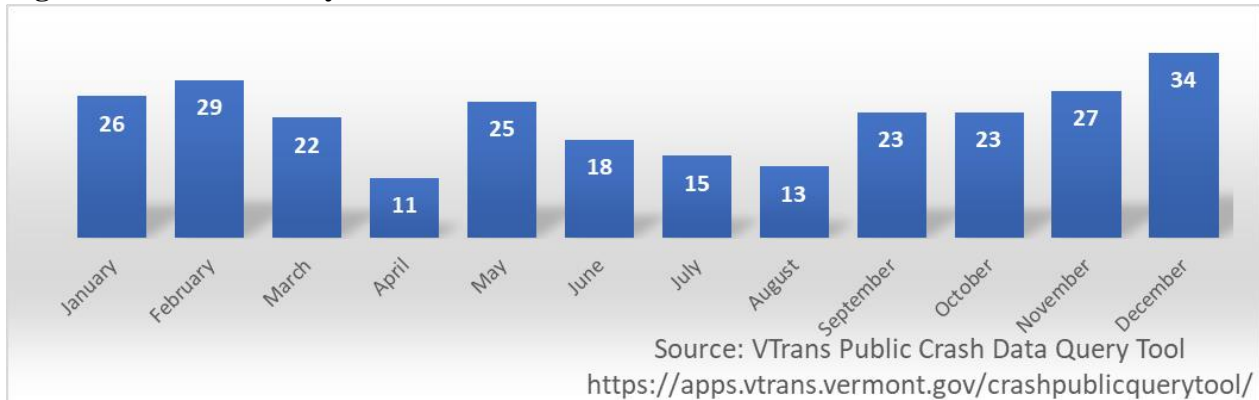


Figure 3. Car crashes by Month



Future Probability:

While documented car accidents over time have declined in recent years, through-traffic may have increased, potentially due to commuters and travelers. GPS often routes travelers from locations on VT Route 7 south of Vergennes going to east Burlington (e.g. BTV airport) through Monkton on Monkton Road, and from Bristol or south of Salisbury through Monkton on Bristol Road, and both groups through Monkton Ridge and Silver Street. Non-local drivers may not expect stop signs and slowing traffic at intersections. Traffic calming measures, such as digital speed radar signs and the installation of fog lines should help reduce speeding and accidents. Changes in climate are not expected to increase the probability of Highway Accidents or affect their impact on community assets or the population.

Vulnerability:

Highway Accidents are considered a **HIGH PRIORITY** for the Town of Monkton, with an overall vulnerability score of 6.00 determined.

4.3.4 Invasive Species (Vulnerability Score: 6.00)

Invasive species are non-native introductions to an ecosystem whose presence 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 due to their ability to outcompete native species in their natural environments without the threat of a predator that can keep their populations in check. Invasive species are considered the second greatest threat to global biodiversity.

The State of Vermont has a long history of invasive species infestation in several categories, including:

Aquatic Species

- Zebra Mussel
- Eurasian and Variable-Leaf Watermilfoil
- Water Chestnut

Forest Pests

- Emerald Ash Borer
- Hemlock Woolly Adelgid*
- Asian Long-horned Beetle*

Arbovirus-Transmitting Arthropods

- Asian Tiger Mosquito (*Aedes albopictus*)*
- Asian Longhorned tick*

*Not yet present in Addison County

Disruptive Terrestrial Plants

- Japanese Knotweed
- Common Reed (Phragmites)
- Purple Loosestrife
- Garlic Mustard
- Buckthorn

Phototoxic Terrestrial Plants

- Giant Hogweed
- Wild Parsnip
- Wild Chervil

Tick Increasing Plants

- Japanese Honeysuckle
- Japanese Barberry

Aquatic Invasive Species pose a serious threat to lakes, ponds, and rivers by choking out swimming holes and crowding out beneficial native species, drastically impacting aquatic foodwebs and limiting fishing, or covering lake bottoms with a layer of sharp shells.

Forest Pests are insects that cause irreversible impacts on tree health and biodiversity.

Arbovirus-Transmitting Arthropods are a group of insects that transmit viral infections through their bites.

Disruptive Terrestrial Plants are invasive plants that can change soil composition, change water tables, and disrupt insect cycles, negatively affecting native plant regeneration, agricultural crops, ecosystem function, recreation and wildlife habitat, and human health.

Phototoxic Terrestrial Plants are invasive plants whose sap can cause a chemical reaction that makes skin hypersensitive to ultraviolet sunlight if it makes direct contact with human skin and potentially cause serious skin burns.

Tick Increasing Plants are plants that have 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.

Location:

Invasive species are commonly introduced via travel routes, unintentionally brought into Vermont with the transportation of people and goods. As a result, many are found along roadsides and in waterways across the entire state.

Aquatic Species have spread throughout Cedar Lake in Monkton, as well as along the New Haven River (Zebra Mussels, Water Chestnut, Milfoil, Alewives, etc.).

A smaller subset of species have become established in Otter Creek and Dead Creek (Water Chestnut).

Monkton also contains significant forest cover susceptible to Forest Pest insects. Large trees adjacent to Jersey Street and other roads and driveways in town could be impacted. All of Monkton is within the five mile “confirmed infested areas” of confirmed Emerald Ash Borer locations in Middlebury and Bristol.

Phototoxic Terrestrial Plants like Wild Parsnip are especially common in abandoned yards, farmland, and along roadsides and other disturbed environments. They spread by seed via waterways, wind, mowers, and wildlife.

Extent:

Invasive species have a variety of effects on humans and the environment so characterizing the extent of their spread is a challenge.

Forest Pest insects threaten more than 14 different species of trees in Vermont, including: maple, elm, horse chestnut, willow, ash, poplar, European mountain ash, hackberry, and hemlock.

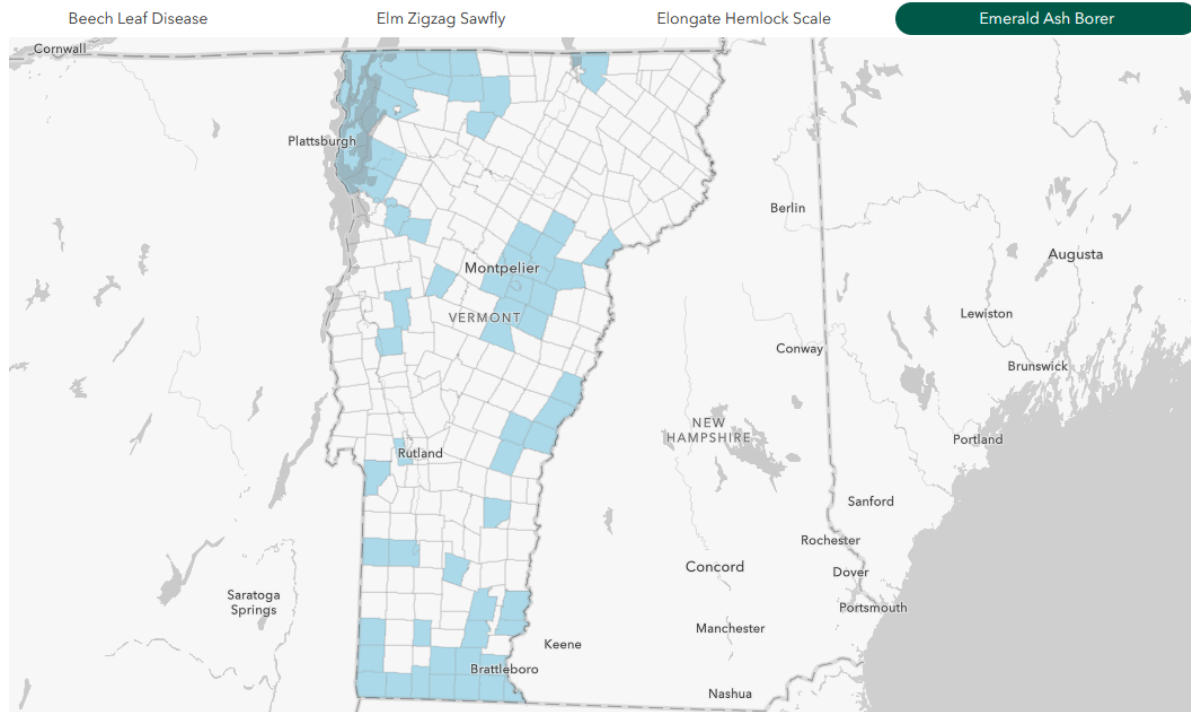
Wild parsnip secretes a toxic sap that contains furanocoumarins, chemicals that make the skin extremely sensitive to ultraviolet (UV) rays. The toxic sap, in combination with sun exposure, can cause a severe skin reaction called phytophotodermatitis, which usually starts within 24 to 48 hours of exposure. The reaction can turn into a severe rash or blistering burn and lead to discoloration of the skin or photosensitivity that can last for years.

Previous Occurrences:

Because invasive species often spread over a long period of time and have dispersed effects, identification of hazard events concerning invasive species is difficult.

- The zebra mussel was discovered in Lake Champlain in the summer of 1993.
- Wild Parsnip was likely brought by early European settlers, but has escaped cultivation and populations have increased dramatically across the state in the last decade. In recent years it has been documented to cause 2nd degree burns to several individuals in parts of Vermont.
- The emerald ash borer was first discovered in Vermont in February 2018, and was detected in nearby Bristol (2019) and Middlebury (in 2021).

Vermont Forest Invasive Pest Status Map



Map showing proximity of Ash Borer infestations in towns adjoining Monkton (<https://experience.arcgis.com/experience/4a3efe4febd24254947e600372793632>)

Future Probability:

Existing and new invasive species are expected to continue moving into Monkton through human transport and by natural reproductive spread.

Phototoxic Terrestrial Plants like Wild Parsnip can form dense stands which outcompete native species and become self-sustaining populations that continue to expand if not eradicated.

Some mobile species like ticks and Woolly Adelgid are moving north from southern Vermont and are expected to continue moving as milder winter temperatures allow them to overwinter. The *Aedes albopictus* (Asian tiger) mosquito, which can carry and transmit Zika, dengue, and other arboviruses including West Nile Virus, has an estimated geographic range that includes southern Vermont and is anticipated to move into Addison County.

In addition to concerns over Vermont's ash tree population, northern hardwood species like maple, yellow birch and American beech are predicted to largely vanish in the State, replaced by tree species such as oak and pine that thrive in warmer, drier conditions. The changing climate is expected to lead to less available water, resulting in additional stress to existing trees, which will increase their vulnerability to pest invasion and disease.

Vulnerability Summary:

Warming temperatures and milder winters make Vermont more vulnerable to insect borne diseases and increases the chance these diseases can overwinter. While not strictly invasive, this shift in species distribution and range could threaten human health in the state. As the global climate continues to shift rapidly rate, species better adapted for warmer climates will continue to proliferate, causing changes in ecosystem composition that could destabilize basic ecosystem functions. Monetary and health costs associated with the disturbances invasives cause will continue to increase. Changes in land use and development are also expected to increase the probability of new Invasive Species and increase their impact on community assets and the population.

Invasive species are considered a **HIGH PRIORITY** for the Town the Town of Monkton, with an overall vulnerability score of 6.00 determined.

4.3.5 Structure Fire (Vulnerability Score: 6.00)

Location:

Nationwide, civilian fatalities are correlated with populations living in rural areas and in older homes. As with much of Vermont, Monkton's housing stock is dominated by older, owner-occupied residential homes, which account for most structure fires. While multi-building fires are unlikely, given the dispersed geography of the town's structures, response time is extended. Access issues on the narrow roads and steep driveways around Lake Dunmore and Fern Lake could also cause challenges, especially with multiple departments and the need to coordinate a continuous stream of water tankers to deliver the needed volume for fire suppression in areas without a municipal water system.

Monkton supports its own volunteer fire department for fire-response coverage, as well as motor vehicle accidents and a number of other types of emergency calls.

Extent:

The primary causes of structure fires are cooking fires and heating appliances, especially wood stoves and uncleaned creosote from solid-fueled heating equipment chimneys. Aging houses and cold Vermont winters put added stress on heating systems. Furthermore, the high cost of heating fuel can force people to use alternative heating sources that may not be safe. An improperly installed and maintained heating appliance can result in added fire risk and carbon monoxide poisoning. While fatalities from fires are rare, older adults have a greater risk of fire death than the overall population.

Previous Occurrences:

In the last decade, only a small number of emergency calls in Monkton were for structure fires. However, structure fires do occur every year or two. Several significant fires have occurred over the last two decades: An electrical fire engulfed Queen Bee's Snack Bar in 2023, destroying the popular eatery. In 2014 home on Hardscrabble Road was for sale and unoccupied when fire destroyed it, resulting in a total loss. In 2013 a horse barn with an attached indoor riding ring on White Ridge Lane causing \$150,000 of damage. A 2008 fire that resulted from a lightning strike resulted in the death of an individual and necessitated a response from fire crews of Monkton, Bristol, Hinesburg and Starksboro.



Historically, fires have also shaped the downtown village. The corner of Monkton Ridge and State Prison Road has been the site of a store since the 1880s, though the original store building and adjoining dwelling burned down in 1912. In October 1913, the building at the former site of Russell Memorial Library burned to the ground.

Future Probability:

The risk of individual structure fire events is likely to continue. Education about safe practices and maintenance activities will prevent some incidents, but accidents and unforeseen occurrences will occur. Changes in climate, land use, and population are not expected to increase the probability of Structure Fires or affect their impact on community assets or the population.

Vulnerability Summary:

Older adults have a greater risk of fire death than the overall population. In the past decade, more than a third of Vermont's fire deaths have been seniors over the age of 65. About 19% of Monkton's population is older 65, much like the rest of Addison County (21%) and Vermont. Structure Fire events are considered a **HIGH PRIORITY** for the Town of Monkton, with an overall vulnerability score of 6.00 determined.

4.3.6 Severe Snow Storm (Vulnerability Score: 5.25)

Location

Severe winter storms are common throughout Vermont and can occur geographically in any part of Monkton. Located at the edge of the Champlain Valley and Green Mountains, Monkton is at greater risk for more widespread Ice. Generally, ice storms strike within a particular elevation band depending on temperatures with higher elevations experiencing snow and lower elevations experiencing rain.

Extent

Because winter storms are extremely temperature and elevation dependent, they are notoriously difficult to predict. When conditions conducive to ice build-up are predicted, the National Weather Service issues a Winter Storm Warning with emphasis on ice accumulation.

The Winter Storm Severity Index (WSSI) (Appendix 5) is a categorization of overall severity based on six components:

- **Snow Amount:** to depict severity due to total amount of snow or rate of snowfall accumulation. (Adjustments are made based on climatology and urban areas, e.g. 4” of snow in Atlanta is more severe than 4” in Minneapolis.)
- **Snow Load:** to depict severity due to total weight of snow on trees and power lines.
- **Blowing Snow:** to depict severity mainly to transportation due to blowing and drifting snow.
- **Ice Accumulation:** to depict severity of transportation and downed trees/powerlines due to the accumulated ice in combination with wind.
- **Ground Blizzard:** to depict severity to mainly transportation of ground blizzards that develop due to a pre-existing snowpack and strong winds.
- **Flash Freeze:** to depict severity primarily to transportation of situations where temperatures rapidly fall below freezing during precipitation.

Previous Occurrences

The National Climatic Data Center reports that the Addison Region has experienced two major Ice Storm events over the past 25 years. During that period an estimated \$850,000 in total property damages were recorded in the region. The highest recorded damages were incurred during the January 1998 Ice Storm which impacted most of the northeastern US and resulted in ice accumulations of up to ¾ inch, a loss of power for up to 2.5 weeks, and \$750,000 in damages to Addison County. The Monkton hazard mitigation committee identified the 1998 ice storm as the worst that had occurred in the region. Fortunately, the residents of Monkton were largely spared the effects of this storm. On December 22-23, 2022, Addison County received high winds, downing power lines and closing roads, followed by cascading temperatures falling into the single digits, with wind chills of zero to the minus 0’s, but again Monkton was largely spared the effects.

Since 1970, NOAA has documented winter storms across Addison County in a number of events, spanning the period from November to April:

| | January | February | March | April | May | June | July | August | September | October | November | December |
|----------------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|
| Ice Storm | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Blizzard | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Heavy Snow | 0 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| High Wind | 4 | 6 | 2 | 2 | 1 | 0 | 1 | 2 | 5 | 4 | 5 | 8 |
| Strong Wind | 11 | 9 | 4 | 7 | 3 | 0 | 0 | 3 | 0 | 9 | 7 | 7 |
| Winter Storm | 28 | 38 | 42 | 10 | 0 | 0 | 0 | 0 | 0 | 1 | 14 | 42 |
| Winter Weather | 54 | 32 | 27 | 12 | 0 | 0 | 0 | 0 | 0 | 7 | 11 | 44 |

*NOAA Storm event database (<https://www.ncdc.noaa.gov/stormevents/>)

The major impacts within the Town of Monkton are generally limited to residents impacted by loss of power and the occasional downed tree or branches in the road. Loss of power to the town hall and garage are of concern due to the frequency of losses at these locations. In March 2001 a string of storms hit Monkton and the rest of Vermont, beginning with 15-30” of snow on March 5-6, followed by 10-30” on March 22, and 10-20” on March 30.

Future Probability

Warmer temperatures such as might be anticipated with climate change would result in less snow and a higher likelihood of ice in winter. Other predictions indicate that climate change will bring more atmospheric moisture and snowfall, or jet stream alternations producing “Bomb Cyclones” that might increase sudden deep freezes or ice storms in early spring and late fall. In all cases, winter storms are predicted to increase in severity. Changes in land use and development are not expected to increase the impacts of ice storms or power outages on community assets or the population.

Vulnerability Summary

The Town of Monkton is a rural community with one major highway and dispersed population. Utility company priorities following storms are to repair the simplest fixes which impact the highest total populations as the highest priority. As a result, there is a high risk of extended power failures due to ice storm throughout the Town of Monkton.

The community vulnerability rating for Ice Storm and accompanying widespread power outage is 6.56 and is considered a **HIGH PRIORITY**. Widespread power outages have been extensively mitigated by service providers in the past few years following the disastrous Ice Storm of 1998 effectively reducing the community’s vulnerability.

4.3.7 Severe Cold (Vulnerability Score: 5.25)

Location:

Severe cold events occur across the entire state, and are generally more severe at higher elevations. Temperatures in the lower, populated areas of Monkton are somewhat moderated by Lake Dunmore, but can still experience significant low temperatures.

Extent:

Vermont often experiences cold conditions during winters, however very cold temperatures remain a threat despite their regularity. The NOAA Wind Chill Chart identifies those temperatures and associated wind speeds that may cause frostbite if skin is exposed to the air over a certain period of time. In anticipation of extreme cold temperatures, the National Weather Service may issue the following watches, warnings or advisories, which are aimed at informing the general public as well as the agricultural industry:

- **Wind Chill Warning:** Dangerously cold wind chill values are expected or occurring
- **Wind Chill Watch:** Dangerously cold wind chill values are possible
- **Wind Chill Advisory:** Seasonably cold wind chill values but not extremely cold values are expected or occurring
- **Hard Freeze Warning:** Temperatures are expected to drop below 28°F for an extended period of time, killing most types of commercial crops and residential plants
- **Freeze Warning:** Temperatures are forecasted to go below 32°F for a long period of time, killing some types of commercial crops and residential plants
- **Freeze Watch:** Potential for significant, widespread freezing temperatures within the next 24-36 hours
- **Frost Advisory:** Areas of frost are expected or occurring, posing a threat to sensitive vegetation

Previous Occurrences:

Since 1970, NOAA has documented severe cold and wind chill events across Addison County in a number of events, exclusively in the period from December to February:

| | January | February | March | April | May | June | July | August | September | October | November | December |
|-----------------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|
| Cold/Wind Chill | 19 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |

*NOAA Storm event database (<https://www.ncdc.noaa.gov/stormevents/>)

In January and March of 2007, several arctic cold fronts moved across Vermont on the 24th and delivered very cold temperatures as low as 15 degrees below zero along with blustery winds.

On January 14, 2009 an arctic cold front moved across Vermont during the early morning hours which delivered some of the coldest temperatures across the region in several years. As the arctic front passed across northern Vermont, temperatures dropped over 20 degrees within several hours. Temperatures averaged 20 to 25 degrees below normal values, which were already at climatological winter minimums. In parts of Addison County, minimum temperatures reached 20 degrees below zero. These extremely cold temperatures led to numerous cold weather-related problems including numerous dead vehicle batteries and broken home/business water pipes.

On January 7, 2015, early evening temperatures were zero to 10 above zero with winds of 15 to 30 mph that created wind chills colder than 20 to 30 below zero through the overnight into the morning hours of January 8th. Actual morning low temperatures on January 8th were 10 below to 20 below zero in Addison County, with temperatures dipping to 12 below zero in neighboring Salisbury

On December 22-23, 2022, Addison County received high winds, downing power lines and closing roads, followed by cascading temperatures falling into the single digits, with wind chills of zero to the minus 0's, but Monkton was largely spared the effects.

Future Probability:

Warmer temperatures associated with climate change may result in milder winters but the possibility of jet stream alterations producing “bomb cyclones” that might increase sudden deep freezes or ice storms in early spring and late fall. As a result, some winter storms and severe cold events are predicted to increase in severity. Changes in land use and population are not expected to increase the impact of severe cold events on community assets or the population.

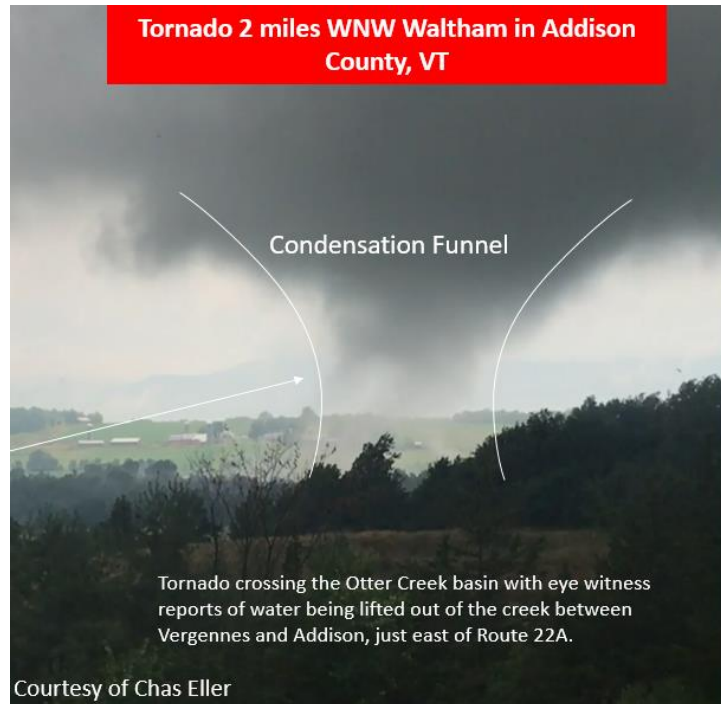
Vulnerability Summary:

Severe Cold events are considered a **HIGH PRIORITY** for the Town of Monkton, with an overall vulnerability score of 5.25 determined.

4.3.8 High Winds (Vulnerability Score: 5.25)

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

- **Wind Storm:** events without precipitation with gusts sustained at more than 31 mph for at least an hour or any gusts greater than 46 mph.
- **Hurricanes/Tropical Storms:** often result in high winds greater than 39 mph, along with inundation flooding, and fluvial erosion impacts.
- **Thunderstorm:** storms with precipitation, lightning, and/or hail, that can be compounded by downburst high winds potentially in excess of 80 mph.
- **Tornado:** a violently rotating column of air extending from a thunderstorm with wind speeds capable of reaching in excess of 250 mph.



Location:

In Vermont, high winds are most often seen accompanying severe thunderstorms. In Addison County, these storms usually originate from the west, southwest, or south. Monkton has not experienced tornadoes, which generally occur further to the west by windstorms crossing the Champlain Valley, and Waterspouts— a tornado that originates over water instead of land- only occur close to Lake Champlain. However, because Monkton spans the edge of the Green Mountains, it is extremely vulnerable to downslope windstorms and related hazards. Squall line thunderstorms from the southwest and wind dynamics caused by the abrupt change in topography, can significantly affect towns along the edge of the mountains. Large-scale hurricanes affecting the entire region are infrequent because hurricanes typically lose wind speed as they move inland and downgraded to tropical storms by the time they reach inland Vermont.

Extent:

Wind-producing storms can range significantly in size and type. Wind storms and hurricanes can affect the entire state in a single event. Squall line thunderstorms move in a line or front that can exceed 100 miles in length, with the strongest rains and winds at the front of the storm. Thunderstorms can produce downburst winds that affect the land immediately beneath a storm. These downburst winds are called microbursts, which move outward from the base of a thunderstorm. Tornado damage paths can be more than mile wide and 50 miles long. Straight-line winds from thunderstorms are more common, but usually more limited in scale. (See Beaufort Wind and Saffir-Simpson wind scales in Appendix 4).

Previous Occurrences:

In Vermont, high winds most often seen accompany severe thunderstorms. In fact, straight-line winds are often responsible for most of the wind damage associated with a thunderstorm. These winds are frequently confused with tornadoes because they exhibit similar wind speeds and cause similar damage but the winds do not rotate as they do in a tornado.

While thunderstorms and associated hazards can occur anywhere and at any time of the year in Vermont; spring and summer are the most common times for severe thunderstorms. Tornadoes typically occur in Vermont between March and August.

Since 1970 across Addison County, NOAA has documented wind-damage from over 180 thunderstorms and only 3 tornadoes, primarily during the spring and summer:

| | January | February | March | April | May | June | July | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|
| Tornado | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Thunderstorm & Wind | 0 | 1 | 2 | 0 | 21 | 32 | 72 | 35 | 9 | 3 | 3 | 1 |

*NOAA Storm event database (<https://www.ncdc.noaa.gov/stormevents/>)

In the Monkton area (Monkton, Monkton Ridge, and North Ferrisburgh) there have been 10 documented Thunderstorm wind events since 1970, and in neighboring municipalities there have been 38.

Tornadoes can occur in Addison County, but are rare and generally occur in the flatter, western part of the county. In July 2022 a storm system produced two tornado touchdowns west of Monkton; one in Addison (EF1) and one in Waltham (EF0). (See Enhanced Fujita Scale in Appendix 4). The tornadoes caused property damage, and uprooted and snapped several trees. The path length of the Addison tornado was 1 mile long and as much as 50 yards wide, while the second tornado path was 0.7 miles long and 25 yards wide. While extremely rare, in 1970 a waterspout moved from Lake Champlain to the southern part of Swanton, Franklin County where it struck a cabin and multiple injuries resulted.

Large-scale windstorms have affected wide portions of the state three times in the last decade: October 30, 2017, November 1, 2019, December 23, 2022. In each of these storms, strong winds affected all of Vermont’s 14 counties, resulting in downed tree limbs, power outages, and uprooted trees which affected transportation routes. Since 1960, Monkton’s NOAA-documented high thunderstorm winds caused ~\$69,000 of property damage.



Future Probability:

Wind events are considered **Highly Likely** in Vermont. The risk due to wind events is moderate for the built environment and minor for natural environment, people, and economy. Tornadoes are not common in Vermont. However, it is likely that as climate change accelerates, the area will see exacerbation of wind events such as hurricanes, tropical storms, and thunderstorms. Projected land use and population changes are not expected to significantly affect their impact on community assets or vulnerable populations.

Vulnerability Summary:

People who live in rural, isolated communities like Monkton are particularly vulnerable to windstorms. High winds can take down trees and power lines, resulting in blocked transportation routes, cut off electricity and telecommunication networks, and property destruction. Lack of electricity is life-threatening for those relying on electric life supports systems and electrical heating and cooling systems. In addition, isolated populations may have limited access to information and communication resources that could prevent injury or death.

High Wind events are considered a **HIGH PRIORITY** for the Town of Monkton, with an overall vulnerability score of 5.25 determined.

4.3.9 Infectious Disease Outbreak (Vulnerability Score: 5.25)

An infectious disease is one that is caused by micro-organisms, such as bacteria, viruses or parasites. A vector-borne disease 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). 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, can cause continuity of operations challenges for local businesses, impact the economy, and interrupt daily life for everyone within a community. These outbreak incidents are a danger to emergency responders, healthcare providers, schools, and the public. Examples include Coronavirus 19 (COVID-19), influenza (e.g. H1N1), pertussis, West Nile Virus, and many other diseases.

The Vermont Department of Health has separated vector-borne and other infectious diseases into five threat categories:

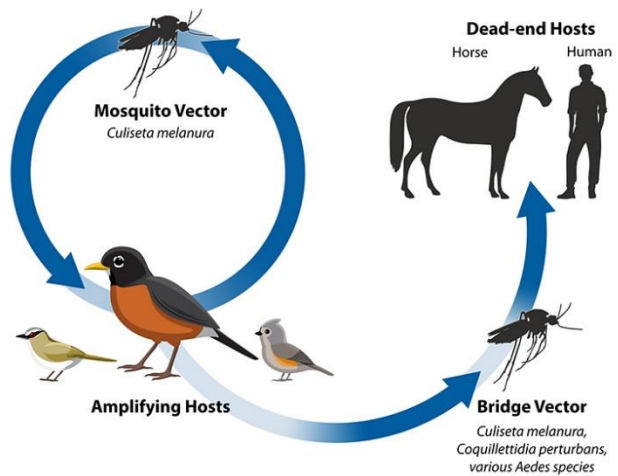
| Threat Classification | Disease |
|---|------------------------------|
| Diseases <u>already present</u> in Vermont that may be <u>exacerbated by climate change</u> | West Nile Virus |
| | Eastern Equine Encephalitis |
| | Lyme Disease |
| | Anaplasmosis |
| | Babesiosis |
| | Hard Tick Relapsing Fever |
| | Jamestown Canyon Virus |
| | Tularemia |
| Diseases that <u>may spread to Vermont</u> even without contribution of climate change, whose spread to and transmission of Vermont <u>could be exacerbated by climate change</u> | Powassan Virus |
| | St. Louis Encephalitis |
| | Western Equine Encephalitis |
| | La Crosse Encephalitis |
| | Ehrlichiosis |
| | Alpha-gal Syndrome |
| Diseases with vectors that <u>may spread to Vermont by the end of the century</u> under a higher emission scenario | Rocky Mountain Spotted Fever |
| | Dengue |
| | Zika Virus |
| Diseases that have or may in the future have competent vectors in Vermont, but are <u>unlikely to become established in Vermont</u> despite a vector presence | Chikungunya Virus |
| | Yellow Fever |
| | Malaria |
| | Chagas Disease |
| Diseases that may be present in Vermont or may spread to Vermont in the future but whose <u>link with climate changes</u> expected in Vermont is <u>tenuous</u> . | Rift Valley Fever |
| | Bartonellosis |
| | Rabies |
| | Hantavirus |
| | Leptospirosis |
| | Plague |
| | Valley Fever |
| Anthrax | |
| Q Fever | |

Location:

Infectious disease cases have been dispersed throughout Vermont and likely in Monkton. Low population density in town may reduce the possibility of respiratory disease spread. Mosquitoes are common throughout Monkton and the surrounding towns due to the large acreages of swamp and poorly drained soils. The species-specific vector for Eastern Equine Encephalitis (EEE) is *Culiseta melanura*, which lives in hardwood swamps which are particularly prevalent along the Otter Creek in Monkton. Trapping efforts funded by the Vermont Agency of Agriculture and the Vermont Department of Health have identified populations of CM carrying EEE in other Towns in the county.

Extent:

Infectious diseases come in a wide variety of types and have a broad range of effects. In most cases, only a few individuals are affected. However, more virulent infectious disease outbreaks have the potential to affect the entire community over a long period of time. Due to the endemic mosquito populations, infection from either West Nile Virus (WNV) or Eastern Equine Encephalitis (EEE) is highly likely and could result in multiple deaths in the Town of Monkton. Most recently, the COVID-19 pandemic beginning in 2020 led to a complete disruption of daily life and municipal operations across Monkton and the rest of Vermont.



Eastern Equine Encephalitis Transmission

The Eastern equine encephalitis virus cycles between mosquitoes and birds. The *Culiseta melanura* mosquito, which primarily bites birds, is responsible for spreading the virus among birds. The virus then multiplies in the birds' bloodstream.

People and other animals, like horses, become infected with the virus when mosquito species that feed on many kinds of animals, feed on infected birds and then bite people. People and horses are considered **dead-end hosts** because unlike birds, they don't develop high levels of virus in their bloodstream and cannot pass the virus on to other biting mosquitoes.



Previous Occurrences:

Respiratory diseases have had the greatest impact and most widespread previous occurrences. 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.

The COVID-19 pandemic beginning in 2020 led to a complete disruption of daily life within Vermont. A state of emergency was issued on March 13th, 2020 by Governor Phil Scott to help ensure Vermont had the resources necessary to respond to the COVID-19 public health emergency. In the following weeks, a series of executive orders were issued restricting activities likely to result in transmission or use up valuable medical resources. Some of these included restricting visitor access to long term care facilities, suspending in person PreK-12 education, closure of bars and restaurants, suspension of elective and non-essential medical surgeries, interstate travel restrictions, and limits on non-essential gatherings. COVID-19 restrictions stayed in effect until June 14th, 2021 when 80% of Vermont's eligible population (those 12 and older) received at least one dose of COVID-19 vaccine, in accordance with the State's Vermont Forward Plan. In Vermont there have been more than 150,000 cases and 900 deaths due to COVID-19.

Other vector-borne diseases continue to pose a significant and growing threat. Vermont, ranked highest in the United States for Lyme disease incidence in 2019 and is often at or near the top of incident rankings. Lyme disease cases have been tracked by the Vermont Department of health for several decades, though not at the town-level. Habitat shifts and changes in climate continue to create favorable conditions for pathogen-carrying ticks to proliferate. Other insect-borne diseases have also been present: West Nile Virus was confirmed in mosquito populations in Vergennes and New Haven in August and September, 2023.

Other vector-borne diseases have been noted recently in and near Monkton. Monkton has had 4 positive cases of rabies from 2005 to 2022, with two raccoons, and two skunks testing positive. A handful of cases have been identified in neighboring Bristol (4), New Haven (9), Ferrisburgh (11), Charlotte (13), and Hinesburg (3) during the same period.

Future Probability:

According to the Centers for Disease Control (CDC), the number of reported cases of vector-borne infectious disease more than tripled between 2004 and 2016 and can be expected to continue rising.

Climate change can increase the range of diseases and their vectors and increase rates of infection. Warmer temperatures allow more diseases and their vectors to expand and establish populations farther north, where harsh winters temperatures previously inhibited expansion.

Perhaps the most significant upward trend in infectious disease cases in Vermont is that of Lyme disease. The Vermont Department of Health reports that the number of reported cases of Lyme disease around the state have increased dramatically over the last decade, and with shortening winters, the potential for infection through tick bites continues to grow. Additionally, Vermont's increase in forest cover could provide a more suitable habitat for ticks and their hosts, which may lead to further spread of Lyme disease.

Projected land use changes are not expected to affect the impact of infectious disease on community assets, but changing demographics may result in faster spread and impacts on vulnerable populations. With increasing trends for global travel and short-term visitors, diseases not previously observed in Vermont may be introduced by infected travelers and spread to the local population.

Vulnerability Summary:

People who are most vulnerable to infectious disease include immunocompromised individuals, elderly and young populations, and healthcare workers. Due to weakened immune systems or compounding factors of other illnesses or stressors these populations are at heightened risk of infection and death. Outdoor laborers and recreationalists are especially vulnerable to mosquito-vector transmission and tick bites that may cause Lyme disease.

Infectious Disease Outbreak events are considered a **HIGH PRIORITY** Town of Monkton, with an overall vulnerability score of 5.25 determined.

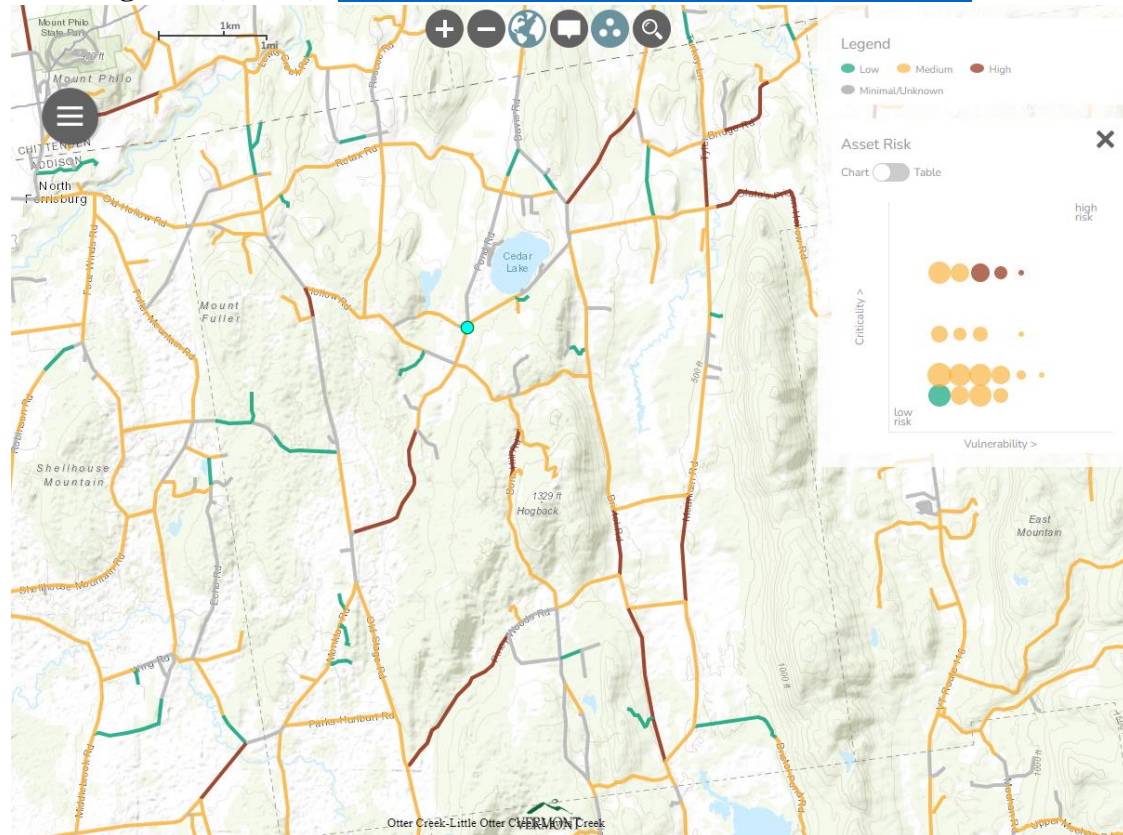
4.3.10 Flash Flooding & Fluvial Erosion (Vulnerability Score: 5.25)

Location:

The generally gentle topography of the Town of Monkton, does not lend itself to widespread high velocity flood events common to fluvial erosion events. Previous plans have identified several vulnerable areas where roadways cross streams, including along Pond Brook-Church Rd., Mountain Road, and Hollow Road.

The statewide Transportation Resilience Planning Tool (TRPT) identifies Piney Woods Road, Tyler Bridge Rd, State's Prison Hollow Rd, Silver Street, Bristol Road and Mountain Road along Pond Brook, parts of Boro Hill Road as highly vulnerable and critical. In 2019, many of these roadways and the culverts along them were damaged by flooding.

Figure 1. Monkton Infrastructure Asset Risk from the Vermont Transportation Resilience Planning Tool (TRPT) (<https://roadfloodresilience.vermont.gov/#/map>)



Beaver dams located at the outlet of Bristol Pond may have the potential to break and created downstream flooding issues. These are covered in more detail in section 4.3.12.

Extent:

Summer downpours and remnants of tropical storms can have the effect of concentrating flood waters into small and narrow areas, particularly in steeper geographic regions.

Monkton may also be affected indirectly by flash flooding in nearby areas, as the closing of either Route #7 or Route #116 (as happened in 1998 when a flood took out bridges in Bristol) may result in an inordinate amount of traffic being directed onto Monkton’s road system.

Previous Occurrences:

According to NOAA statistics, the Addison Region has experienced more than 45 flash flood events over the past 25 years. These generally occur in the summer months due to intense rainstorms, but they can occur in other seasons as well.

Figure 1. NOAA recorded flash flood events by month of occurrence

| | January | February | March | April | May | June | July | August | September | October | November | December |
|-------------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|
| Flash Flood | 2 | 1 | 1 | 2 | 7 | 10 | 13 | 7 | 0 | 2 | 1 | 1 |

The highest record of private property damage in Monkton was \$10,000 on June 30, 2020. During the late afternoon of June 30th, thunderstorms back-built in the Hinesburg, Monkton, Starksboro area quickly producing 4+ inches of rainfall within two hours. This led to some localized flash flooding, especially gravel roads in the area. Flooded roads and partial gravel road washouts along State Prison Road in Starksboro and Monkton as well as water lapping several roads in the neighboring vicinity.

The Halloween storm of October 31-November 1, 2019 brought more than 3 inches of rain and gusting southwest winds that caused flooding and power outages across the region. In Monkton, flooding damaged culverts and covered roadways along Hollow Road, Piney Woods, Rotax Road, and Old Stage Road.



Figure 2. Flooding along Hollow Road, Monkton, VT in November 2019

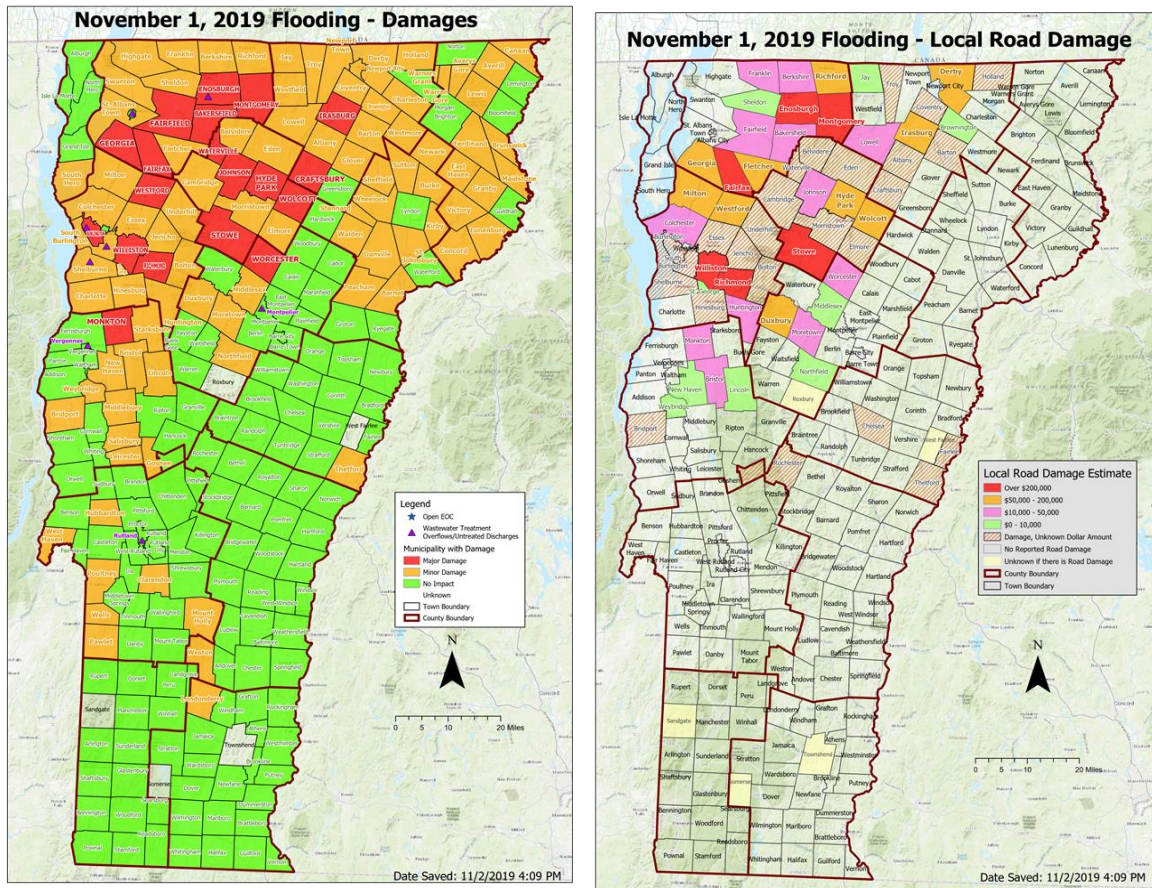


Figure 3. Overall Damages and Local Road Damages statewide from Nov. 1, 2019 Flooding

Future Probability:

Changes in climate are expected to increase the probability of large rainfall events and rapid snow melt that may have increasing impacts on community assets. In Vermont, average annual precipitation has increased by almost 7 inches over the past 50 years. The northeastern United States is projected to experience above average precipitation in the winter and spring, with even wetter conditions expected under a high greenhouse gas emissions scenario, and is also projected to experience more frequent, heavier rainfall events. These anticipated increases in both frequency and magnitude of precipitation in Vermont are expected to lead to alterations of hydrology and increased flash flooding events and fluvial erosion. Increasing development in Monkton, can be expected to affect the impact of flash flood events on vulnerable populations.

Vulnerability:

Flash flooding is an increasing concern for residents of the Town of Monkton. The extensive area conducive to flash flooding and expense of infrastructure repairs make the community relatively vulnerable to large scale damages caused by flash flooding. Flash Flooding & Fluvial Erosion events are considered a **HIGH PRIORITY** for the Town of Monkton, with an overall vulnerability score of 5.25 determined.

4.3.11 Lightning Storm (Vulnerability Score: 3.50)

Location:

Severe storms which include lightning along with wind and rain events are a common occurrence in Monkton during summer months. While unpredictable, lightning tends to be drawn to exposed areas of higher elevation or where there are sudden increases in elevation. Areas where elevation and ledge have resulted in more frequent lightning strikes are located primarily along high ridges like Monkton Ridge where the village area is located.

Lightning fatalities are most commonly associated with water-related activities such as fishing, boating, and swimming. Given the popularity of Monkton's Cedar Lake, victims are most likely to be recreationists located on the water.

Extent:

Lightning strikes in western Addison County, Vermont average between 4-6 strikes per square kilometer each year based on data collected by NASA satellites between 1995 and 2002. Within the Town of Monkton, these numbers would extrapolate into between 225 and 350 lightning strikes per year. Another common strike location is at a power line transformer.

Lightning strikes routinely cause fires to trees along ridge tops in Vermont and less commonly start fires in structures. Fires associated with lightning strikes to inhabited buildings occur fewer than once every five years on average. More common is loss of power and damage to electronic equipment in homes where there has been a proximity strike. Anecdotally, there are multiple reports each year of electronic equipment unprotected by surge suppressors which are damaged by lightning strikes. Generally, these homeowners file insurance claims for damages and total annual damages in the entire community likely do not exceed \$10,000.

Previous Occurrences:

Relatively little information has been recorded of recent significant lightning strikes. Statewide, the National Lightning Safety Institute recorded 3 known fatalities due to lightning in the period from 1990-2003.

A 2008 fire that resulted from a lightning strike resulted in the death of an individual and necessitated a response from fire crews of Monkton, Bristol, Hinesburg and Starksboro. The State Police Fire Investigation Unit determined that lightning struck the back side of the house, setting it ablaze. Given the estimated numbers of lightning strikes in Monkton, it is certain that there have been strikes on homes and barns resulting in fires.

Future Probability:

It is unlikely that lightning strikes will be reduced over the next few decades. However, if predicted increases in storm numbers and severity are true, increased numbers of lightning strikes would be expected. The effect of strikes may be mitigated by the use of fire-resistant materials in new construction. Changes in climate are expected to slightly increase the probability of Lightning Strikes, but projected land use and population changes are not expected to affect their impact on community assets or vulnerable populations.

Vulnerability Summary:

Monkton's susceptibility to lightning strike seems to be relatively limited. While historically, buildings may have been protected from lightning-caused fires by a lightning rod system, these have fallen out of favor in recent years. During that same time period, an increase in fire protection capability has allowed the community to keep their perceived risk at a constant level.

The highest risk area for lightning strikes with the highest resultant damage to the public infrastructure is where public buildings are scattered along Monkton Ridge in the traditional village center. Loss, due to fire caused by lightning or electrical surge could be quite disruptive to the community if it were to strike either the Town Hall or church located in this area.

Lightning Storm events are considered a **MODERATE PRIORITY** for the Town of Monkton, with an overall vulnerability score of 3.50 determined.

4.3.12 Dam Failure (Vulnerability Score: 3.50)

Location

There are no High Hazard Potential Dams located within the municipal limits of Monkton. The Kaolin Dam next to Hardscrabble Road is classified as having low hazard potential. The Bristol Pond dam built in 1969 is also classified as having low hazard potential. Wetlands are located downstream from both dams.

The Hazard Mitigation Committee identified concerns about shifting beaver dams on streams near roads. Beavers pose a problem for the town's highway department, as the dams they create can plug culvert pipes and lead to flooding, primarily at the western end of Hollow Road after a device installed by the state failed.

Extent

There have been no known dam failures in Monkton, or significant damage due to beaver dams.

Previous Occurrences:

Beaver dams have caused over-the-road flooding at the western end of Hollow Road. In the past, Monkton's highway department has worked with the Vermont Fish & Wildlife Department to trap beavers but has recently tried first to use nonlethal methods to address beaver concerns.

Future Probability:

Changes in climate, land use, and population are not expected to increase the probability of Dam Failure or affect their impact on community assets or the population. Town residents have formed a volunteer committee to explore nonlethal ways to deal with beavers when their woody waterwork creates problems for homeowners, farmers or road crews. The Cedar Lake Association has successfully implemented Beaver Deceiver Water Flow Device to reduce beaver-caused flooding at Cedar Lake-Monkton Pond.

Vulnerability:

Dam Failure events are considered a **MODERATE PRIORITY** for the Town of Monkton, with an overall vulnerability score of 3.50 determined.

4.3.13 Wildfire (Vulnerability Score: 3.50)

Location:

Severe wildfires are uncommon throughout Vermont, but minor fires are regular occurrences and could conceivably occur in any part of Monkton. Un-mowed field edges and grass or shrub vegetation are the most likely locations for fires to start.

Extent:

A Wildfire is the uncontrolled burning of woodlands, brush, or grasslands. These do not generally include Prescribed Fires that are intentionally set to burn for beneficial purposes. Monkton's climate, vegetation types, and landscape discourage major wildfires. Wildfire conditions 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. The majority of fires in Vermont are caused by burning debris, though they can be a result of naturally occurring influences such as lightning, and exacerbated by drought and extreme heat. Open burning of natural and untreated wood, brush, weeds, or grass requires a 'Permit to Kindle Fire' from the Town Forest Fire Warden. When there is significant fire danger, open burns are banned entirely.

Previous Occurrences:

There has not been a major wildfire in Monkton or all of Vermont in the last 50 years. Most wildland fires occurring in vegetation or natural fuels in Vermont are quickly reported and contained. The Town Forest Fire Warden issues permits and local fire departments respond for wildland fire control with mutual aid assistance from other towns and the State, when necessary.

The greatest impacts to communities from wildfires are smoke from wildfires in Canada and the western United States. In 2023, Monkton and much of Vermont experienced substantial impacts from Canadian wildfire smoke from June 5 to 8. The entire state experienced poor air quality, with records for highest ever 24-hour average concentration of fine particulate matter (PM_{2.5}, µg/m³), broken several times over multiple days and far exceeding the previous records. Air quality was worst in the south and west of Vermont, with the Air Quality Index exceeding 400 in some locations, considered "hazardous" for all populations, resulting in cancellations of outdoor activities and widespread distribution on N95 masks to the public.

Future Probability:

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. Unhealthy wildfire smoke from out-of-state wildfires is also expected to affect Vermont more frequently and severely in the future, as climate change is already increasing wildfire risks in the western United States and Canada. Changes in climate are expected to significantly increase the probability of Wildfire events, if not in Monkton, then in forested areas affecting atmospheric conditions. Local land use changes are not expected to significantly affect their impact on community assets, but changing population demographics, especially aging populations, may create more vulnerability and compounding factors. For instance, older residents may have more breathing issues, or experience more social isolation

Vulnerability Summary

Populations that are more vulnerable to wildfire include firefighters, isolated residents, and immunocompromised individuals. The community vulnerability rating for a Wildfire is 3.50 and is considered a **MODERATE PRIORITY**.

4.3.14 Drought (Vulnerability Score: 3.50)

Location

Drought is an inherent, cyclical component of natural climatic variability and can occur at any place at any time. They are often spread over a larger geographic area than other natural hazards, with gradation of impacts that are not as obvious as other hazards. Significant droughts would affect the entirety of the municipality of Monkton, as well as adjoining municipalities and likely extending to other counties and states during the same event.

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. Droughts are rated in classifications from D0–D4, depending on the severity of the drought, the amount of time it will take for vegetation to return to normal levels, and the possible effects of the drought on vegetation and water supply. High winds, low humidity, and extreme temperatures can all amplify the severity of a drought.

| 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: <http://droughtmonitor.unl.edu/AboutUSDM/DroughtClassification.aspx>

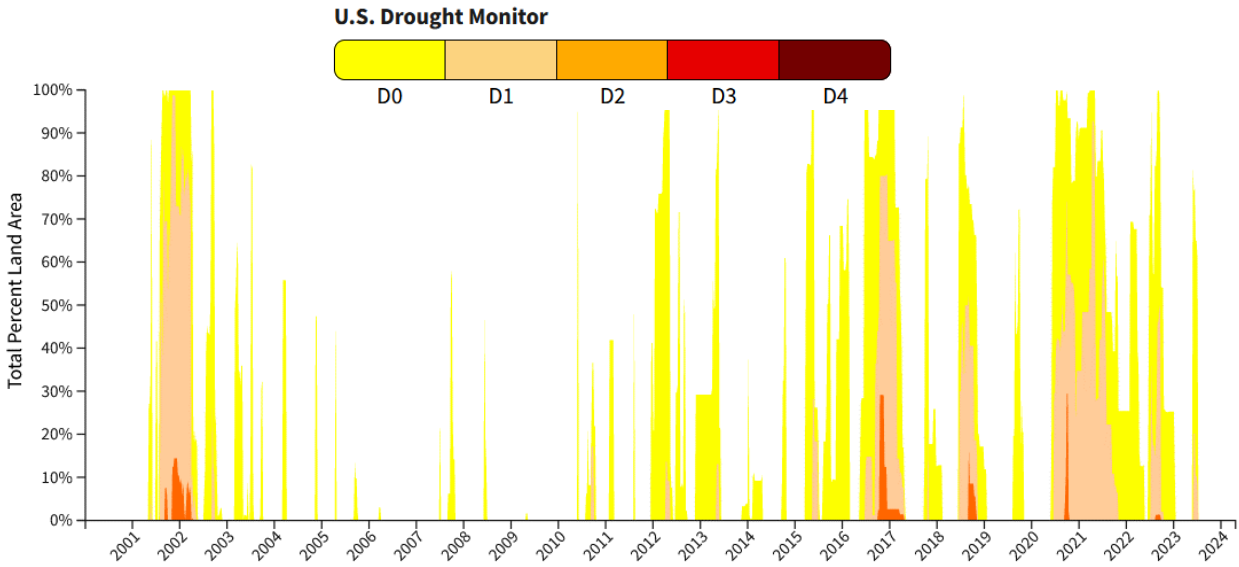
The impacts of drought are typically felt by rural residents in areas like Monkton first. Drought can cause extensive damage to gardens, agricultural crops and livestock. Drought can also lead to dry or low water levels in wells needed for drinking water. and can also concentrate water contaminate levels and lead to resulting in potential health concerns.

Soil moisture, streams, and groundwater are all depleted due to drought. Drought depletes water availability for both cultivated and wild plants and animals. Lack of rain combined with high temperatures can lead to significant crop loss.

As a result, the economic effects of a drought can be just as devastating as any other natural hazards.

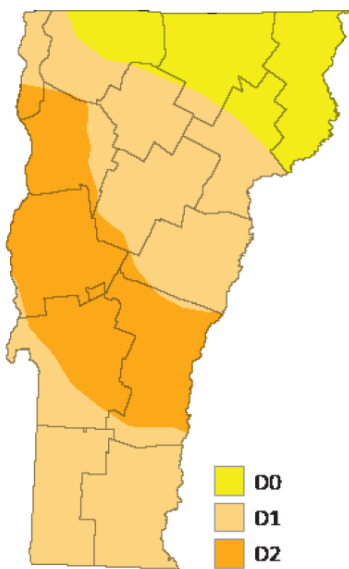
Previous Occurrences

Droughts, while low frequency hazards, are of serious concern to the population of Vermont. It is often difficult to recognize the onset of a drought during its preliminary stages. Since 2000, drought conditions measured by intensity indices have periodically surged in Vermont.



Source: <https://www.drought.gov/states/vermont#historical-conditions>

Beginning in 2001, New England experienced historic drought conditions not seen since the 1960s. In 2001-2002, large parts of Vermont were affected by a Severe Drought (D2), but Monkton and the Champlain Valley were judged to have only reached Abnormally Dry (D0) conditions.



A series of drought conditions have affected portions of Vermont nearly annually over the past decade. Parts of central Vermont were in Severe Drought (D2) from October 2016 through April 2017, peaking in October and November 2016. At least 80% of the State was in at least Moderate Drought (D1), including all of Monkton and Addison County reaching Severe Drought (D2) (Figure). Moderate Drought conditions returned in October of 2017 and again in June 2018.

Since 2018 there have been three Severe Droughts, more than the previous two decades combined. From September to November of 2018 the State experienced another Severe Drought. Then from June 2020 to October 2021 much of the State was under Moderate Drought to Abnormally Dry conditions. From September to October of 2020 29.4% of the State was under Severe Drought conditions.

Figure 1. Map of abnormally dry (D0) to severe drought (D2) during significant 2016 drought period in Vermont
(Source: <https://www.drought.gov/drought/states/vermont>)

Future Probability

Relative to other regions of the country, severe droughts are not frequent occurrences in Vermont. However, changes in climate are expected to significantly increase the probability Drought events. Both wet and dry extremes are expected to increase over time across the state: Vermont's precipitation trend is an on upward trajectory, having seen increases in average annual precipitation of 7.5 inches since 1900. At the same time Vermont is seeing an increase in average annual maximum and minimum temperature, which is contributing to an increased likelihood of drought. Higher temperatures lead to increased rates of evaporation, combined with dry periods between intense precipitation events will lead to increased dry conditions.

Land use changes are not expected to significantly affect the impact of droughts on community assets, but changing demographics, especially isolated or aging populations, may increase vulnerability. For instance, isolated residents may be unable to obtain drinking water.

Vulnerability Summary

The community vulnerability rating for a Drought is 3.50 and is considered a **MODERATE PRIORITY**.

4.3.15 Inundation Flooding (Vulnerability Score: 3.00)

Location

The 1% annual chance of flooding Special Flood Hazard Area (aka 100-year floodplain) identified by FEMA is primarily along the north-south running valleys of Monkton and the edge of Cedar Lake. Much of the mapped floodplain is associated with large areas of wetlands

Extent

The Town has been a participating member of the National Flood Insurance Program since 1985 and as such, has adopted zoning by-laws designating Flood Hazard Areas including associated regulations for administering those areas. The most current floodplain maps were adopted 11/1/1985 and are available on paper copy and unofficial digitized versions. The availability of alternate sites and the adoption of flood hazard regulations have thus far discouraged development along these low-lying areas due to difficulties in disposing of septage and the costs of complying with floodplain regulations. There are no “repetitive loss” or “severe repetitive loss” properties.

Previous Occurrences

Minor inundation flooding has occurred around Monkton Pond-Cedar Lake, most recently in



March-April, 2020, when the water level in Cedar Lake-Monkton Pond rose to 2 feet higher than normal and caused flooding on the properties surrounding the pond. The historically high water level was due to beaver dams which were breached. Later in 2020, a “beaver deceiver” water flow device was installed with private funding from the Cedar Lake Association.

Future Probability

Flood hazard areas for Monkton and all of Addison County are currently being updated by USGS for FEMA and are expected to be finalized by 2027. The Zoning Administrator implements the substantial improvement/substantial damage provisions of the town’s floodplain management regulations by prohibiting substantial improvement and post-event repairs that will result in any increase in flood levels. All new construction and substantial improvements require the granting of a conditional use permit. Changes in climate and high rainfall events may increase the probability of inundation flooding events, but land use and development changes are not expected to affect their impact on community assets or vulnerable populations.

Vulnerability Summary

The community vulnerability rating for Inundation Flooding is 3.00 and is considered a **MODERATE PRIORITY**.

4.4 Downgraded Hazards from previous Hazard Mitigation Plan

Earthquake

All of Vermont and New England is classified as an area with “moderate” seismic activity. Several seismic centers and events have been projected to have a <2% chance of affecting Addison County in the next 50 years, including:

- The Middlebury Once-in-500-year earthquake (5.7 magnitude)
- The Goodnow, NY Once-in-500-year earthquake (6.6 magnitude)
- The Montreal, Quebec (6.8 magnitude) Once-in-500-year earthquake
- Tamworth, NH (6.2 magnitude) Once-in-500-year earthquake

These are all predicted to have low to moderate damage to buildings, transportation and utility systems, but minimal casualties and economic loss. The Monkton Hazard Mitigation Committee and Residents of the community do not generally consider earthquake to be a high enough risk to require preparing for one beyond providing information to local residents.

Ice Jam

Severe ice jams causing flooding do not occur in the Town of Monkton. Ice formation in culverts can cause spring runoff to flood over the tops of low lying and wooded stretches of town highways. These are closed for a few days until warm weather melts the plugged culverts. The Town believes its current program of upgrading culverts and bridges as they are replaced will mitigate much of the Ice Jam issues in town.

5. Community Mitigation Strategies
5.1 Hazard Mitigation Goals by Hazard Type

Requirement 44 CFR § 201.6(c)(3)(i)
(Goals to reduce vulnerability to Hazards)

The Town of Monkton has identified that its goals for hazard mitigation are to reduce vulnerabilities to the hazards identified in section 4.3 and mitigate their potential harmful effects. In doing so, it also recognizes that political will and lack of funding stand in the way of many mitigation projects. The town particularly supports local residents’ efforts to mitigate their personal risks. The Town also supports projects that lead to a positive benefit vs. cost evaluation and which the voters can afford.

| Identified Hazard | Primary Mitigation Goal |
|----------------------------------|--|
| Ice Storm | Ensure that essential services can function during disaster |
| Severe Heat | Protect the health and safety of the public |
| Invasive Species | Reduce impacts to residents and local industry and provide for the outdoor recreational safety of the public |
| Structure Fire | Protect the health and safety of the public |
| Highway Accident | Ensure that highway improvements result in safer conditions |
| Severe Snow Storm | Ensure that essential services can function during disaster |
| Severe Cold | Protect the health and safety of the public |
| High Winds | Ensure that essential services can function during disaster |
| Infectious Disease Outbreak | Protect the health and safety of the public |
| Flash Flooding & Fluvial Erosion | Protect the safety of the public, properties and public infrastructure |
| Lightning Storm | Protect the health and safety of residents and critical infrastructure. |
| Dam Failure | Protect the health and safety of residents and critical infrastructure. |
| Wildfire | Protect the health and safety of residents, first responders, and critical infrastructure. |
| Insect-Borne Illness | Protect the health and safety of the public. |
| Drought | Protect the health and safety of residents and reduce impacts to agricultural operations. |

5.2 Authorities, Policies, Programs, Resources

5.2.1. Authorities of Town Officials:

**Requirement 44 CFR § 201.6(c)(3)
(Existing capabilities and ability to expand)**

Selectboard: The Selectboard is responsible for

the basic administration of the town. They take care of roads, make appointments to other boards and commissions, and authorize expenditures of voted budgets. The selectboard may enact ordinances and rules in many areas including traffic regulation, regulating nuisances, managing solid waste, dogs and recreation, and establishing bike paths.

Planning Commission: The Planning Commission is responsible for long range planning in a town particularly as it relates to future land uses and resilience. They prepare a municipal plan and zoning bylaws which are adopted by the Selectboard and Town by Australian ballot. Planning Commission members are elected by the Town.

Conservation Commission: The Town Conservation Commission is responsible for inventories of the natural resources of a town and making recommendations to the Planning Commission related to conserving them. Conservation Commission members are appointed by the Selectboard.

Zoning Administrator: The Zoning Administrator (ZA) is appointed by the town's Selectboard with consideration given to the recommendation of the planning commission. Their responsibilities include administration and enforcement of a town's zoning bylaws. The ZA also serves as the administrator of town floodplain regulations.

Tree Warden: The Town Tree Warden is responsible for the shade and ornamental trees within the town rights-of-way. They oversee tree health and removal when necessary. The tree warden is appointed by the Selectboard.

Fire Warden: The Town Forest Fire Warden has the responsibility for suppression of wildland fires, regulating open burning in the town by issuing burn permits, and wildfire education/prevention. The Town Fire Warden is appointed by the state Commissioner of Forests, Parks and Recreation with approval by the town's Selectboard.

Health Officer: The Town Health may make and enforce rules and regulations...relating to the prevention, removal, or destruction of public health hazards and the mitigation of public health risks. The Town Health Officer is appointed by the Commissioner of Health with approval by the local Selectboard. They take direction from the state Department of Health in investigation and enforcement of public health issues.

Emergency Manager or Coordinator: The Selectboard chair is the town's emergency management director (EMD) unless one is appointed. Many communities retain the authorities of an EMD within the Selectboard and appoint an emergency coordinator instead. The emergency manager is responsible for the organization, administration and operation of the local emergency management organization. Emergency managers prepare local emergency operations plans, coordinate a local emergency management group and perform emergency management functions at the local level.

5.2.2. Current policies, programs, resources

These may be expanded on for the following identified hazards:

Ice Storm

Many private residences have back-up power sources and essential Town facilities like the Fire Station and Town Garage have been retrofitted in recent years.

As population growth and housing expands along remote road corridors, increasing reliance on dependable power by the new homeowners requires changes in line maintenance. Green Mountain Power (GMP), the utility servicing the Town of Monkton, has an ongoing program of line clearing and relocation to ensure outages are kept to a minimum. In addition, recent improvements to the transmission system in northwest Vermont have provided redundant systems to bring electric power to the region.

The Town of Monkton supports continued development of a robust and redundant local electric generation and transmission system for its residents. This support is limited to that which can prove that the benefit to local residents outweighs the societal costs associated with industrial generation and transmission degradation of the local landscape.

The ability to expand on the town's activities is directly related to the availability of funds. It is also possible to require back-up power sources by ordinance though support for this type of action is practically non-existent.

Highway Accidents

A representative from the town sits on the local Transportation Advisory Committee (TAC), a regional group whose purpose is to prioritize potential transportation related projects within the region. This group rates high crash locations highly in prioritizing projects to mitigate the risks associated with these locations by changing alignments, added signage and reduced speeds.

Monkton has been the recipient of grant funding in the past to evaluate traffic calming strategies through Monkton Ridge and Monkton Boro. The 1997 Traffic Calming and Non-vehicular Routes for 5 Addison County Towns made recommendations for actions the Town could take to reduce speeds and address dangerous intersections. Some of which have been implemented by the community.

The community is also a participant in the VTrans High Risk Rural Roads program, currently addressing signage on Boro Hill Road.

The Town's ability to more actively mitigate highway accidents is limited. One area where activities that would mitigate some accident risks have been defined is in the traffic calming study of 1997. At the time of its release, some recommendations in the study were considered to be too radical for the then sleepy hamlets. While some basic changes were made to limit speeds, the populace opposed the more major changes involving rehabilitation of intersections and speed humps.

Structure Fire

Installation of dry hydrants at water supply locations can increase the availability of and speed in which water can be accessed for firefighting purposes. The Town of Monkton supports installation of these hydrants as funding permits and suitable locations can be identified.

The ability to increase fire resistance in new construction is technically feasible at this time. The wholesale lack of building codes in residential construction has a long history in Vermont as only a few communities have adopted any codes. It is within the ability of the town planning commission and Selectboard to adopt national codes but the political will to do so is nonexistent in the local populace.

Actions identified under the Drought hazard would also mitigate structure fire and wildfire risk in future developments.

Severe Snow Storm

Mitigation activities by power companies have re-routed many of the remote lines along town highways since a 1998 ice storm and an increased pruning effort has reduced the impact of a wind driven blizzard event would it happen today.

The Town of Monkton generally mitigates its severe snow storm risk through preparedness activities in the form of appropriately sized equipment and training. The periodic cutting of brush along town highways also mitigates the effects of large snow events by reducing their ability to act as snow fence dropping windblown snow into the town highway system.

All improvements to the road system take into account ease of snow removal in design.

As identified in the structure fire section above, building codes requiring roof design that will support a heavy snow load could be legislated at the local level. While possible, this approach is politically unfeasible in communities such as Monkton which have never had building codes.

Wildfire

Monkton has an active fire warden who requires permits prior to any outdoor burning in the town. This process includes a site visit at the proposed burn site and a subsequent issuance of a permit. Enforcement is usually limited to a warning if the fire seems lit out of ignorance and can result in fines if the fire department is called out.

The town has no guidelines for home construction in place that would limit the risk to wildfire in Monkton. Actions taken as described above, serve to limit the setting of uncontrolled outdoor fires and result in an overall limited risk. In addition, fire ponds required as an impact assessment should mitigate wildfire fire risk in future developments.

If the support is present, fire ponds required as part of overall development design could also be required to be built with dry hydrants in place.

Earthquake

Despite the probability of an earthquake within the next 50 years, most town residents do not even attempt to mitigate its hazard.

The Town of Monkton has also not historically identified earthquake as a hazard it feels is imminent enough to justify much in the way of mitigation actions. However, safety reviews of the school and town buildings are possible including identification of hazards which might be associated with earthquake risk.

Extreme Temperatures

The Town of Monkton currently does little in the way of mitigating the effects of extreme temperatures on town residents. The Town Service Officer does keep a list of vulnerable residents (primarily elderly) that could be used to identify those who may be at greatest risk to extreme temperatures.

As extreme temperatures become more common in the community, additional outreach activities could be undertaken to identify vulnerable populations and a “check your neighbor” program could be implemented. While warming shelter operation is possible during cold snaps, cooling shelters are less available, especially for overnight care. The town fire station, which serves as the primary shelter facility, has no way to provide cooling. Only the Town Hall and Library are air-conditioned and neither have a full kitchen or cots for people to sleep on. Town officials are currently working on acquiring grant funding to install a heat pump at the fire station to add capability.

Ice Jam

The Town of Monkton does not specifically address ice jams as hazards that are being mitigated. Ice jam hazards, however, are slowly being removed due to flood mitigation actions which are increasing the size of culverts townwide. The future replacement of the Lime Kiln Road and Tyler Bridge Road bridges will be constructed to pass bank-full width stormwaters and as an added benefit, will also reduce ice jam risks at those locations.

High Winds

Residents of the Town generally do not recognize high wind as a hazard which can be mitigated with the exception of the effects previously discussed under Ice Storm risks. Newly constructed buildings may have tie downs between roof and side walls but no building codes exist within the community that require construction to any particular standard.

Where high wind hazards have been recognized, it is usually a function of damage that might be caused if a tree were to be blown over and its effect on a residents’ home. For this reason, some trees are removed from the landscape to reduce their vulnerability to high wind events. The Town of Monkton supports removal of dead and hazardous trees in the town rights-of-way to mitigate the hazards associated with their falling either on town highways or on power lines.

Since the vulnerabilities associated with High Winds are, in many cases, the same as for an Ice Storm, similar actions could be taken as well as adoption of building codes which would require roof tie downs. The ability to take some of these actions does exist but the political will is virtually nonexistent.

Tornado

As in the case of High Winds, most residents of Monkton do not recognize Tornado as a hazard they must mitigate. The Town government also does not intentionally mitigate for tornado. Fortunately, much of what is being done to address high wind events is the same as would be viable for Tornadoes.

In general, removal of weak trees is the primary action which will help mitigate some of the damages that would be expected from a tornado. The town also has the ability to raise the residents level of awareness through education by supplying informative material to its residents. As has been identified in other vulnerabilities, the lack of any standard building codes contribute to the risks associated with Tornadoes but the desire for adoption of such standards does not exist. The community feels the added security that would be the result of stringent building codes is not significant enough to remove the “right to build as I please” from residents bundle of property rights.

Drought

Most homeowners with shallow wells have learned to live with the inconvenience of dry spells by purchasing bottled water and using public toilets and laundries for the short periods they would be without a dependable water supply. When the inconvenience has become too much, many of these homeowners have mitigated the problem by drilling deep wells. Increasingly, home mortgages are requiring a dependable deep well water supply as a condition of a loan.

Recent work by citizen volunteers, supported by the town and the State Geologist has confirmed and vetted information on existing private wells in town. Analysis of this confirmed data will potentially assist in identification of underground aquifers which could be tapped during drought conditions.

Agricultural activities highly dependent on water such as fruit and vegetable crops can be severely impacted by lack of rain. Most of these businesses have mitigated the effects of periodic droughts by providing irrigation systems. Other farms, dependent on crops to feed livestock rather than humans, are highly impacted by low water supplies and may be dependent on a USDA disaster declaration to find relief.

Reduced water supplies also impact the community’s fire fighting capabilities. Since no public water supply is available, the contract fire department is highly dependent on surface water supplies for fire fighting. The Monkton Volunteer Fire Department is active in installing dry hydrants in deep water ponds and streams to make access to water easier within the Town. As housing continues to expand into rural areas, the potential lack of a dependable water supply for fighting fire is becoming an issue.

As a mitigation measure shared with structure fire and wildfire, future development may need to be required to provide fire ponds as part of an impact assessment. Monkton's current subdivision regulations call for "adequate" water supply to be provided for any subdivision.

Invasive Species (Insects, Plants)

The Town of Monkton has an active tree warden appointed annually to oversee the publicly owned trees located in the Town's right-of-way. Unhealthy or hazardous trees are removed on a regular basis. Careful watch of these trees may indicate the presence of Emerald Ash Borer, Asian Long-horned Beetle or others. Any drastic increase in tree deaths due to invasives may need to be budgeted for separately from the highway budget should the need arise.

Biting insects and the diseases they carry are not currently officially addressed by the Town of Monkton which has a high percentage of its land mass in frequently flooded soils and abandoned farmlands. These lands are home to insects, some of which also carry arboviruses. In other parts of the state where the disease risk is higher, towns have joined together to create insect control districts which primarily spray for mosquitoes as a nuisance. The ability to join or create such a district with shared spray costs is possible should these hazards rise in priority.

Roadside invasive plants are spreading rapidly throughout town. The Town currently does not address this spread through use of recommended roadside mowing schedules. This seems to be the best treatment known at this point short of an active herbicide spray program to rid or reduce the spread of these plants.

Active programs to combat the impacts of these species are a possibility though the benefit vs. cost equation is often unjustified.

5.3 Project Prioritization Process

**Requirement 44 CFR § 201.6(c)(3)(ii)
(Prioritization, Implementation, Administration)**

Projects and actions included in Section 5.2 are conducted by the Town of Monkton, or regional and State agencies where noted. The Town encourages its residents to adopt mitigation actions which could protect their personal property by making educational materials available to residents. Mitigation actions identified in Section 5.4, are considered the jurisdiction's priority mitigation actions.

The Town has established the following priorities for choosing mitigation projects: Life safety and the safety of its residents, keeping local roads and bridges open to ensure access for emergency vehicles, and protecting critical infrastructure facilities in the town. These actions/projects are constantly evaluated for benefit to the community, estimated project cost and political will to implement and will be implemented as those factors indicate. Several mitigation projects have been completed in the past five years, and additional work is underway.

The actions identified in Section 5.4 under each hazard have passed a preliminary evaluation utilizing those general concepts by the hazard mitigation committee, and are listed in their order of priority. Before undertaking these projects, they will additionally be prioritized based on their feasibility and a benefit vs. cost review. A minimum C/B result of 1.0 will be required prior to any request for federal mitigation funds. All projects in section 5.4 will be reviewed for progress following any local disaster declaration and will be considered annually as part of overall town budgeting.

5.4 Proposed Mitigation Actions by Hazard Type

Requirement 44 CFR § 201.6(c)(d)(3)
(Revisions due to priorities changes)
Requirement 44 CFR § 201.6(c)(3)(ii)
(Range of actions and projects considered)

The following list of proposed mitigation actions and projects was revised from the previous plan due to changes in community priorities. The Hazards Committee identified a comprehensive range of specific mitigation actions from the previous Hazard Mitigation Plan, the State Hazard Mitigation Plan, and the goals and actions of neighboring municipalities, and analyzed each. Projects were considered to reduce the effects of each priority hazard, with emphasis on human life and safety as well as consideration of the new and existing buildings and infrastructure.

The final list includes only those projects which could be considered reasonable and feasible based on cost and political willingness. The town will maximize 406 mitigation opportunities whenever possible when making repairs to Public Assistance eligible damages during a declared disaster.

Each project in this action plan includes an estimated cost, possible funding sources, potential benefits, the lead person or agency responsible for completion of the project and an estimated start and end timeframe for project completion. Timeframes are an estimate only and are dependent upon funding and the political will to complete.

Requirement 44 CFR § 201.6(c)(3)(ii)
(Actions for each identified hazard)
Requirement 44 CFR § 201.6(c)(3)(iii)
(Responsible position, potential funding, expected time frame)

5.4.1. Severe Ice Storm

Provide online and social media materials to educate community on preparation, warning, and places to go during ice storm.

Estimated cost to Town: None to Town

Source of funds: ACRPC through website: <https://acrpc.org/regional-programs/emergency-management/emergency-preparedness/hazard-mitigation-and-preparation/>

Responsibility: Emergency Management Director

Timeframe: Late Fall and Winters 2024-2029

Benefits: Centralized, updated information

Verify that all town shelter possibilities (Fire station, town hall, school) have appropriate back up power and facilities for housing residents overnight.

Estimated cost to Town: None to Town

Source of funds:

Responsibility: Emergency Management Director, Fire Department, MAUSD facilities staff

Timeframe:

Benefits:

Remove dead and dying trees from rights-of-way. Grant access to utility companies for Right of Way maintenance and tree removal purposes, with due consideration for maintaining scenic corridors beauty of tree-lined streets and roads.

Estimated cost to Town: Portion of Town Highway budget

Source of funds: Town Budget

Responsibility: Town Select Board, GMP and Town tree warden

Timeframe: Ongoing, 2024-2029

Benefits: Reduce tree limb falls and power outages due to ice

5.4.2. Severe Heat

Determine and implement cooling options at town shelters, e.g. Heat pumps for cooling of fire station.

Estimated cost to Town: \$5,000-\$10,000

Source of funds: Grant funding

Responsibility: Planning Commission, Emergency Management Director

Timeframe: 2025-2026

Benefits: Provide overnight cooling shelter for town residents.

Educate community on shelters during periods of extreme heat.

Estimated cost to Town: None to Town

Source of funds: ACRPC through website: <https://acrpc.org/regional-programs/emergency-management/emergency-preparedness/hazard-mitigation-and-preparation/>

Responsibility: Emergency Management Director

Timeframe: Late Fall and Winters 2024-2029

Benefits: Centralized, updated information

Develop and support neighbor-networks to check on each other

Estimated cost to Town: None to Town

Source of funds: N/A

Responsibility: Town Service Officer

Timeframe: 2025-2026

Benefits: Provide support for vulnerable individuals in times of need.

Develop hot weather emergency plan with clear triggers of what constitutes a heat emergency and expectations for opening shelters

Estimated cost to Town: None to Town

Source of funds: N/A

Responsibility: Emergency Management Director

Timeframe: Spring 2025

Benefits: Provides clear information about when and how to open necessary shelter

5.4.3 Highway Accidents

Maintain County Sheriff's patrols to reduce speeding

Estimated cost to Town: \$27,000

Source of funds: Town Budget

Responsibility: Addison County Sheriff's Department

Timeframe: 2024-2029

Benefits: Reduce potential accidents and hazardous materials spills on main roads

Add additional speed radar signs

Estimated cost to Town: \$10,000

Source of funds: Town Budget

Responsibility: Select Board, Road Crew

Timeframe: 2025-2026

Benefits: Slow traffic on key roads to reduce potential accidents

Maintain fog lines to clarify appropriate routes, install fog lines on two remaining class 3 roads

Estimated cost to Town:

Source of funds: State safety grant

Responsibility: Town Road Crew

Timeframe: 2025

Benefits: Reduce potential accidents

5.4.4. Invasive Species

Continue timely roadside mowing to reduce the spread of wild parsnip

Estimated cost to Town: \$5,000

Source of funds: Town Budget

Responsibility: Town and State road crews

Timeframe: Ongoing, 2024-2029

Benefits: Reduce spread of roadside invasive plants

Support community efforts to eradicate invasive species from community property, lakes, streams.

Estimated cost to Town: None to town

Source of funds: Fundraising and donations

Responsibility: Conservation Commission

Timeframe: Ongoing, 2024-2029

Provide tools that can be borrowed from town for removal of invasive species, and educational materials on safe handling and removal of invasive species.

Estimated cost to Town: None to town

Source of funds: Fundraising and grants

Responsibility: Conservation Commission

Timeframe: Ongoing, 2024-2029

Benefits:

Support State efforts to trap and identify damaging invasive insects

Estimated cost to Town: None to Town

Source of funds: State ANR budget

Responsibility: State of Vermont

Timeframe: Ongoing, 2024-2029

Benefits: Provide awareness of extent of existing and new invasive insects

Support citizen efforts to get training to provide identification surveillance and removal methods

Estimated cost to Town: None to Town

Source of funds: N/A

Responsibility: Conservation Commission

Timeframe: Ongoing, 2024-2029

Benefits:

Monitor aquatic invasives (in Cedar Lake and Lewis Creek)

Estimated cost to Town: None to town

Source of funds: Fundraising and grants

Responsibility: Cedar Lake Association, Lewis Creek Association

Timeframe: Ongoing, 2024-2029

Benefits:

Acquire/build lake barge for suction harvesting of invasive plant materials

Estimated cost to Town: \$15,000-\$20,000

Source of funds: Donations and private fundraising

Implementation Responsibility: Cedar Lake Association

Timeframe: 2025-2026

Benefits:

5.4.5. Structure Fire

Continue installing dry hydrants throughout town

Estimated cost to Town: None to Town

Source of funds: VT Rural Fire Protection Program

Implementation Responsibility: VT Rural Fire Protection Program and Monkton Fire Department

Timeframe: Ongoing, 2024-2029

Benefits: Increase response capability for structure fires

Maintain and upgrade municipal fire trucks and equipment

Estimated cost to Town: \$60,000 annually to operating budget, additional for equipment

Source of funds: Town budget, Fire Department fundraising

Implementation Responsibility: Monkton Fire Department

Timeframe: Ongoing, 2024-2029

Benefits: Maintain preparedness and response to structure fires

Provide education on Fire Safety, fire blankets and testing fire extinguishers annually.

Estimated cost to Town: None to Town

Source of funds: N/A

Implementation Responsibility: Monkton Fire Department

Timeframe: Annually, 2024-2029

Benefits: Reduce occurrence of accidental structure fires

5.4.6. Severe Snow Storm

Manage vegetation in the ROW to minimize/allow space for powerlines

Estimated cost to Town: Portion of Town Highway budget

Source of funds: Town Budget

Responsibility: Town Select Board, GMP and Town tree warden

Timeframe: Ongoing, 2024-2029

Benefits: Reduce tree limb falls and power outages

Provide back-up power for the school and Town Office to allow continued operations,

Estimated cost to Town: \$10,000 - \$15,000

Source of funds: Grants

Responsibility:

Timeframe:

Benefits:

Maintain backup generator at Fire Station

Estimated cost to Town: \$10,000 - \$15,000

Source of funds: Grants

Responsibility: Fire Department, Planning Commission

Timeframe: 2026-2028

Benefits:

5.4.7. Severe Cold

Provide information to private homeowners to be prepared for extreme temperatures,

Estimated cost to Town: None to Town

Source of funds: ACRPC through website: <https://acrpc.org/regional-programs/emergency-management/emergency-preparedness/hazard-mitigation-and-preparation/>

Responsibility: Emergency Management Director

Timeframe: Late Fall and Winters 2024-2029

Benefits: Centralized, updated information

Develop and support neighbor-networks to check on vulnerable residents

Estimated cost to Town: None to Town

Source of funds: N/A

Responsibility: Town Service Officer

Timeframe: 2025-2026

Benefits: Provide support for vulnerable individuals in times of need.

Maintain municipal shelter facilities and coordinate with neighboring towns on providing a regional shelter

Estimated cost to Town: None to Town

Source of funds: Town budget

Responsibility: EMD

Timeframe: Ongoing, 2024-2029

5.4.8. High Winds

Remove dead and dying trees from road and powerline rights-of-way

Estimated cost to Town: Portion of Town Highway budget

Source of funds: Town Budget

Responsibility: Town Select Board, GMP and Town road crew

Timeframe: Ongoing, 2024-2029

Benefits: Reduce tree limb falls and resulting road blockages or power outages

Provide educational materials for individual and construction safety

Estimated cost to Town: None to Town

Source of funds: ACRPC through website: <https://acrpc.org/regional-programs/emergency-management/emergency-preparedness/hazard-mitigation-and-preparation/>

Responsibility: Emergency Management Director

Timeframe: Ongoing, 2024-2029

Benefits: Centralized, updated information

Create a standard process for residents to request assistance due to the impact of high winds and other storms including names, departments, what they can help with and contact information.

Estimated cost to Town: one to Town

Source of funds: NA

Responsibility: EMD, Town Service Officer

Timeframe: 2026

Benefits: Provide information for town residents to receive assistance

5.4.9. Infectious Disease Outbreak

Work with VT Department of Health to disseminate health information and protective supplies.

Estimated cost: Staff wages and benefits for necessary time

Source of funds: N/A

Responsibility: EMD and EMC, Town Office Staff

Timeframe: 2024 - Ongoing as needed

Benefits: Reduce spread of respiratory diseases and increase public health awareness.

Develop and maintain continuity planning and agreements for potential town staff shortages.

Estimated cost: None to Town

Source of funds: N/A

Responsibility: EMD and EMC, Selectboard, Town Office Staff, Highway Department

Timeframe: 2024 - 2025

Benefits: Provide continuity of operations in the event of a pandemic or infectious disease outbreak.

5.4.10. Flash Flooding,

Provide educational materials for individual safety, e.g. Turn Around Don't Drown

Estimated cost to Town: None to Town

Source of funds: ACRPC through website: <https://acrpc.org/regional-programs/emergency-management/emergency-preparedness/hazard-mitigation-and-preparation/>

Responsibility: Emergency Management Director

Timeframe: Ongoing, 2024-2029

Benefits: Centralized, updated information

Replace and upsize failing culverts.

Estimated cost to Town: \$10,000 - \$20,000 annually

Source of funds: Town budget

Responsibility: Town Road Crew

Timeframe: Ongoing, 2024-2029

Benefits: Reduce road washouts from heavy rain events

Maintain road-side drainage ditches

Estimated cost to Town: \$3,000 to \$5,00 for Erosion stone, additional labor

Source of funds: Town budget

Responsibility: Town Road Crew

Timeframe: Ongoing, 2024-2029

Benefits: Reduce road washouts from heavy rain events

Support property buyouts of at-risk properties within at-risk river and stream corridors

Estimated cost to Town: Up to 25% of property value, costs to maintain as open green space in perpetuity

Source of funds: Grant funding

Responsibility: EMD, Select Board

Timeframe: Ongoing, 2024-2029

Benefits: Reduce potential property damage and risk to life.

Support wetland and floodplain restoration projects

Estimated cost to Town: None

Source of funds: Grant funding

Responsibility: Planning Commission, Conservation Commission

Timeframe: Ongoing, 2024-2029

Benefits: Reduce water volume and power during and immediately following storm events

5.4.11. Lightning Storm

Provide educational materials for individual safety

Estimated cost to Town: None to Town

Source of funds: ACRPC through website: <https://acrpc.org/regional-programs/emergency-management/emergency-preparedness/hazard-mitigation-and-preparation/>

Responsibility: Emergency Management Director

Timeframe: Ongoing, 2024-2029

Benefits: Centralized, updated information

5.4.12. Dam Failure

Check status of man-made dams and implement plans to remove or repair failing dams.

Estimated cost to Town: None to Town

Source of funds: State of Vermont, private dam owners

Responsibility: State of Vermont

Timeframe: Ongoing, 2024-2029

Manage beaver dams along roads- utilize beaver deceivers

Estimated cost to Town: \$5,000

Source of funds: Town Budget

Responsibility: Conservation Commission, Town road crew

Timeframe: 2025-2026

5.4.13. Wildfire

Provide emergency shelter or existing N95 masks to help mitigate health impacts.

Estimated cost: None to Town

Source of funds: N/A

Responsibility: EMD

Timeframe: Ongoing, 2024-2029

Benefits: Reduce respiratory health impacts

5.4.14. Drought

Provide information to residents on methods for preparing for extended drought and loss of drinking water supply

Estimated cost to Town: None to Town

Source of funds: ACRPC through website: <https://acrpc.org/regional-programs/emergency-management/emergency-preparedness/hazard-mitigation-and-preparation/>

Responsibility: Emergency Management Director

Timeframe: Ongoing, 2024-2029

Benefits: Centralized, updated information

5.4.15. Inundation Flooding

Support property buyouts of at-risk properties within flood hazard zones

Estimated cost to Town: Up to 25% of property value, costs to maintain as open green space in perpetuity

Source of funds: Grant funding

Responsibility: EMD, Select Board

Timeframe: Ongoing, 2024-2029

Benefits: Reduce potential property damage and risk to life.

Manage beaver dams at Monkton Pond

Estimated cost to Town: \$5,000

Source of funds: Grants, Fundraising

Responsibility: Cedar Lake Association

Timeframe: 2025-2026

Support wetland and floodplain restoration projects

Estimated cost to Town: None

Source of funds: Grant funding

Responsibility: Planning Commission, Conservation Commission

Timeframe: Ongoing, 2024-2029

Benefits: Reduce water volume to downstream areas following storm events

5.5 Mitigation activities undertaken since 2017 plan adoption

| Hazard | Action Description | Project Status |
|---|---|--|
| Ice Storm | In future requests for Right of Way usage for maintenance purposes, the Town will normally grant access. Due consideration in granting these permissions will be given when such access will adversely impact scenic corridors and residents’ desires to keep the beauty of tree-lined streets and roads. | In Progress-Continuing |
| | Acquire back-up power capacity for the Monkton Central School as funding becomes available. | Yes- town has acquired tow-behind generator |
| Highway Transportation Accidents | The town will review the 1997 recommendations for possible implementation including a stop sign and additional fog line to clarify the appropriate routes at the intersection between Monkton Ridge and States Prison Hollow Road | Partially Completed and In-Progress- 3 way stop sign and changed road to one-way, Fog lines being replaced |
| | Pursue cost effective safety measures which could be applied to the high-crash stretch of the Bristol Road through “Meaders Swamp” | Ongoing |
| | The town will explore additional safety treatments and increased Sheriff patrols at Tyler Bridge Road | Ongoing- Increased Sheriff’s presence |
| Structure Fire | The Town supports efforts by the fire department to install dry hydrants throughout town. | Done several, putting in more |
| | The Town supports review of possible fire pond installations in the next planning commission zoning bylaw rewrite to support water availability in new developments. | Completed- included in zoning bylaws |
| Severe Snow | Manage vegetation in the ROW to minimize/allow space for heavy/wet snow events | Ongoing |
| | Purchase and install a generator at the Town Office for use as an EOC during bad snow events. | Yes- town has acquired tow-behind generator |
| Wildfire | The Town supports the fire warden system requiring outdoor burn permits prior to any outdoor burning. | Ongoing |
| | The Town believes it is the homeowner’s responsibility to mitigate their susceptibility to wildfire through “firewise” practices. The town will support education in this area by providing educational materials in the town office. | Ongoing |

(continued on following page)

| Hazard | Action Description | Project Status |
|-----------------------------|---|--|
| Earthquake | The Town feels education is the key to preparing private homes for an earthquake and will make earthquake education materials available at the town office when available | Ongoing- shifting information to website |
| | The Town believes its time is best spent conducting safety reviews of town-owned buildings to identify hazard vulnerabilities. | Ongoing |
| | The Town anticipates the safety reviews will identify unanchored book stacks at the library and would propose to alleviate that problem. | Ongoing |
| Extreme Temperatures | The Town generally believes it is the responsibility of private homeowners to be prepared for extreme temperatures. | Ongoing-shifting information to website |
| | The town recommends a current list of vulnerable populations be kept and will explore programs which encourage “neighbor helping neighbor” activities. | In-progress- working with Town Service Officer |
| Ice Jam | The Town believes its current program of upgrading culverts and bridges as they are replaced will mitigate much of the Ice Jam issues in town. | Ongoing |
| High Winds | The town road crew, with assistance from the tree warden, currently removes dead and dying trees from its right of way as part of normal maintenance. This is ongoing work which requires no new actions. | Ongoing |
| Tornado | Support education in this area by providing educational materials in the town office. | Ongoing- shifting information to website |
| Drought | Support the State of Vermont’s water/wastewater rules to help mitigate the impacts of future droughts. | Ongoing |
| | Town volunteers have recently completed a location confirmation/review of private wells in the community. This new data when combined with surficial geology may assist in future well production estimates and the town encourages the further development of this data. | Completed |
| Insect-Borne Illness | Encourage use of appropriate repellants and behavior patterns which reduce the likelihood of mosquito bites through education. | Ongoing- shifting information to website |
| Invasive Species | Support State efforts to trap and identify tree damaging invasive insects. They support citizen efforts to become bug spotters as an added surveillance method. | Ongoing |
| | The Town will explore roadside mowing techniques which may reduce spread of unwanted invasives along roadsides | Ongoing |

6. Plan Maintenance Procedures

The Monkton Hazard Mitigation Plan is dynamic and should not be fixed. To ensure that the plan remains current and relevant, it is important that it be updated periodically. The plan will be integrated into other plans and updated at a minimum every five years.

Requirement 44 CFR § 201.6(d)(3)
(Process of mitigation plan integration)
Requirement 44 CFR § 201.6(c)(4)(ii)
(Integration process and planning mechanisms)

6.1 Hazard Mitigation Plan Integration

The recommendations of the previous hazard mitigation plan have been integrated into other municipal planning mechanisms, including the annual Local Emergency Management Plan, annual municipal budget, and Monkton Municipal Plan (re-adoption due in 2027). The Emergency Management Director and Emergency Management Coordinator will be responsible for integrating the goals, information and strategy of the mitigation plan into other planning mechanisms. The Planning Commission will consider the gaps in land use and development ordinances to address vulnerability to all hazards in this plan

6.2 Hazard Mitigation Plan Review/Update Process

1. The Monkton Selectboard assembles a Review/Update Committee to include government officials and interested public.
2. The Committee will discuss the process to determine if any modifications or additions are needed due to changing conditions since the last update occurred. Data needs will be reviewed, data sources identified and responsibility for collecting/updating information will be assigned to members.
3. Other Town plans (Emergency Management Plan, Town Plan, Road Plan, etc.) will be reviewed to ensure a common mitigation thread still exists throughout.
4. A draft update will be prepared based on these evaluation criteria:
 - Changes in community and government processes, which are hazard-related and have occurred since the last review.
 - Progress in implementation of plan initiatives and projects.
 - Effectiveness of previously implemented initiatives and projects.
 - Evaluation of unanticipated challenges or opportunities that may have occurred between the date of adoption and the date of the report.
 - Evaluation of hazard-related public policies, initiatives and projects.
 - Review and discussion of the effectiveness of public and private sector coordination and cooperation.
5. The public will be invited to review and give input on drafts as they are produced.
6. Selectboard members will have an opportunity to review the draft update. Consensus will be reached on any changes to the draft.
7. The Selectboard will notify and schedule a public meeting to ensure adequate public input.
8. The Selectboard will recommend incorporation of community comments into the draft update.

**Requirement 44 CFR § 201.6(c)(4)(i)
(Monitoring, Evaluating, and Updating)**

6.3 Mitigation Project Status Monitoring and Evaluation

The town of Monkton has outlined a process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy. The plan will be reviewed and updated in its entirety at least every five years as described in Section 6.2 above, the Town will monitor and evaluate its hazard mitigation goals, strategies and actions/projects annually as the town budget is created. A town budget is created by the Selectboard of a town in publicly noticed meetings utilizing budget requests from town committees and the citizenry. This will ensure that progress will be reviewed and actions/projects either added or removed from the towns work plan based on changing local needs and priorities. In creation of the municipal plan by the planning commission, concepts, goals and strategies from this plan will be used to inform the development of that plan and will be incorporated into that plan when appropriate. The progress/status of the mitigation actions identified within the mitigation strategy will be tracked by the Selectboard and Emergency Management Coordinator, who will be responsible for this process and bring mitigation actions to other planning processes. The plan will be evaluated for effectiveness annually and post-disasters (see section 6.5).

**Requirement 44 CFR § 201.6(c)(4)(iii)
(Future public participation)**

6.4 Public Participation

This Hazard Mitigation Plan solicited and received public input, especially in developing the hazard risk and vulnerability assessment. The municipality will continue to encourage future public participation in mitigation actions after the plan has been approved. Notice of the plan will be made and a copy of the plan along with contact information will be made available on the town website and at the Town Office. While the public are encouraged to read and comment on the plan, the committee understands that the length of the plan following all FEMA requirements is unwieldy and time-consuming for review, and has therefore provided a concise executive summary to provide the main Vulnerabilities, Goals and Mitigation actions. The Emergency Management Director and Emergency Management Coordinator will provide a status report on mitigation action progress at the annual Town Meeting and provide information on potential weather-hazards via local networks including Front Porch Forum. Public comments and suggestions will be recorded and incorporated into the upcoming hazard mitigation plan.

6.5 Post-Disaster Review Procedures

Should a declared disaster occur, a special evaluation process will occur in accordance with the following procedures:

1. Within six (6) months of a declared emergency event, the Town will initiate a post disaster review and assessment of actions.
2. This post disaster review and assessment will document the facts of the event and assess whether the existing Hazard Mitigation Plan effectively addressed the hazard.
3. A report of the review and assessment will be created by a Review/Update Committee.
4. The committee will make a determination whether the plan needs to be amended. If the committee determines that NO modification of the plan is needed, then the report is distributed.
5. If the committee determines that modification of the plan IS needed, then the committee drafts an amended plan based on its recommendations and forwards to the Selectboard for their input.
6. Following completion of a public input process, further amendments may be made and a final plan delivered to the Selectboard for adoption.
7. The Selectboard adopts the amended plan.

7. Plan Adoption Resolution

**Requirement 44 CFR § 201.6(c)(5)
(Documentation of adoption)**

TOWN OF MONKTON, VERMONT SELECTBOARD ADOPTION RESOLUTION

WHEREAS, the Town of Monkton has occasionally experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **Town of Monkton, Vermont Single Jurisdiction All-Hazards Mitigation Plan (Plan)**, which can result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Monkton has developed the **Plan** and received conditional approval from the Federal Emergency Management Agency (FEMA); and

WHEREAS, the **Plan** identifies specific hazard mitigation strategies, and plan maintenance procedures applicable to the Town of Monkton; and

WHEREAS, the **Plan** identifies actions and/or projects intended to provide mitigation for specific natural hazards that impact the Town of Monkton; and

WHEREAS, adoption of this **Plan** will make the Town of Monkton eligible for additional funding to help alleviate the impacts of future hazards;

Now, therefore, be it RESOLVED by Town of Monkton Selectboard:

1. The **Town of Monkton, Vermont Single Jurisdiction All-Hazards Mitigation Plan** is hereby adopted as an official plan of the Town of Monkton, Vermont. While content related to Monkton may require revisions to meet the plan approval requirements, changes occurring after adoption will not require Monkton to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions;
2. The respective Town officers identified in the action plan are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Support agencies within the Town of Monkton are also requested to implement actions assigned to them within this plan;
4. Plan maintenance procedures described in Section 6 of this plan are also adopted as part of this resolution.

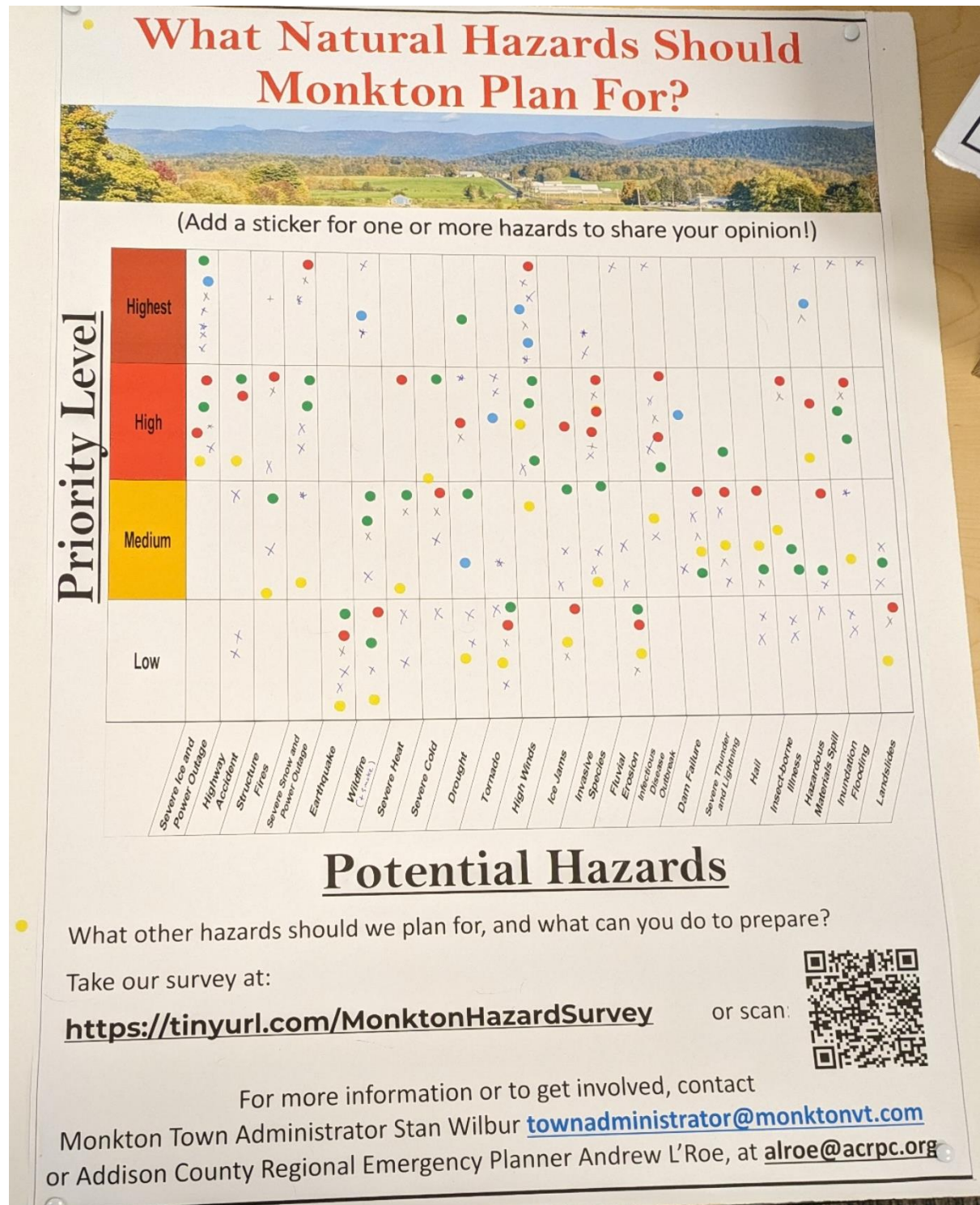
IN WITNESS WHEREOF, the undersigned have affixed their signatures for the Town of Monkton, this ____ day of _____ 202__.

| | | |
|-------------------|--------------------|--------------------|
| _____ | _____ | _____ |
| Selectboard Chair | Selectboard Member | Selectboard Member |

ATTEST: _____

Appendix 1. Public Outreach

Poster with results from display at Town office on and preceding Town Meeting, March 2024:

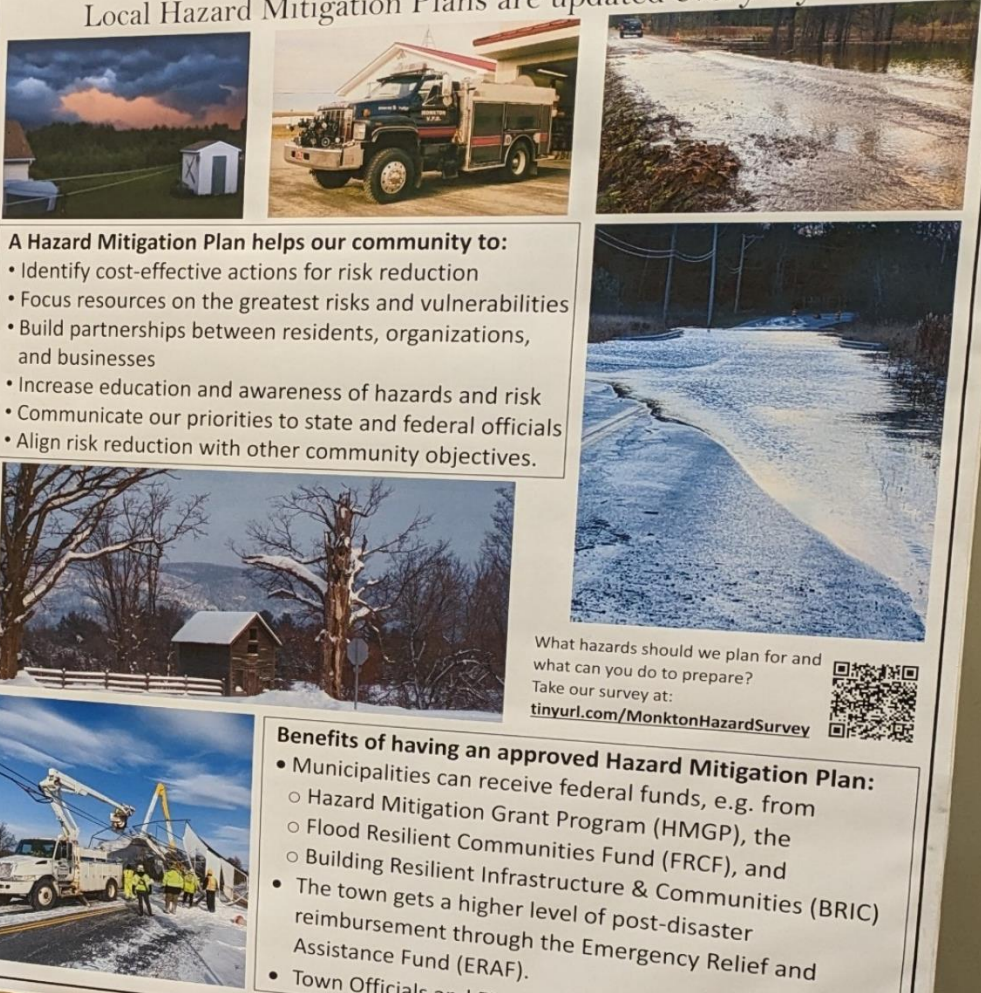


Poster displayed at March 2024 Town Meeting, and afterwards:

The Town of Monkton is updating its Hazard Mitigation Plan and needs your Input!!


Hazard Mitigation is sustained action taken to reduce or eliminate long-term risk to people and property due to natural or man-made disasters.

Local Hazard Mitigation Plans are updated every 5 years



- Identify cost-effective actions for risk reduction
- Focus resources on the greatest risks and vulnerabilities
- Build partnerships between residents, organizations, and businesses
- Increase education and awareness of hazards and risk
- Communicate our priorities to state and federal officials
- Align risk reduction with other community objectives.

What hazards should we plan for and what can you do to prepare?
Take our survey at:
tinyurl.com/MonktonHazardSurvey



Benefits of having an approved Hazard Mitigation Plan:

- Municipalities can receive federal funds, e.g. from
 - Hazard Mitigation Grant Program (HMGP), the
 - Flood Resilient Communities Fund (FRCF), and
 - Building Resilient Infrastructure & Communities (BRIC)
- The town gets a higher level of post-disaster reimbursement through the Emergency Relief and Assistance Fund (ERAF).
- Town Officials and First Responders are better prepared!

Online Survey Responses

The online survey received 17 responses from Monkton residents, providing the following hazard priority rankings (on 1-5 scale, where 1 = Least Concern, 5= Most Concern).

| Hazard | Mean Priority (5= Highest, 1 = Lowest) | Number of Times with Highest Priority Ranks |
|---|---|--|
| Severe Wind Storm | 4.1 | 6.0 |
| High Winds | 4.0 | 6.0 |
| Widespread Power Failure | 3.7 | 5.0 |
| Infectious Disease Outbreak (Avian Flu, Lyme Disease, Rabies, Respiratory Pandemic, etc.) | 3.6 | 5.0 |
| Pandemic | 3.4 | 4.0 |
| Severe Ice Storm | 3.3 | 2.0 |
| Invasive Species (Poison Parsnip, Emerald Ash Borer, etc.) | 3.0 | 2.0 |
| Inundation Flooding | 3.0 | 2.0 |
| Severe Snow Storm | 2.9 | 2.0 |
| Severe Heat | 2.9 | 2.0 |
| Severe Cold | 2.9 | 1.0 |
| Structural Fires | 2.9 | 0.0 |
| Wildfire | 2.7 | 2.0 |
| Fluvial Erosion | 2.7 | 0.0 |
| Hazardous Materials Truck Accident | 2.6 | 1.0 |
| Drought | 2.5 | 0.0 |
| Hail Storm | 2.3 | 0.0 |
| Dam Failure | 2.2 | 0.0 |
| Landslide | 1.9 | 0.0 |
| Ice Jams | 1.8 | 0.0 |
| Tornado | 1.8 | 0.0 |
| Earthquake | 1.3 | 0.0 |

Stakeholders providing comments:

David Bristol, resident attending public meetings

Other Stakeholders contacted for review:

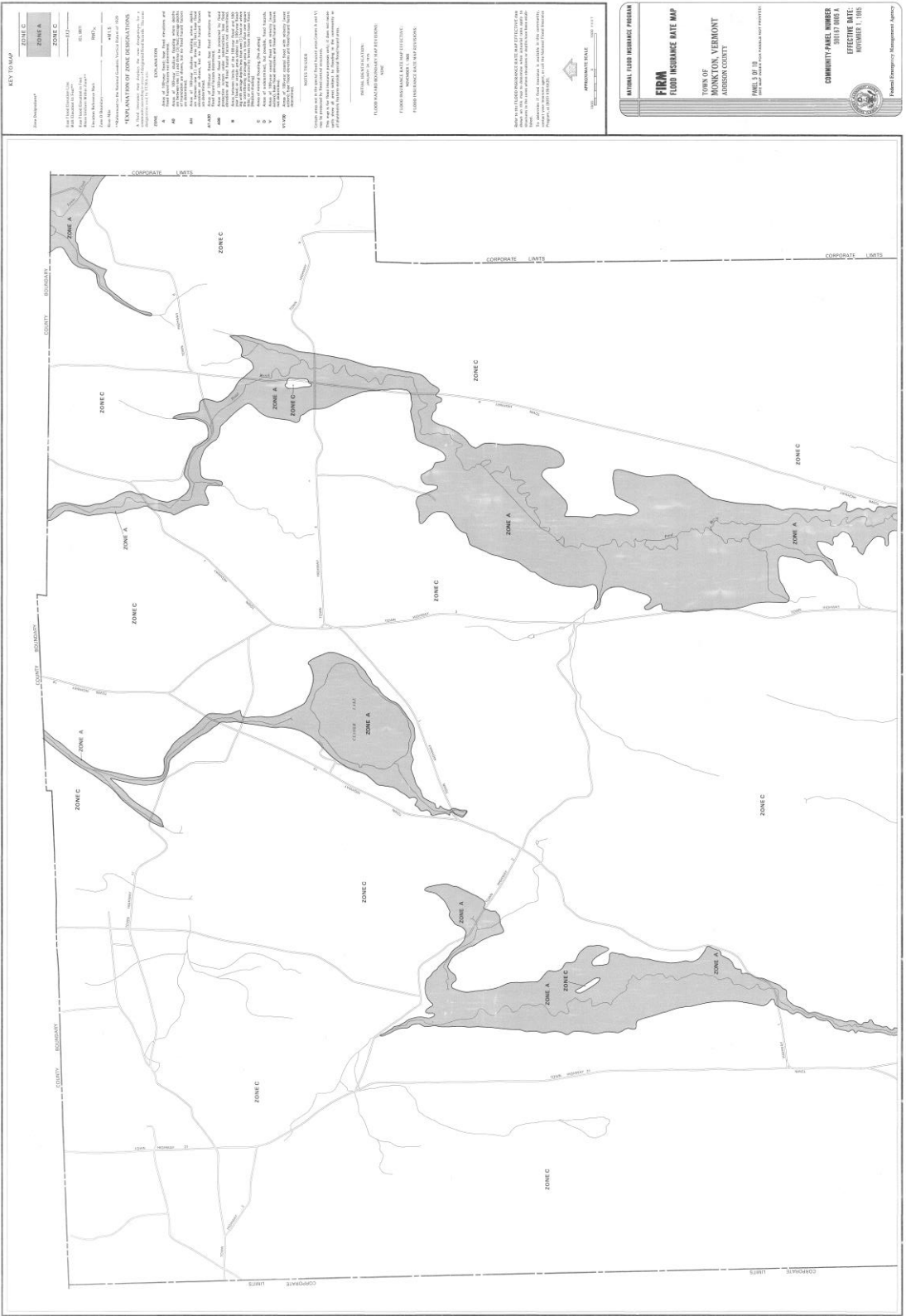
Cedar Lake Association

Monkton Friends Methodist Church

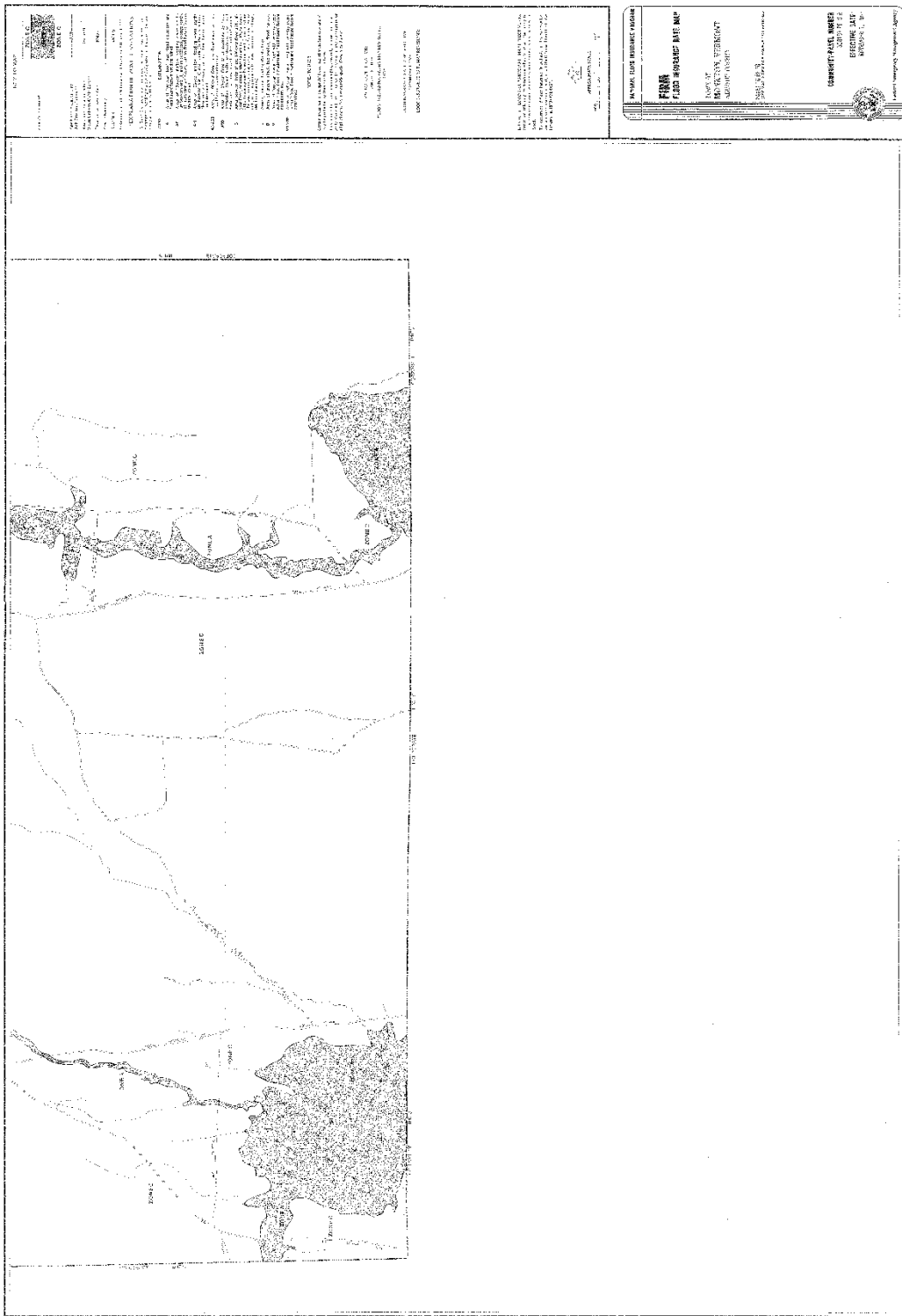
Monkton Museum and Historical Society

Lewis Creek Association

Appendix 2. FEMA Flood Insurance Rate Map Number 5001670005A, effective on 11/1/1985



Number 5001670010A, effective on 11/1/1985



(Available at <https://msc.fema.gov/portal/search?AddressQuery=Monkton%20VT>)

Appendix 3. Flood Hazard language in Monkton Unified Development Regulations

ARTICLE VI

FLOOD HAZARD AREA REGULATIONS

Section 600 – Statement of Purpose

It is the purpose of these regulations to promote the public health, safety, and general welfare, to prevent increases in flooding caused by the uncontrolled development of lands in areas of special flood hazard, and to minimize losses due to floods by:

- A. Restricting or prohibiting uses that are dangerous to health, safety, or property in times of flood or cause excessive increase in flood heights or velocities.
- B. Avoiding and minimizing the loss of life and property, the disruption of commerce, the impairment of the tax base, and the extraordinary public expenditures and demands on public services that result from flooding related inundation and erosion.
- C. Ensuring that the selection, design, creation, and use of development in hazard areas is reasonably safe and accomplished in a manner that is consistent with public wellbeing, does not impair stream equilibrium, floodplain services, or the river corridor
- D. Requiring that uses vulnerable to floods, including public facilities that serve such uses, shall be protected against flood damage at the time of initial construction.
- E. Protecting individuals from buying lands that are unsuited for their intended purposes due to flood hazard.
- F. Manage flood hazard areas in accordance with state and federal regulations so that the Town of Monkton, its residents, and businesses will remain eligible for federal flood insurance, federal disaster recovery funds, and hazard mitigation funds.

Section 605 – Definitions Specific to Article VI

Administrator: The Federal Insurance Administrator.

Area of Special Flood Hazard: The land in the flood plain within a community subject to a one percent or greater chance of flooding in a given year. The area includes all A Zone designation on the FIRM. It does not include Zones B and C.

Base Flood: “Base Flood” means the flood having a one percent chance of being equaled or exceeded in any given year (commonly referred to as the “100-year flood”).

Base Flood Elevation (BFE): is the elevation of the water surface elevation resulting from a flood that has a 1 percent chance of equaling or exceeding that level in any given year. On the Flood Insurance Rate Map the elevation is usually in feet, in relation to the National Geodetic Vertical Datum of 1929, the North American Vertical Datum of 1988, or other datum referenced in the Flood Insurance Study report, or the average depth of the base flood, usually in feet, above the ground surface.

Development: means any human-made change to improved or unimproved real estate.

Including, but not limited to the division of a parcel into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation, or enlargement of any building or other structure, or excavation or landfill, and any change in the use of any building or other structure, or land, or extension, as well as the mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.

Federal Emergency Management Agency (FEMA).

Flood Insurance Rate Map (FIRM): means an official map of a community, on which the Federal Insurance Administrator has delineated both the special flood hazard areas and the risk premium zones applicable to the community. In some communities the hazard boundaries are available in paper, pdf, or Geographic Information System formats as a Digital Flood Insurance Rate Map (DFIRM).

Flood Insurance Study: means an examination, evaluation, and determination of flood hazards and, if appropriate, the corresponding water surface elevations or an examination, evaluation and determination of mudslide (i.e., mudflow) and /or flood related erosion hazards.

Floodway: means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot at any point.

Flood proofed or flood proofing: Any combination of structural and nonstructural additions, changes, or adjustments to structures that reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures, and their contents.

New Construction: Structures, or filling, commenced on or after the effective date of the original flood hazard ordinance.

Recreational vehicle: means a vehicle which is: (a) Built on a single chassis; (b) 400 square feet or less when measured at the largest horizontal projection; (c) Designed to be self-propelled or permanently towable by a light duty truck; and (d) Designed primarily not for use as a permanent dwelling but as a temporary living quarter for recreational, camping, travel, or seasonal use.

River Corridor: (to replace fluvial erosion hazard area) means the land area adjacent to a river that is required to accommodate the dimensions, slope, planform, and buffer of the naturally stable channel and that is necessary for the natural maintenance or natural restoration of a dynamic equilibrium condition, as that term is defined in 10 V.S.A. §1422, and for minimization of fluvial erosion hazards, as delineated by the Agency in accordance with the ANR River Corridor Protection Guide.

Special Flood Hazard Area: is the floodplain within a community subject to a 1 percent or greater chance of flooding in any given year. For purposes of these regulations, the term “area of special flood hazard” is synonymous in meaning with the phrase “special flood hazard area”. This area is usually labeled Zone A, AO, AH, AE, or A1-30 in the most current flood insurance studies and on the maps published by the Federal Emergency Management Agency. Maps of this area are available for viewing in the municipal office or online from the FEMA Map Service Center: msc.fema.gov. Base flood elevations have not been determined in Zone A where the flood risk has been mapped by approximate methods. Base flood elevations are shown at selected intervals on maps of Special Flood Hazard Areas that are determined by detailed methods

Structure: means, for regulatory purposes under this bylaw including but not limited to, a walled and roofed building, as well as a manufactured home, mobile home or trailer, and any related built systems, including gas or liquid storage tanks, signs, walls, or fences, except a wall or fence on an operating farm.

Start of Construction: The date the permit was issued if work starts within 180 days from that date. Otherwise, the date shall be that on which a structure is placed on the site. See also FEMA

definition in Section 1909.1 of the current National Flood Insurance Program rules and regulations.

Substantial Improvement: Any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either, (a) before the improvement or repair is started, or (b) if the structure has been damaged, and is being restored, before the damage occurred. The term does not, however include either

1. any project for improvement of a structure to comply with existing state or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions or
2. any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

Top of Bank: means that vertical point along a stream bank where an abrupt change in slope is evident. For streams in wider valleys, it is the point where the stream is generally able to overflow the banks and enter the floodplain. For steep and narrow valleys, it will generally be the same as the top of slope.

Violation: means the failure of a structure or other development to be fully compliant with this bylaw. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in 44 CFR 60.3 is presumed to be in violation until such time as that documentation is provided.

Section 610 – Precedence, Liability, Applicability

A. Precedence. Any provision of this section will take precedence if it imposes a greater restriction than another provision of these regulations or any other town, state, or federal regulations.

B. Liability. The provisions of this section does not:

1. Imply that land outside this overlay district or that land development undertaken in conformance with this section will be free from flooding or erosion hazards; and
2. Create liability on the part of the Town of Monkton, or any town official or employee, for flood damage.

C. Applicability. The provisions of this section apply to the:

1. Special flood hazard area as established in the most recent flood insurance studies and maps published by the **Federal Emergency Management Agency's (FEMA)** National Flood Insurance Program. The Town of Monkton has adopted the flood insurance studies and maps by reference and incorporated them into these regulations

If there is uncertainty regarding the boundary of the special flood hazard area, the applicant may provide a letter of map amendment from FEMA to certify its location.

2. River corridors as established by the Vermont Agency of Natural Resources including the Statewide River Corridors and the area within 50 feet from the top of slope along any stream without a defined corridor. The Town of Monkton has adopted the state river corridor maps and as most recently amended, by reference and incorporated them into these regulations. If there is uncertainty regarding the boundary of the river corridor, the applicant may provide a letter of determination from the Vermont Agency of Natural Resources to certify its location.

Section 620 – Base Flood Elevations and Floodway Limits

The Town of Monkton will use the base flood elevations and floodway limits provided by the National Flood Insurance Program to administer and enforce the provisions of this section. Where the National Flood Insurance Program has not provided base flood elevations and/or floodway limits, the applicant must provide the information necessary to demonstrate conformance with the standards of this section and must use data from FEMA or other federal or state agencies where available.

Section 630 – Activities Exempt from These Regulations

The following land development and uses are exempt from the provisions of this section:

- A. The removal of a structure in whole or part.
- B. Maintenance of existing roads and stormwater drainage.
- C. Silvicultural activities conducted in accordance with the Vermont Department of Forest, Parks, and Recreation’s Acceptable Management Practices.
- D. Agricultural activities conducted in accordance with the Vermont Agency of Agriculture’s Required Agricultural Practices (RAP).

Section 640 – Prohibited Uses

Development Prohibited. The Town of Monkton prohibits:

- A. All development within the special flood hazard area.
- B. All development within the river corridor except as specifically authorized under Section 597 of these regulations.

Appendix 4. Wind Scales

| Saffir-Simpson Hurricane Wind Scale | | | | |
|-------------------------------------|---|---|----------------|-------------------------------------|
| Tropical Depression | | ≤38 mph, ≤33 knots, ≤62 km/h | Tropical Storm | 39–73 mph, 34–63 knots, 63–118 km/h |
| Category | Wind Speed | Types of Damages Due to Hurricane Winds | | |
| 1 | 74-95 mph 64-82 kt 119-153 km/h | Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding, and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days. | | |
| 2 | 96-110 mph 83-95 kt 154-177 km/h | Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks. | | |
| 3 (Major) | 111-129 mph 96-112 kt 178-208 km/h | Devastating damage will occur: Well-built frame homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes. | | |
| 4 (Major) | 130-156 mph 113-136 kt 209-251 km/h | Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months. | | |
| 5 (Major) | ≥ 157 mph ≥ 137 kt ≥ 252 km/h | Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months. | | |

Source: <https://www.nhc.noaa.gov/aboutsshws.php>

| Enhanced Fujita Scale | | | |
|-----------------------|------------|---------|---|
| Scale | Wind Speed | | Types of Damages Due to Hurricane Winds |
| | mph | km/h | |
| EF0 | 65-85 | 105-137 | <i>Minor or no damage.</i> Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0. |
| EF1 | 86-110 | 138-177 | <i>Moderate damage.</i> Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken. |
| EF2 | 111-135 | 178-217 | <i>Considerable damage.</i> Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground. |
| EF3 | 136-165 | 218-266 | <i>Severe damage.</i> Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations are badly damaged. |
| EF4 | 166-200 | 267-322 | <i>Devastating damage.</i> Well-constructed and whole frame houses completely leveled; cars and other large objects thrown and small missiles generated. |
| EF5 | >200 | >322 | <i>Extreme damage.</i> Strong-framed, well-built houses leveled off foundations are swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; some cars, trucks, and train cars can be thrown approximately 1 mile (1.6 km). |

Source: <http://www.spc.noaa.gov/efscale/ef-scale.html>

Appendix 5. Winter Storm Severity Index

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

- **Snow Amount:** to depict severity due to total amount of snow or rate of snowfall accumulation. (Adjustments are made based on climatology and urban areas, e.g. 4” of snow in Atlanta is more severe than 4” in Minneapolis.)
- **Snow Load:** to depict severity due to total weight of snow on trees and power lines.
- **Blowing Snow:** to depict severity mainly to transportation due to blowing and drifting snow.
- **Ice Accumulation:** to depict severity of transportation and downed trees/powerlines due to the accumulated ice in combination with wind.
- **Ground Blizzard:** to depict severity to mainly transportation of ground blizzards that develop due to a pre-existing snowpack and strong winds.
- **Flash Freeze:** to depict severity primarily to transportation of situations where temperatures rapidly fall below freezing during precipitation.

| Scale for the Winter Storm Severity Index (WSSI) | |
|--|--|
| Potential Winter Storm Impacts | |
| | No Impacts Impacts not expected. |
| | Limited Impacts Rarely a direct threat to life and property. Typically results in little inconveniences. |
| | Minor Impacts Rarely a direct threat to life and property. Typically results in an inconvenience to daily life. |
| | Moderate Impacts Often threatening to life and property, some damage unavoidable. Typically results in disruptions to daily life. |
| | Major Impacts Extensive property damage likely, life saving actions needed. Will likely result in major disruptions to daily life. |
| | Extreme Impacts Extensive and widespread severe property damage, life saving actions will be needed. Results in extreme disruptions to daily life. |

Source: http://www.weather.gov/ict/WSSI_Overview