



GREENSBORO LOCAL HAZARD MITIGATION PLAN

DRAFT AUGUST 10, 2023



CERTIFICATE OF LOCAL ADOPTION

Greensboro, Vermont

A Resolution of Greensboro, Vermont Adopting the Update to the All-Hazards Mitigation Plan

NOTE: THIS DOES NOT GET SIGNED UNTIL AN APPROVAL PENDING ADOPTION IS RECEIVED!

WHEREAS, Greensboro recognizes the threat that natural hazards pose to people and property within Greensboro; and

WHEREAS, Greensboro has prepared a multi-hazard mitigation plan, hereby known as the 2023 All-Hazards Mitigation Plan Update in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS, Greensboro identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Greensboro from the impacts of future hazards and disasters; and

WHEREAS, adoption by Greensboro demonstrates its commitment to hazard mitigation and achieving the goals outlined in the 2023 All-Hazards Mitigation Plan Update.

NOW THEREFORE, BE IT RESOLVED BY GREENSBORO VERMONT THAT:

In accordance with local rule for adopting resolutions, Greensboro adopts the 2023 All-Hazards Mitigation Plan Update. While content related to Greensboro may require revisions to meet the plan approval requirements, changes occurring after adoption will not require Greensboro to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

Date Peter Romans, Selectboard Chair

Date Gary Circosta, Selectboard Member

Date Eric Hanson, Selectboard Member

Date David Kelley, Selectboard Member

Date Ellen Celnik, Selectboard Member

Attested to by Town Clerk

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1. INTRODUCTION

A. Plan Purpose

The purpose of this plan is to assist Greensboro in identifying hazards facing the town and to identify mitigation strategies to begin reducing their risks. It is less costly to reduce vulnerability to disasters than to repeatedly repair damage.

Hazard Mitigation: Any sustained action that reduces or eliminates long-term risk to people and property from natural hazards and their effects.

-- Vermont 2018 State Hazard Mitigation Plan

Hazard mitigation strategies alter the hazard by eliminating or reducing the frequency of occurrence, avert the hazard by redirecting the impact by means of a structure or land treatment, adapt to the hazard by modifying structures or standards, avoid the hazard by stopping or limiting development, or reducing the potential impact through education and outreach. Specific hazard mitigation projects include:

- Flood-proofing structures
- Securing propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters in flood-prone areas
- Identifying and modifying high traffic incident locations and routes
- Ensuring adequate water supply
- Elevating structures or utilities above flood levels
- Identifying and upgrading undersized culverts
- Proactive land use planning for floodplains and other flood-prone areas
- Proper road maintenance and construction
- Ensuring critical facilities are safely located
- Providing public information

With enhanced emphasis on community resilience, many state agencies and local organizations have increased awareness of the importance of mitigation planning and have produced plans and resources that towns can use to support their planning efforts. This plan will reference, when relevant, pertinent tools and resources that can be used to enhance mitigation strategies.

[*The Code of Federal Regulations \(44 CFR Part 201\)*](#), establishes criteria for State and local hazard mitigation planning authorized by Section 322 of the Stafford Act as amended by Section 104 of the *Disaster Mitigation Act of 2000*. Effective November 1, 2003, local governments must have an approved local hazard mitigation plan prior to the approval of a local mitigation project funded through federal Pre-Disaster Mitigation funds. Furthermore, the State of Vermont is required to adopt a State Pre-Disaster Mitigation Plan for Pre-Disaster Mitigation funds or grants to be released for either a state or local mitigation project after November 1, 2004.

There are several implications if the plan is not adopted and approved by FEMA:

- After November 1, 2004, [Flood Mitigation Assistance Grant Program \(FMAGP\)](#) funds will be available only to communities that have adopted a local plan;
- Communities without a plan are not eligible to receive funding from [FEMA's Hazard Mitigation Grant Program \(HMGP\)](#) to pay for hazard mitigation projects. (Communities, however, may apply for planning grants under the 7% of HMGP available for planning;

- Communities with a local plan are not eligible to funding from [FEMA’s Pre-Disaster Mitigation \(PDM\)](#) program, and
- For disasters declared after October 14th, 2014, a community without a plan will be required to meet a greater state match when public assistance is awarded under the Emergency Relief Assistance Fund (ERAF) requirements.

Adoption and maintenance of this Hazard Mitigation Plan will:

- Make certain funding sources available to complete the identified mitigation initiatives that would not otherwise be available if the plan were not in place;
- Support effective pre- and post-disaster decision making efforts;
- Lessen each local government’s vulnerability to disasters by focusing limited financial resources to specifically identified initiatives whose importance have been ranked; and
- Connect hazard mitigation planning to community planning where possible.

B. Planning process

This plan was developed in the immediate aftermath of the worst flooding disaster the community has experienced in living memory. As roads were still being repaired, a semblance of normalcy still being established, the planning team quickly assembled under the guidance and support of the selectboard. Each core planning team member serves the communities in a number of capacities, creating a balanced perspective:

This section satisfies Requirement 44 CFR § 201.6(c)(1): Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction?{

- Kim Greaves, Town Clerk who wears multiple hats, which include Emergency Coordinator and liaison for the Greensboro Giving Closet. Kim also participated in the previous Hazard Mitigation Plan Update;
- Dave Brochu, Emergency Management Director and Fire Chief. Dave is also active on the Hardwick Rescue Squad;
- Josh Karp, Selectboard Clerk. Josh also previously served on the Greensboro Planning Commission. A prominent local agricultural producer, Josh also provided insights into impacts and vulnerabilities faced by Greensboro thriving agricultural community; and
- Christine Armstrong, Deputy Health Officer and member of the Greensboro Planning Commission. Christine is also a member of the Greensboro Association, which supports community initiatives and strives to protect water quality of Caspian Lake.

They were assisted by Alison Low, Senior Planner at Northeastern Vermont Development Association, the regional planning commission serving Greensboro, and Brett Stanciu, Greensboro’s Zoning and Flood Hazard Regulations Administrator.

Table 1B.1: Details of the Planning Process

Plan Development Element	Description and timeframe
Project kickoff	August 7: Kim Greaves consulted with Alison Low to set up a Special Public Meeting in the Greensboro United Church. She also alerted the members of the core team for their immediate availability. On August 8, the core planning team assembled, along with Alison Low and Brett Stanciu. The group evaluated natural hazards identified in the State

	<p>Hazard Mitigation Plan (2018), using the same criteria used in that plan. (See Section 2, Hazard Identification and Analysis. This process identified the priority hazards to be included in this plan update. The team opted to focus only on natural hazards, since FEMA does not review man-made hazards. The team also discussed key development trends to be included in the plan.</p>
<p>Stakeholder involvement</p>	<p>During this meeting, the project team identified all the stakeholders to be involved in the planning process, other than the Selectboard (One Selectboard member is the Road Foreman). Stakeholders identified were:</p> <ul style="list-style-type: none"> • Greensboro Association (water quality, flooding) • Greensboro Lakewise Committee (invasives, dam report) • Greensboro Nursing Home (critical facilities, vulnerable populations) • Greensboro Free Library (pandemic response) • Greensboro Energy Coordinator • Housing Vermont (operates Lauredon apartments for senior housing) • Lakeview Elementary School (critical facility, vulnerable population) <p>Given the short time frame for involvement, the Town Clerk provides a phone and email contact list for NVDA. She also made personal calls to contacts to let them know that someone would be contacting them. Other core project team members emailed stakeholder contacts to put them in touch with NVDA. This step was important because in the immediate aftermath of a disaster, it could have been easy to overlook an unsolicited call or email from an unknown outside consult, when post disaster scams are an ongoing concern. The outreach resulted in telephone interviews with the NVDA consultant. Those who were not phoned directly also received an email and an invitation to respond to the general public survey. Many of these contacts responded to the survey as well. Interviews with the nursing home and school provided background information about those two critical facilities and were incorporated into the plan. Interview with the Energy Coordinator led to inclusion of additional strategies for consideration.</p>
<p>General public involvement</p>	<p>The core project team reviewed an approved online survey for general circulation through the Town web site, Front Porch Forum, social media, and direct solicitation through either phone calls or emails. The survey received more than 60 responses.</p> <p>The public also had an opportunity to participate at a publicly warned Selectboard meeting on August 9th, which reviewed the hazards to be profiled, along with an extended list of proposed hazard mitigation strategies being considered by the core project team. At that meeting, there were some questions about the adoption process, and the consultant explained that adoption did not occur until after receipt of an Approval Pending Adoption (APA) from VEM/FEMA. An attendee wanted to know if the plan could be changed after adopted, and it was explained that it could. In fact, updating the plan every year is a great way to keep the plan relevant!</p> <p>Finally, on Thursday evening, a second special public meeting, posted around the community and promoted on Front Porch Forum and social media, was held at the Greensboro United Church Fellowship Hall. Twenty attendees were asked to evaluate the proposed mitigation strategies, identify priorities, and identify resources and timeframes. Following this meeting, the core project team selected their priority mitigation strategies for inclusion in the plan, using a modified STAPLEE method.</p> <p>A complete draft of the plan was made available through the Town website on August 11, and its availability was promoted through Front Porch Forum and social media.</p>

Businesses, academia, and other private and non-profit interests	In addition to the school, the consultant reached out to the following non-profits: WonderArts/Spark, Highland Arts Center, Circus Smirkus. These contacts were emailed and were invited to speak with the NVDA consultant and complete the survey. Again, direct contact by core project team members was helpful in establishing a contact. Businesses were also contacted directly: these included two agricultural processors/producers, two farms, two general stores, a country club, and lodging. The same approach – email from the consultant and direct solicitation from a known contact on the project team was used. These contacts also received an invitation to participate in the survey. There are numerous small home-based businesses and hobby farms. Survey respondents had the opportunity to indicate if they had a business or farm that had been impacted by natural hazards.
Neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development	On August 11, the NVDA consultant sent an initial draft plan to neighboring communities, as well as the Agency of Natural Resources Department of Environmental Conservation, and the basin planners. The plan was also sent to VEM for initial review, so the comments and input from all of the above-mentioned contacts and outreach strategies continued to be incorporated into the plan.

Plans, Studies and Reports Used in this Plan

Research and feedback on hazards, community capacities, community assets and potential mitigation projects was also conducted in coordination with other important stakeholders. Phone calls, emails and meetings were exchanged and held to involve the expertise of additional town staff, various state agency and regional stakeholders, with an emphasis on vulnerable populations. Following FEMA guidance in Local Mitigation Plan Review Tool Regulation Checklist, the plan was written using data sources that included:

This section satisfies 44 CFR § 201.6(b)(3): Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information?

- Surveys and warned, public meetings collecting public comment (issues raised were addressed in plan and the public meeting)
- 2019 Town Plan (provided current goals and regulations supporting mitigation, recent capital expenditures and infrastructure value helped to drive vulnerability assessment)
- Town of Greensboro Zoning, Subdivision, and Flood Hazard Regulations, to more accurately portray existing and desired land development patterns
- The Greensboro Local Emergency Management Plan (adopted August 9, 2023) to understand emergency procedures
- Previous Greensboro Hazard Mitigation Plans from 2017 and 2005, to identify a procedural history of hazard mitigation planning and document public assistance detail from federal disaster declarations not available from Open FEMA
- Town of Greensboro Annual Reports to understand Town Operations, especially during the pandemic
- FEMA Service Center, to review “Approximate A” zones on Greensboro Flood Insurance Rate Map
- Efficiency Vermont, to obtain town-level data on energy-burdened households
- US Drought Monitor to quantify historic periods of drought in Orleans County

- US Center for Disease Control, to better understand the risk of heat-related illness
- 2018 Vermont State Hazard Mitigation Plan (provided key guidance language and definitions throughout the plan)
- National Weather Services, including NOAA Events Data, NOW Data, and Climate at a Glance to research climate trends, climate records, and special weather events
- Open FEMA datasets to obtain information about federal disasters and public assistance received in the Town of Greensboro
- US Census Bureau and American Community Survey 5-Year Estimates, to obtain population data, median age, and age of housing stock in Greensboro
- Vermont Department of Health studies and information on heat risk to better understand potential impacts to vulnerable populations, as well as reporting on COVID
- Vermont Dam Inventory, to obtain information on the condition and history of inspection of the Caspian Lake Dam, a significant hazard dam. This information was supplemented by

C. Community Profile¹

The Town of Greensboro is 39.4 square miles in size. It is first and foremost a rural community, characterized by farms, forest, open land, healthy natural resources, modest-sized homes, a diversity of small-scale employers, dirt roads, and a community of people with a range of incomes, family sizes, and ages who place great value on neighborliness while respecting each others' privacy in a rural community. Increasingly, Greensboro has become a preferred destination for retirees who have had a history with the community and who seek a balanced, connected, and active lifestyle.

The history of Greensboro began with the building of the Bayley-Hazen military road ordered by George Washington in 1776 for an anticipated invasion of Canada. By 1779, the road had reached Greensboro and continued through to Montgomery before the project was abandoned. The town organized in 1793. By then inhabitants had started to settle Greensboro Village, starting with a sawmill and a blacksmith shop. The village of Greensboro Bend evolved when the railroad came through in 1872. A large sawmill, box factory, foundry/tin shop, granite shed, and stores grew up in that village. The town's population hit its peak of 1,065 in 1860 and then began dropping in the early 20th century. Since then the town has grown slowly to a population of 811 in 2020. Greensboro has been a recreation destination for many years. Summer campers used to arrive by train at the Greensboro Bend station and were escorted by horse and buggy to the camp for their summer retreat. Today, Caspian Lake is still a destination in the summer months, when the population probably swells to 2,000 or even higher.

Greensboro has retained its historic settlement pattern is that of two compact villages (Greensboro and Greensboro Bend) with a mix of housing and commercial services, surrounded by farms and forested land.

Although the community has transitioned from a resource-based economy to recreation tourism and hospitality, the town has also experienced a renaissance of agricultural and production, creating a unique sense of place. Local residents, members of the eighth generation of the Hill farm family, and two summer residents, quietly started two small manufacturing businesses, replacing the original dairy farms. They have since flourished. Hill Farmstead Brewery, an internationally celebrated craft brewery, opened in 2010. Its mission statement reads: "To hand craft succinct, elegant beers of distinction and to revive and diversify the farmscape of the Hill Farmstead in Greensboro." The Cellars at Jasper Hill, a

¹ Much of this material from this section is from the 2019 Greensboro Town Plan.

renowned cheese manufacturer, opened in 2003. Other larger local businesses include an international youth circus school, Circus Smirkus, which opened in 1987; and a regional theater, Highland Center for the Arts, which opened in 2017. Willey's Store, the bedrock of the community in Greensboro Village, endures. Similarly, family-owned Smith's Grocery is a hub of commerce and community activity in Greensboro Bend.

The population is aging. According to the latest US Census, more than a third of the population is over the age of 65. Based on current trends, it appears the population's aging demographic will become increasingly skewed over the next two decades.

Greensboro has historically been characterized by a socially and economically diverse population, united by a strong commitment to community, and which could be described as having a mutually exclusive housing composition. There is a distinct line, both economically and functionally, between the two major housing types in town. On one hand, the village centers and surrounding rural areas are typical of any small Vermont town. On the other hand, the regions surrounding Caspian Lake and Eligo Lake represent a largely tourism-based, vacation home housing for families that have been coming to summer here for generations. These two distinct groups play an important role in the character of Greensboro while also creating a unique and challenging situation in the creation of economically accessible housing.

Greensboro exhibits a great need for moderately priced housing, which for the purposes of this Plan, is defined as housing which is affordable to an individual or couple where both persons are gainfully employed in the Greensboro area. People who work in Greensboro's current industries and retail outlets, such as Jasper Hill Cheese, Hill Farmstead Brewery and Willey's, have difficulty finding affordable places to live in their workplace town, due to both the cost of housing and the lack of affordable housing stock.

Residential density is restricted by septic capacity and results in a mix of densities. Zoning plays a role, too: minimum lot sizes outside of the village and the lakeshore are 10 to 25 acres. Over half of the residential units in the town are on lots greater than six acres. Of the two villages, "The Bend" is characterized mainly by single family homes on small lots (1/4 acre), several former commercial buildings, as well as Smith's Grocery, the Methodist Church, a community park, Four Seasons of Early Learning and daycare (identified as a vulnerable population on the Local Emergency Management Plan), and a post office. The second village, Greensboro Village, lies on the edge of Caspian Lake and contains Willey's Store, The Miller's Thumb gift shop, Greensboro Garage, Cassie's Corner Shop, Lakeview Union School, the United Church of Christ, the Historical Society, the library, fire department, town offices, post office, Grange, as well as various home businesses and residences.

Critical Facilities, Town Departments, Infrastructure, Utilities and Basic Services

Police, Fire, and Rescue: The Town contracts with the Orleans County Sheriff's Department for policing. The Greensboro Fire Department (FD) is made up of 23 volunteers and no paid staff. Many firefighters attend regular classes to keep up with the new techniques for fighting fires. Firefighters are also trained in water rescue on winter ice. The FD averages 35- 40 calls per year, and receives an average of 6 mutual aid calls per year. The Department belongs to Rural Vermont Mutual Aid, which started with four towns and has grown to six towns. There are also agreements with two other towns in the area. The current fire station, located on the southern end of Greensboro Village at Tolman Corners, is a new 68'x80' structure with five bays for equipment, a bathroom, and a meeting space. The new fire station was built in 2013-2014, after receiving voter approval at the 2013 Town Meeting. The Fire Station is the Town's secondary Emergency Operations Center.

Emergency medical services are provided by the Hardwick Rescue Squad (HRS), a volunteer ambulance service based in the neighboring town of Hardwick. HRS was formed in 1967, and currently has 45

volunteer members living in the greater Hardwick area. HRS responds to all trauma and medical calls, and provides support at Fire Department calls within the service area. There is one paid employee, who staffs the facility four days a week, and in addition to being on-call, performs various administrative duties. This employee holds an Advanced EMT credential. HRS is licensed at an “Advanced Life Support” level with one Paramedic living in Hardwick.

Town Hall and Grange Buildings: The town hall houses the town offices. There are four town staff; one full-time town clerk, two part-time town clerks, and one part-time zoning administrator who is responsible for Bylaw compliance. There are four large rooms on the ground floor of the building, with the fourth room, the “Collier Room,” is used for various meetings and events. The town hall is a primary Emergency Operations Center. A back-up generator has been installed. The Greensboro Giving Closet, a community resource for donation and exchange of lightly used essentials, is on the second floor. There is also an unused third floor which does not currently meet ADA rules for accessibility. The Town Hall is one of Greensboro’s designated emergency shelters. In June of 2012, the historic Grange building next to the United Church of Christ (UCC) was purchased by the town for \$8,000. It is intended to use this building for meetings and other community functions. The Town of Greensboro received a \$70,000 grant from the Preservation Trust of Vermont, in conjunction with the Freeman Foundation, to be used on refurbishing the building. There has been discussion in recent years to consider refurbishing the Grange building into the Town Clerk’s office, which it had originally been. The Greensboro Town Garage houses an office for the 3 full-time road crew personnel, along with a shop to repair and maintain the fleet of Town vehicles. It also has a large detached shop for storage and more maintenance space.

Schools: Greensboro’s K-6 student population is served by Lakeview Union Elementary School in Greensboro Village, which represents a vulnerable population in Greensboro’s Local Emergency Management Plan. Six Greensboro citizens serve on the Lakeview Union School District Board alongside two representatives from Stannard. Greensboro’s 7-12th grade student population is served by Hazen Union School in Hardwick. The Lakeview School currently serves 27 children, who can access the school by bus from all of Greensboro as well as Stannard and even Hardwick. The school has two buses and two vans, although some routes (like Stannard Mountain) can become inaccessible in mud season. A critical facility, the school is equipped with a backup generator. The school has also received electrical upgrades to mitigate weather conditions. Because of the school’s location near a gravity-fed water system, it never loses access to water in a power outage. Meals are not prepared on site but are trucked in from Hardwick. If roads became inaccessible from Hardwick, the school could use the Willey’s Store as a backup resource. The school’s base server is in Hardwick, so a power failure in Hardwick could make their internet and phone system unavailable. To ensure redundant coverage, the school maintains an analog phone connection, and each teacher is provided with a paper binder with parent phone list in case the internet is unavailable. Cell phone coverage is consistently available throughout the school. The Lakeview School is an emergency shelter for the community and is an off-site shelter for the Greensboro Nursing Home, which may need access to maintain lifesaving medical equipment in the case of an extended power outage. School and nursing homes officials have practiced emergency drills.

Emergency Shelters: In addition to the Town Hall and the Lakeview School, which have generators, the Fellowship Hall in Greensboro Village, as well as St. Michael’s Parish Hall in the Bend are also designated emergency shelters. However, both lack generators. The Fire Station also lacks a generator. Highland Center for the Arts can also serve as an emergency shelter.

Transportation: Greensboro employs a staff of three, plus one part-time summer person, to maintain its fifty seven miles of dirt roads, eleven miles of pavement, 14 bridges, and 582 culverts. The town road crew works out of the Town Shed located on Cemetery Ridge. The town owns a gravel pit in Glover. Two state roads pass through Greensboro: State Route 16 runs through Greensboro Bend as it connects

Hardwick to points in northern Orleans County, and a short portion of State Route 14 runs aside Lake Eligo. Road maintenance equipment owned by the town includes a pick-up, two ten-wheeler 14-yard dump trucks, one 7-yard six-wheel dump truck, an excavator, a grader, and a bucket loader. Driveway plowing and roadside mowing services are contracted to private contractors on an annual basis. Rural Community Transportation, Inc (RCT) is the only public transit provider in the Northeast Kingdom. It provides transport for a fee on its fixed routes and will schedule an individual volunteer driver to drive a person from their home to an appointment. Unfortunately, their regular fixed routes do not cover the Greensboro/Hardwick area.

Water Supply and Wastewater Treatment: Greensboro has no public sewer system; all residents and businesses have their own septic systems and leach fields. If the population grows, the demand for effective wastewater systems will also grow. The ability to develop within the village will likely become more challenging. The Town is currently exploring the possibility of establishing a waste water system in the Village.

There are now two small public water systems providing potable water. One is in Greensboro Bend, and currently serves 13-15 residents, a church, a store, the Four Seasons of Early Learning pre-school, and additional residential properties. The other system serves the Village of Greensboro and part of the summer community on Caspian Lake. Both systems serve fewer than 250 residences, schools, offices and businesses. Their water sources are drilled wells. Both systems are Fire Districts (#1 and #2) established by the Legislature; neither is part of Greensboro's town government. Both are operated and financed entirely by the residents who purchase their service. The Greensboro Village system was very outdated, with constant leakages. As a result of this and potential problems with water quality, the State of Vermont required a massive replacement of the system. In 2013 - 2014 the Greensboro Village system (GFD#1) installed new water lines from the reservoir to the Village and up to the Country Club. This also included new water lines to Black's Point. These new lines were double the diameter of the previous lines in order to meet the firefighting capacity as required by State Statutes. In 2015, the water lines were extended to the new firehouse, and in 2016 the Highland Center for the Arts extension was installed with an 8" diameter pipe and one hydrant.

Solid Waste: Greensboro is a member of the Northeast Kingdom Waste Management District, which provides the solid waste planning, hazardous waste collection, education, state compliance reporting, facility certification, grant applications, and the collection and processing of recycling material from Greensboro's recycling center. Greensboro maintains a recycling center located behind Town Hall. It accepts sorted materials for recycling such as paper, cardboard, glass, aluminum and tin cans, batteries, fluorescent bulbs, e-waste (TVs, computers, electronics), food scraps, and metal. It is open Saturdays 9 to 11am and in the summer on Wednesdays 3:30 to 5:30 pm. Trash is accepted on a pay-by-the-bag basis when the center is open. Homeowners and businesses can contract with haulers for the pickup of their trash and recyclables.

Utilities: Electric service delivery is provided by Hardwick Electric Department, a not-for-profit municipal utility located in Hardwick, Vermont.

Telecommunications. About 95% of Greensboro residents now have internet access. Free wi-fi is available at Town Hall, and higher speed, fiber optic wi-fi is available at the SPARK business incubator/co-working space, as well as the Greensboro Free Library. Phone, DSL internet, and fiber optic internet service are provided by Consolidated Communications. Cable television is provided by Comcast, and is limited to Greensboro Bend. Cell coverage is available via Verizon and AT&T. Despite the telecommunications coverage some survey respondents indicated the need for emergency communications that was not dependent on internet access.

Community Assets

Greensboro Free Library and Greensboro Historical Society: The Greensboro Free Library (GFL) has a staff of one part-time librarian and two additional part-time employees and relies on approximately 77 hours per week of volunteer commitment. Each week, the GFL is open 29 hours in the winter and 39 hours in the summer. The historical society is in the former library building, with separate exhibit space.

Nursing Home: Greensboro Nursing Home (GNH), with a total of 30 available beds, is one of the community's largest employers with 42 full-time employees, 24 part-time employees, and a payroll of approximately \$2.5 million annually. It is a nonprofit organization with a board of trustees made up of members from the community. This allows the organization to be flexible to local needs and to offer only the services that are needed. All revenue is channeled back into the facility's operations and maintenance, continuing to improve the quality of services. The mission statement of the Greensboro Nursing Home is to: "Provide the highest quality of care to the residents of our community regardless of their ability to pay." Since it is locally owned and operated, the organization provides its services to all members of the community. In addition to providing health care to seniors, the GNH also provides Meals on Wheels to seniors at home, loans equipment at no charge to those in need, provides private day care services, and answers questions about Medicare and Medicaid. The Nursing Home is identified as a vulnerable population on the Local Emergency Management Plan. Getting emergency vehicles to patients can become a problem during natural hazards, such as severe winter weather.

Churches: There are three churches in the Town of Greensboro; the United Church of Christ (UCC) in Greensboro Village and St. Michael's Catholic Church and the Methodist Church, both in Greensboro Bend. All three churches have facilities for public meetings, including Town Meeting. The UCC has a large facility known as Fellowship Hall, which is available and frequently used for area meetings, performances, music group rehearsals, wedding receptions, etc. In addition, there is a large space below Fellowship Hall, which is occupied by WonderArts and the SPARK business incubator. St. Michael's has a separate facility known as St. Michael's Parish Hall, which is available for public interest meetings and which can be rented for private functions. The Methodist Church has a large area below the sanctuary which is used for public meetings.

Highland Center for the Arts: The Highland Center for the Arts is a venue for locally and nationally sourced performances, exhibitions, and events serving the residents and artists of Vermont's Northeast Kingdom. The main stage features exceptional drama, music, and dance performances. The center also offers school collaborations, skill share classes, yoga and movement, music workshops, and weekly movies. The facility features the Hardwick Street Café, and an art gallery which showcases an ever-changing exhibit of paintings, sculptures, and photos.

Parks: Greensboro is fortunate in its outdoor resources, much of which is private but open to the public. Greensboro does own Willey's Breach, adjacent to the Public Beach" which is kept in its natural wooded condition. There's also a substantial playground at the school. The Greensboro Association works with Hardwick Electric to maintain the park at the Public Beach. Barr Hill Preserve is privately owned but maintains a trail system open to the public.

Natural Resources

Most of Greensboro is in the Black River Watershed headwaters, with drainage flowing north to Lake Memphremagog on the Canadian border. The Lamoille River flows through the southern part of town, which puts that area in the Lamoille watershed, flowing toward Lake Champlain.

The town is a lovely, hilly landscape of farms, forest, and wetlands. The 256-acre Barr Hill Nature Preserve is located just east of Caspian Lake, which offers trails open to the public (hiking and cross-

country) with spectacular views of much of the Green Mountains. Barr Hill is the highest point in Greensboro.

Lakes and Ponds: Caspian Lake is regarded as the town's natural resource jewel and, together with Long Pond and Horse Pond, is considered to be in the overall top 20% of Vermont's Best Lakes. (Vermont Lakes and Ponds Program, 2012). The lake is 789 acres and has a maximum depth of 142 feet, (mean depth is 57 feet), a maximum length of 1.66 miles and a maximum width of 1.3 miles. It is classified as oligotrophic (a deep clear water lake with a very low nutrient level). It is in the Upper Lamoille Basin whose waters ultimately flow into Lake Champlain. In 2016 the status of the lake was downgraded to "Stressed" due to the flow alteration with resultant water level fluctuation, causing pollution and jeopardizing fish habitat. Caspian had one of the finest lake trout fisheries in northern Vermont, but current water level fluctuation has the potential to impair fishery. Ice damage due to the lack of drawdowns invites evaluation of the best water level to be maintained to have the least amount of impact.

Sedimentation and road and developed land runoff are negatively affecting water quality. Action by the town to address the sedimentation and the feeder stream contribution to the problem is imperative. Furthermore, the groundwater table is unusually high, and old, outdated and expired, overburdened septic systems increase the danger of septic overflow, especially in wet years.

The Greensboro Association is very active in keeping the lake free from Eurasian Milfoil and Zebra Mussels. The Association also sponsors swimming lessons, and monitors water quality on a weekly basis. These activities are testament to the concern and care the residents, both full and part time, have for Caspian Lake. The Vermont Department of Environmental Conservation (DEC) has conducted a lake water quality monitoring program for over twenty years.

Eligo Lake: This lake of 174 acres, with a maximum depth of 100 feet (mean depth is 29 feet), is shared with Craftsbury. That Town maintains a public beach at the north end. The area surrounding this glacial pond is so level that it drains both south (into the Lamoille) and north (into the Black River). The steep slopes on the eastern side are environmentally sensitive as are the northern and southern outlet areas. Like Caspian, Eligo is oligotrophic, meaning a deep clear water lake with very low nutrient level. Eligo is currently fighting to combat its milfoil problem.

Long Pond: One of the four kettle ponds in town, this body of water consists of 100 acres and is essentially undeveloped. Its maximum depth is 33 feet (mean depth of 15 feet) and it is classified as mesotrophic (moderate in nutrients). It was evaluated by the State for water quality, biological diversity and unusual or scenic natural features. It is ranked as exemplary in all three categories. Other than the fishing access owned by the State of Vermont and a few lots owned by private landowners, most of the surrounding property is owned and protected by The Nature Conservancy.

Horse Pond: This pond of 32 acres with a maximum depth of four feet is adjacent to Route 16. Classified as mesotrophic, recreational fishing is poor due to excessive plant growth. It is labeled by the state as a warm water fish habitat.

Mud Pond(s): These ponds are in North and South Greensboro. These two ponds are small, (9 and 5 acres), shallow, are rapidly eutrophying and becoming swamps. There is no road access to either pond.

Forested areas: Greensboro has 38,255 acres of blocks of contiguous forest habitat, covering 76% of the 49,940 acres of the town. The largest forest blocks in Greensboro ring the outer boundary of town. A 9,636 acre block in the northeast extends into Glover. To the east, a small portion of a 19,584-acre block [that is mostly in Wheelock] occurs east of Route 16. To the west/southwest, a small bit of a 9,294-acre block in

Wolcott occurs west of Route 14. The inner ring of forest blocks surrounding Lake Caspian are all less than 2,000 acres.

Local Plans and Regulations

Town Plan: The overarching goal of the Town Plan is to retain the influence that the healthy, natural environment heritage has had on Greensboro's community character. This goal is articulated in the vision for the community:

- The Town's rural character is viewed as a significant benefit that should be preserved
- As a community, there is a strong sense that conservation of our natural resources, including Caspian Lake, should be a high priority
- Greensboro continues to attract and enjoy vibrant and unique small businesses that sustain tourism, support our economy, and are gathering places for local residents
- Greensboro is attractive for both retired families as well as new families raising young children. This balance is what will make ours a special community
- Greensboro, a small New England town, is the home of many cultural opportunities typical of larger towns
- The community offers a multitude of recreational activities for young and old
- The community strongly supports maintaining the Lakeview School, with the important benefits it provides to the community

Other Plans and Regulations: Greensboro last updated its Zoning Regulations in 2015. The Planning Commission is working on an amendment to its Zoning Regulations, which is likely to coincide with a FEMA's long-awaited release of a updates to the flood maps. This release will probably require some amendments to the flood hazard regulations to ensure ongoing participation in the National Flood Insurance Program.

The Town's flood hazard bylaws are included as a section of the zoning regulations and, as such, are administered and enforced by the town zoning administrator. She confers with the state floodplain manager when she has questions or concerns regarding compliance with the National Flood Insurance Program (NFIP). Greensboro joined the NFIP in 1985.

The Town has adopted the 2013 Road and Bridge Standards, provided by the state, in 2013.

The Town also updates and readopts its Local Emergency Management Plan each spring. It has not adopted river corridor protection standards.

D. Significant Development Trends

Development is incremental and slow, with about a half-dozen zoning permits issued for residential structures each year. Nevertheless, there are two significant development trends that are changing the community's vulnerability to natural hazards.

This section of the plan satisfies 44 CFR § 201.6(d)(3): Was the plan revised to reflect changes in development?

Municipal Roads General Permit

Act 64, the Vermont Clean Water Act, requires the state to develop a new Municipal Roads General Permit (MRGP). The MRGP requires Greensboro to conduct Road Erosion Inventories (REIs) for hydrologically connected municipal road segments. The ANR Natural Resources Atlas shows hundreds of road segments in the town that will be included in this regulation. Greensboro will also be required to

develop Road Stormwater Management Plans for all hydrologically connected road segments not meeting MRGP standards. Greensboro would then be required to implement the Road Stormwater Management Plans over time, reaching full compliance by 2035. Road improvements, which generally consist of gravel resurfacing and stone-lined ditching, also can make the roads more resilient in conveying excess water. Roads that were brought up to standard generally fared well in the most recent flood. Ongoing compliance with MGRP will improve the flood resilience of our roads, which are most likely to be damaged in flooding.

The Revitalization of Greensboro Bend

Greensboro’s two villages are separate and distinct and are marked by economic disparity. In recent years, the Bend has been the focus of revitalization efforts that include expanding and improving housing stock, beautifying streets, and expanding economic opportunity, especially through ties to the Lamoille Valley Rail Trail. The 93 mile all season recreation trail --the longest rail trail in New England – goes directly through the Bend, creating unprecedented opportunity for local businesses to capitalize on recreational tourism. Unfortunately, the LVRT flooded only weeks after its completion. A culvert along the LVRT caused extensive flooding damage to a home and displaced a home daycare. Major portions of the trail are closed for now, but Greensboro must plan for its full reopening (possibly the end of 2024) and needs to prioritize its safety and compatibility with neighboring properties in the Bend.

E. Climate and Future Natural Hazards

An analysis of FEMA disaster declarations indicates weather extremes are becoming more commonplace in Vermont.

There are two types of disaster declarations provided for in the Stafford Act: Emergency Declarations and Major Disaster Declarations. Both declaration types authorize the President to provide supplemental federal disaster assistance.

- **Emergency Declarations:** An Emergency Declaration can be declared for any occasion or instance when the President determines federal assistance is needed. Emergency Declarations supplement State and local efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe in any part of the United States. The total amount of assistance provided for a single emergency may not exceed \$5 million. If this amount is exceeded, the President shall report to Congress. Sometimes an Emergency Declaration is followed by a Major Declaration.
- **Major Declaration:** The President can declare a Major Disaster Declaration for any natural event that the President believes has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work.

From 1964 to 2007 there were 12 major declarations in Orleans County (two of which were statewide), and one emergency declaration for heavy snowfall. From 2011 to the present, Orleans County has already had 12 major declarations and one emergency declaration. The majority of these declarations have involved flooding.

Table 1E.4: FEMA Disaster Declarations in Orleans County, FY1964-present

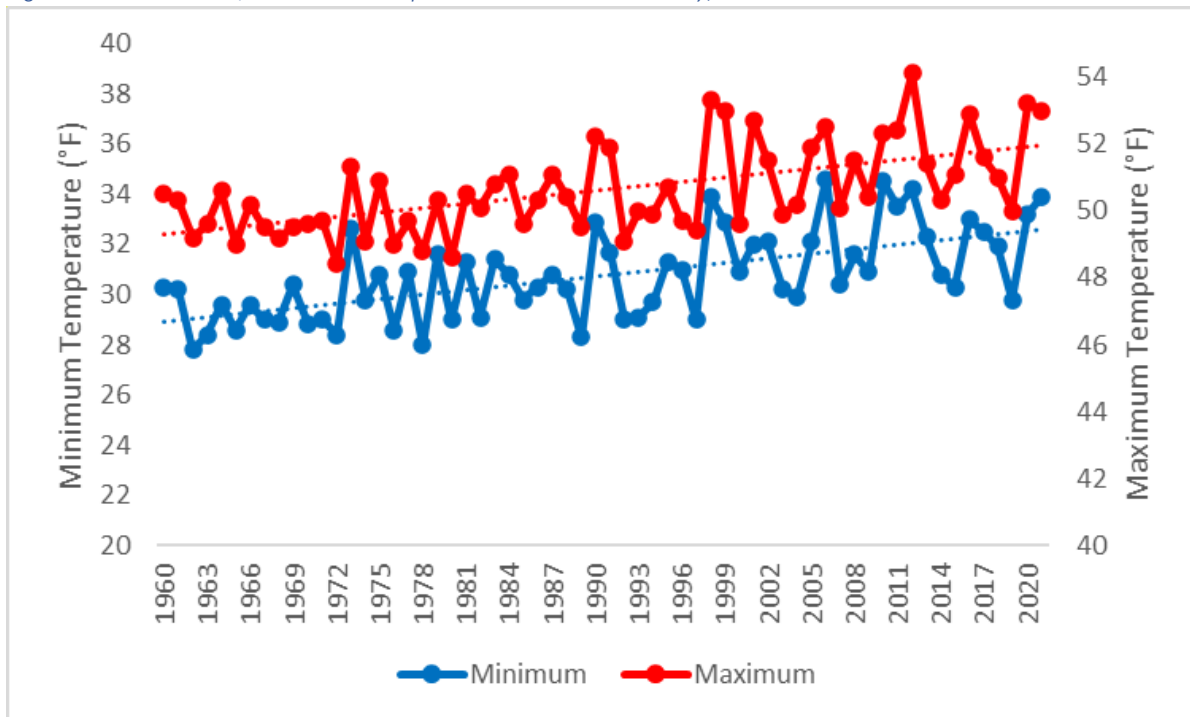
Declaration Number	Declaration Date	Incident Description
DR-160-VT	11.02.1963	Drought and impending freeze (this was a statewide declaration)
DR-164-VT	03.17.1964	Flooding (this was a statewide declaration)

DR-397-VT	07.06.1973	Severe storms, flooding and landslides
DR-518-VT	08.05.1976	Severe storms, high wind, and flooding
DR-1063-VT	08.16.1995	Excessive rainfall, flooding
DR-1101-VT	02.13.1996	Ice jams and flooding
DR-1184-VT	07.25.1997	Excessive rainfall, high winds, and flooding
DR-1228-VT	06.30.1998	Severe storms and flooding
DR-1307-VT	11.10.1999	Tropical Storm Floyd
EM-3167-VT	04.10.2001	Snow
DR-1428-VT	07.12.2002	Severe storms and flooding
DR-1559-VT	09.23.2004	Severe storms and flooding
DR-1715-VT	08.03.2007	Severe storms and flooding
DR-1995-VT	06.15.20011	Severe storms and flooding
DR-4022-VT	09.01.2011	Tropical Storm Irene; earlier declaration was EM-3338 on 8.29.2011
DR-4066-VT	06.22.2012	Severe storm, tornado, and flooding
DR-4140-VT	08.02.2013	Severe storms and flooding
DR-4163-VT	01.29.214	Severe winter storms
DR-4178-VT	06.11.2014	Severe storms and flooding
DR-4207-VT	02.03.2015	Severe winter storm
DR-4356-VT	01.02.2018	Severe storm and flooding
DR-4380-VT	07.30.2018	Severe storm and flooding
DR-4474-VT	01.17.2020	Severe storms and flooding
DR-4532-VT	04.08.2020	Biological – COVID 19 Pandemic; earlier declaration was EM-3437 on 03.13.2020
EM-3567-VT	08.22.2021	Hurricane – Tropical Storm Henri
DR-4720-VT*	07.14.23	Severe Storms, Flooding, Landslides, and Mudslides

Bolded text denotes public assistance FEMA funding for damage to public infrastructure in Greensboro. Note: Open FEMA only has public assistance records going back to 1999. Pre-1999 public assistance data comes from the 2005 Greensboro All-Hazards Mitigation Plan. *Public assistance for DR-4720 is anticipated.

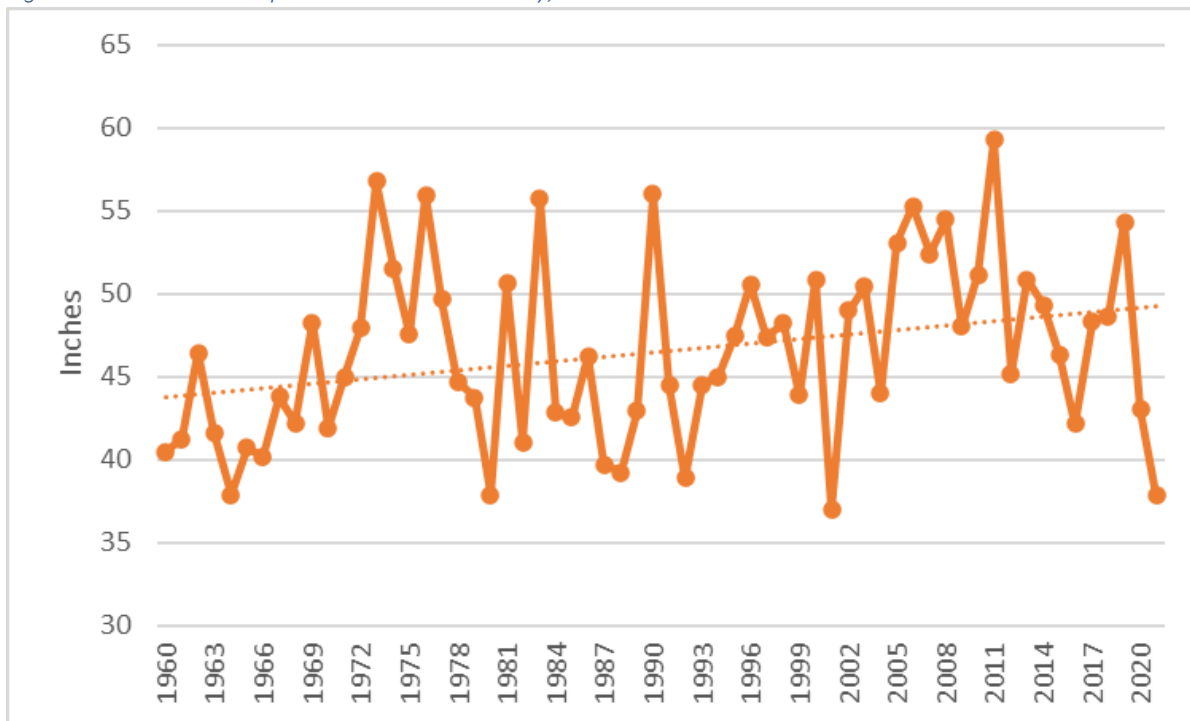
In recent years, it has become evident that human activities, mostly associated with the combustion of fossil fuel, have added to the natural concentration of greenhouse gases in the atmosphere and are contributing to rapid climate change on a global scale. An analysis of annual minimum and maximum temperatures in Orleans County shows that minimum temperatures are generally rising faster (.6°F per decade) than maximum temperatures, (.4°F per decade). (See Figure 1E.2).

Figure 1E.2: Minimum/Maximum Temperatures in Orleans County, 1960-2020



Annual precipitation is rising at a rate of about .89" per decade (See Figure 1C.3). While projections of the effects of climate change vary, it is generally predicted that the region can expect to have warmer temperatures year-round, with warmer, wetter winters, and increasingly erratic patterns of precipitation.

Figure 1E.3: Annual Precipitation in Orleans County, 1960-2020

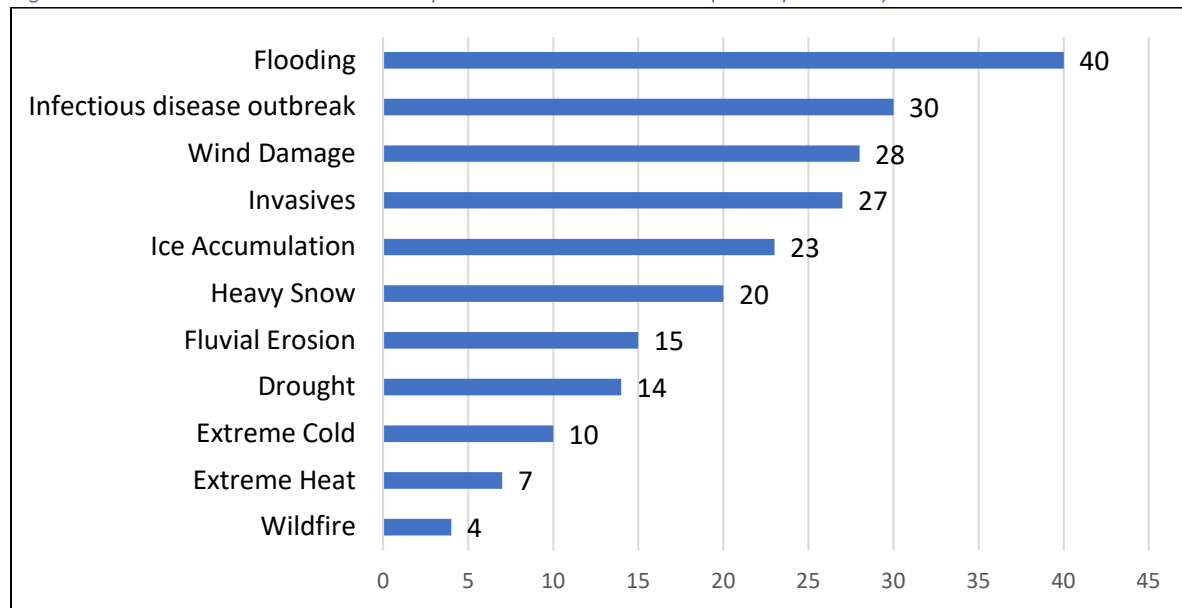


Sources: NOAA Climate at a Glance

USDA’s recent drought disaster declaration in Orleans County (and all other counties in Vermont) is not an aberration from the warming trend: According to the University of 2021 Vermont Climate Assessment, increasing variability of rain patterns and water tables makes both flooding and drought likely possibilities. We are moving to extremes: either too much rain or not enough. An increase in precipitation may result in increased flooding and fluvial erosion. Drier summers may increase the chance of drought and wildfire. A warmer climate may also result in the influx of diseases and pests that cold winters previously prevented. The Intergovernmental Panel on Climate Change (IPCC) forecasts a temperature rise of 2.5°F to 10°F over the next century, which will affect different regions in various ways over time. Increasing temperatures are expected to significantly exacerbate the impacts of natural hazards and net economic damages will continue to rise².

Greensboro residents who responded to the Community Survey indicated that they have primarily experienced flooding, infectious disease outbreak, and wind damage. (Figure 1E.4) Those who specified impacts included restricted travel due to impassable roads in severe weather, downed trees, and power outages.

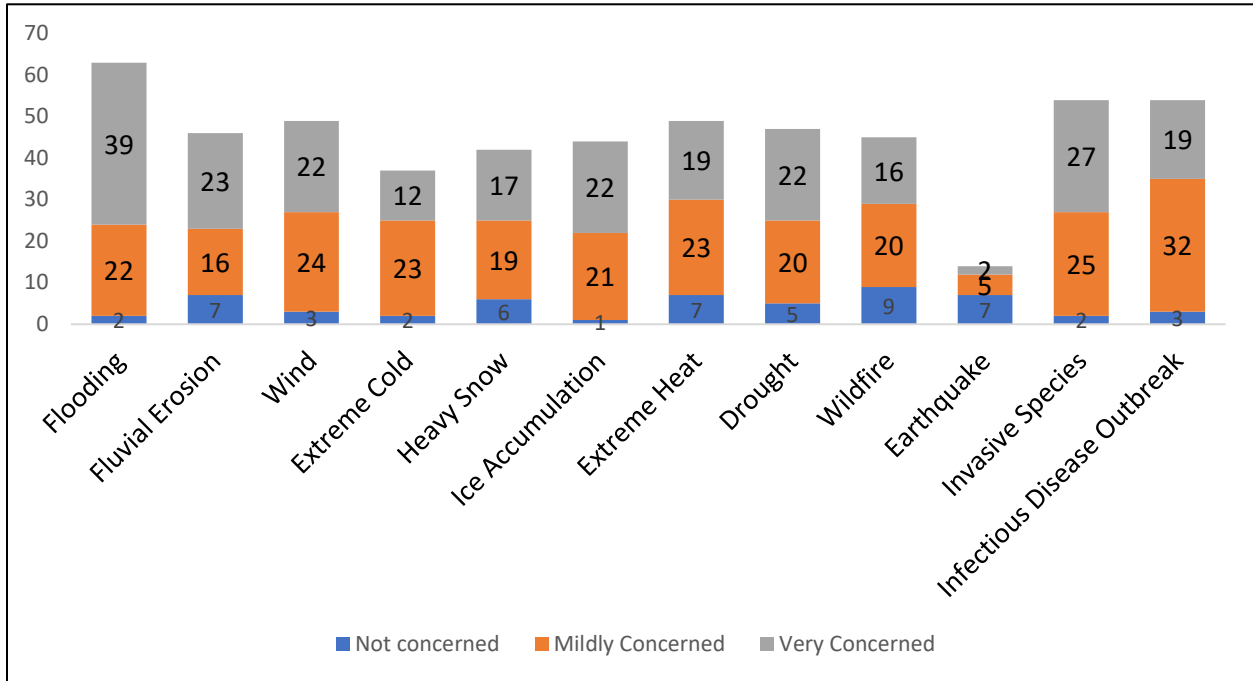
Figure 1C.4: What Hazards Have You Experienced in Greensboro? (60 respondents)



² World Economic Forum: Climate Change is Making Disasters More Expensive. <https://www.weforum.org/agenda/2018/10/climate-disasters-cause-global-economic-losses-un/>

Greensboro residents may be anticipating a wider array of natural hazards in the future (Figure 1E.5).

Figure 1E.5: How concerned are you about the following hazards? (61 respondents)



2. GREENSBORO HAZARDS AND POTENTIAL IMPACTS

A. Hazard Identification Process

Effective mitigation efforts must be based on a rational evaluation method that answers three basic questions:

1. What bad things can happen, given the town's vulnerabilities and loss history?
2. How likely are these hazards to occur?
3. How bad could they be?

The tables below represent Greensboro's inventory of known hazards, a determination of the likelihood of future occurrences, and assessment of the community's vulnerability. By performing this analysis we can then prioritize actions to mitigate the impacts of each of these hazards and make Greensboro a safer place.

To answer the above questions, we assembled as much data and insight on past events that we could find. Disasters that have occurred in the Town, the larger region, and the State of Vermont can give us good information about what types of disasters we can expect in the future and what kinds of damage they might cause. However, while historical data shapes our

perspective, past losses are by no means a crystal ball for predicting future events. Climate change is already changing our weather patterns, which means we can expect a proliferation in storm events with severe impacts as well as new challenges, like drought in summer and long winters characterized by heavy ice accumulation. Armed with historical data and a healthy respect for climate change and the unknown, the plan represents the town's best attempt to identify hazards and prepare for the future.

This section of the plan satisfies requirement of CFR §201.6(d)(3): Was the plan revised to reflect changes in priorities?

Greensboro's 2017 Local Hazard Mitigation Plan identified the following hazards as the highest risk to the community:

- unsafe travel or extended power outages from severe winter weather (including ice storms) or thunderstorms;
- large structure fires in the village (man-made hazard)
- severe wind (from hurricanes, severe thunderstorms or winter storms)
- flooding (from Caspian Lake dam failure, hurricanes, severe thunderstorms, ice jams or severe winter storms)

To update the plan, the Greensboro Hazard Mitigation working group considered the hazards profiled in the 2018 Vermont Hazard Mitigation Plan, as well as all the hazards originally assessed in the 2017 Greensboro Plan. The group revised priorities along these guidelines:

- **Events vs. Impacts:** The 2017 plan indicates a differentiation between causes (such as events) and cascading hazards that result from those events. The current Vermont State Hazard Mitigation Plan makes the same distinction by assessing the *impacts of events* (e.g. inundation flooding, fluvial erosion, wind, cold). This is a logical way to assess hazards since it is the impacts, not the events, that can be mitigated. For example, while tornadoes are not as common as microbursts in Vermont, both events can produce powerful winds that damage structures and bring down trees.

- **Natural vs. Man-made:** Man-made disasters in local plans, such as structure fires, are not reviewed by FEMA or Vermont Emergency Management staff. In fact, FEMA does not provide mitigation funds for man-made hazards. While structure fires are not insignificant concerns, the Greensboro Hazard Mitigation working group felt it was prudent to address man-made hazards through other more appropriate channels, such as regional emergency preparedness exercises. Nevertheless structure fires, a man-made hazard considered in Greensboro’s previous plan should be considered as a *vulnerability* to natural hazards, such as extreme cold (which may encourage unsafe use of space heaters) or extreme heat or drought (which can increase risk for fire.)

It is important to note that since the development of its 2017 plan, Greensboro remains a rural community marked by low-density rural development. *Learned experiences*, rather than changes in development patterns, have reshaped hazard planning priorities. Since 2017 the myriad impacts of climate change, such as the introduction of invasive and non-native species, rising temperatures, and increasingly erratic weather patterns, have intensified. Moreover, global pandemic and its crippling impact on nearly every aspect of daily life is no longer a hypothetical risk.

Table 2A.1: Greensboro Hazards, 2017 vs. 2023

Hazards originally considered in 2005	...are now considered
Flood (from severe thunderstorms, hurricane, or tropical storm event) Ice Jam (flooding) Dam failure	Fluvial erosion Inundation flooding (with a consideration of high hazard dams)
Wind (from thunderstorm or hurricane) Tornado (wind)	Wind
Ice Storm Severe Winter Storm	Snow Ice Cold (with structure fires a vulnerability of a heating season)

Greensboro’s Plan from 2017 also evaluated wildfires, earthquakes, and landslides, infectious disease, invasives, temperature extremes, and hail, which are also evaluated in the 2018 Statewide Hazard Mitigation Plan. Greensboro’s core project team then evaluated a list of hazards using the same methodology to determine their highest priority hazards:

Probability x Average impact score = Overall Score

Table 2A.2: Probability and Impact Scoring

Score	Probability	Score	Impact
1	Unlikely: <1% probability in any year	1	Negligible: isolated occurrences of minor property and environmental damage, potential for minor injuries, no to minimal economic disruption
2	Occasionally: 1-10% of occurrence in any year; at least 1 chance in 100 years	2	Minor: isolated occurrences of moderate to severe property and environmental damage, potential for injuries, minor economic disruption
3	Likely: >10% but < 75% in any year; at least one chance in next 10 years	3	Moderate: severe property and environmental damage on a community scale, injuries or fatalities, short-term economic impact

4	Highly likely: >75% in any given year
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4	Major: severe property and environmental damage on a community or regional scale, multiple injuries or fatalities, significant economic impact
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Table 2A.3 All Hazards Assessed

Hazard Impact	Probability	Infra-structure	Potential Impact				Avg.	Score
			Life	Economy	Environment			
Fluvial Erosion	4	4	4	4	4	4	16	
Inundation Flooding	4	4	4	4	4	4	16	
Ice	4	2	2	2	1	1.75	7	
Snow	4	2	2	1	1	1.5	6	
Wind	4	3	2	2	1	2	8	
Heat	3	2	2	2	2	2	6	
Cold	4	2	3	2	1	2	8	
Drought	3	2	2	3	3	2.5	7.5	
Landslide	2	2	2	1	1	1.5	3	
Wildfire/Forest Fire	3	2	2	1	3	2	6	
Earthquake	1	1	1	1	1	1	1	
Invasive Species	4	1	1	3	4	2.25	9	
Infectious Disease Outbreak	4	1	3	4	1	2.25	9	
Hail	3	1	1	2	2	1.5	4.5	

The highest risks to the town (risks to be profiled) were those with an overall score of six or higher. Landslide, hail, and earthquake have a low probability and were not be profiled. Each of the “priority” hazards were profiled to identify the following factors in accordance with FEMA requirements:

- **Location:** General areas in community that may be vulnerable to the hazard.
- **Vulnerability:** Community structures, systems, populations, or other assets as defined by the community that are susceptible to damage and loss from hazard events.
- **Extent:** The strength or magnitude and details of the most notable event(s).
- **Observed impact:** Financial impact from an event, and/or the number of structures that are impacted.
- **Likelihood/Probability:** Occasionally: 1-10% of occurrence in any year; at least 1 chance in 100 years; Likely: >10% but < 75% in any year; at least one chance in next 10 years; Highly likely: >75% in any given year

B. Hazard-Specific Information for Profiled Risks

1. Infectious Disease Outbreak

COVID's unprecedented disruption of daily life is a grim reminder that climate change increases the risk of future infectious disease outbreaks. According to the Centers for Disease Control, vector borne illnesses such as Lyme disease, West Nile virus disease, and Valley fever are already on the rise and spreading to new areas of the United States. Milder winters, warmer summers, and fewer days of frost make it easier for these and other infectious diseases to expand into new geographic areas and infect more people.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Infectious Disease Outbreak

The COVID-19 pandemic resulted in the first ever major disaster declaration of all 50 states, five territories, and the District of Columbia. In March of 2020, by Executive Order No. 01-20, the Governor declared a State of Emergency for Vermont, and restrictions to protect public health were enacted.

While a variety of measures were recommended by the Center for Disease Control and the Vermont Department of Health to help curb the spread of disease, including frequent hand washing, wearing masks, and keeping a distance of 6 feet from other persons, vaccination was identified as the best way to keep from getting and spreading COVID-19. In Vermont, the vaccine was first made available to residents and staff of long-term care facilities in December 2020, and then to those 75 and older in mid-January 2021. The Vermont State of Emergency was extended for over a year until all restrictions were lifted on June 14 of 2021, when the benchmark of an 80% vaccination rate for the eligible population of Vermont was reached.

Even though the State of Emergency is behind us, the long-term impacts are still unclear. As of August 2023, the Vermont Department of Health reports that COVID hospitalizations are low, and there is one case reported in Orleans County. As of July 2023, the Vermont Department of Health reports 992 COVID deaths in Vermont, with 7,152 cases and 49 deaths in Orleans County. The death toll is based on death certificates that list COVID as a cause or probable cause of death. The Department of Health does not publish death counts at the municipal level.

Despite the recent flooding, the pandemic was still a predominant natural hazard concern among Greensboro survey respondents – for past experiences and concern over future hazards. Thirty respondents reported they had been adversely affected, with multiple respondents alluding to isolation and hindrance of gainful employment. Thirty-two respondents were mildly concerned about future infectious disease hazards and 19 respondents were extremely concerned. Essential services, government operations, schools and businesses were severely disrupted during COVID, requiring rapid implementation of safety protocol to continue critical operations. While “social distancing” was an appropriate response to mitigate the spread, all sectors of Greensboro population experienced some form of disruption, especially those with no broadband or spotty broadband coverage. The pivot to a virtual environment has demonstrated that reliable broadband is a vital utility for business, work, school, healthcare, and civic involvement.

The Greensboro Nursing Home reports that isolation was the biggest challenge for their residents. The nursing home reports receiving clear guidance on mask and vaccine mandates and increased testing, as well as strong support from community and government to have sufficient personal protective equipment and even tablets for Zooming. The nursing home successfully avoided COVID for the first two years, and there were no reported cases in the home until vaccines were available. One resident did pass, but they were already in hospice care.

The Lakeview School went remote from March 16 until the end of the school year. There was a delayed opening the second year allowing staff for time to plan for effective social distancing practices. The greatest difficulty may have come from masking when prevents important nonverbal communication with students.

Understandably, the Town government had to pivot as well. Act 162 allowed the Town to hold Town Meeting via Australian Ballot in 2021 and 2022. Town offices can only be reopened and operated in compliance with the State’s “Work Safe” guidance as authorized by the Governor’s executive order. Town offices were adapted to allow for plexiglass separation from the main entranceway, an improvement that had been needed for some time.

With so many individuals unable to work or working reduced hours, food insecurity (defined as a lack of consistent access to enough food for an active, healthy life³) increased. In a University of Vermont survey, 441 Vermonters were interviewed at the following intervals: March/April 2020, June 2020, and March/April 2021. Of those surveyed, 31.9% were food insecure at some point during the pandemic. Of those who experience food insecurity during the pandemic, 46.9% were food insecure prior to the pandemic but the remainder were *newly* food insecure. The survey also found that those who were more likely to experience food insecurity were people without a college degree, those with a job disruption, households with children, women, and younger people.⁴

Business also experienced losses. One major employer in town, a value-added agricultural producer, experienced revenue losses due to the loss of restaurant and institutional customers. Both grocery stores in town had to introduce adaptive measures, such as curbside pickup and delivery.

Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Townwide	Seniors, people with underlying conditions; critical facilities and healthcare, and schools	Statewide emergency declaration from March 13, 2020 to June 14, 2021.	49 confirmed deaths in Orleans County, local outbreak, no published data on death counts at the municipal level, job loss, loss of business revenue, food insecurity; isolation	Highly likely: >75% in any given year

2. Flooding (Inundation and Fluvial Erosion)

Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and result in fatalities. People may be stranded in their homes for a time without power or heat, or they may be unable to reach their homes. Long-term collateral dangers include the outbreak of disease, loss of livestock, wash out of septic systems causing water supply pollution, downed power lines, loss of fuel storage tanks, fires and release of hazardous materials.

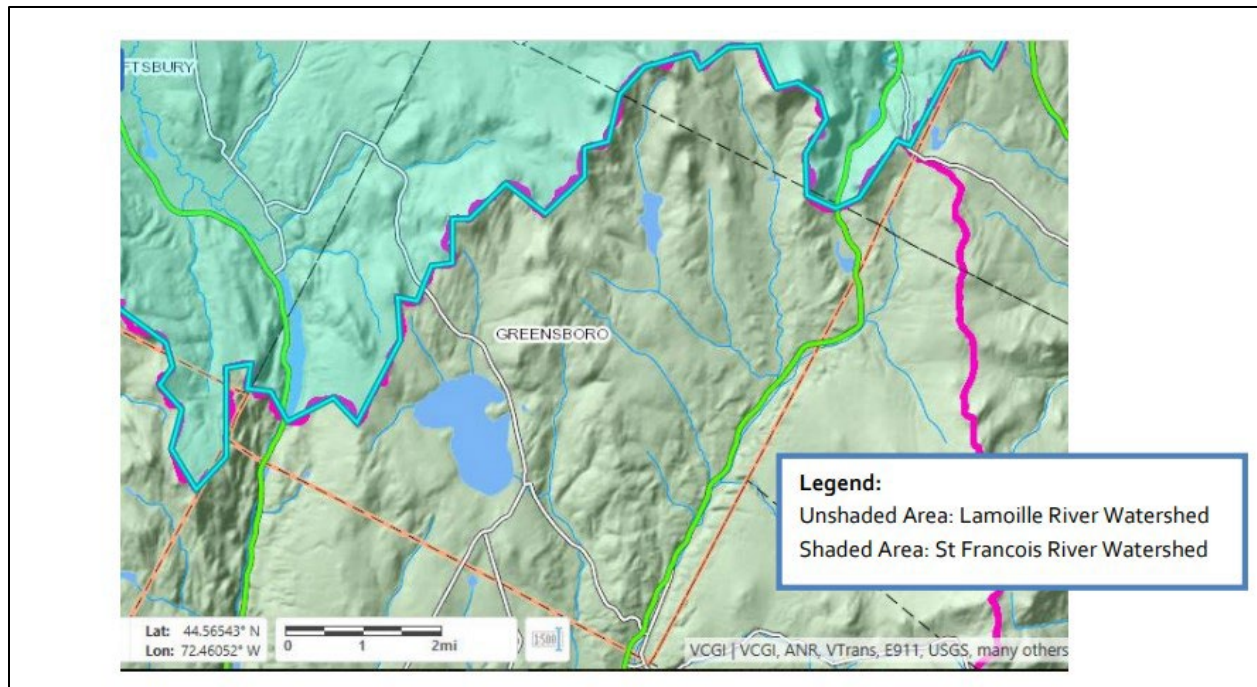
Greensboro lies within two watersheds: the Upper Lamoille River watershed, and the St. Francois watershed (a sub-basin of the Lake Memphremagog watershed). The Upper Lamoille River watershed is fed by an area of about 720 square miles, beginning at the headwaters in Greensboro. Most of the streams in Greensboro ultimately drain into the Lamoille River (the only exception is Eligo Lake, which drains to

³ Feeding America. What is Food Insecurity? <https://hungerandhealth.feedingamerica.org/understand-food-insecurity/>

⁴ University of Vermont. Food Security Impacts of the COVID-19 Pandemic: Following a Group of Vermonters During the First Year <https://scholarworks.uvm.edu/calsfac/186/>

the St. Francois watershed). Whetstone Brook and Whitney Brook drain into Lake Memphremagog. (Figure 2B.2.1)

Figure 2B.2.1: Watersheds in Greensboro



Source: Greensboro Town Plan, Vermont Center for Geographic Information

Inundation Flooding

This is the type of flooding that occurs when heavy precipitation and ice jams cause streams to spill over into adjoining low-lying lands called floodplains. This risk is associated with moderate to severe community scale impact to life, economy and environment due to damage to personal property, businesses, and business disruption. Major community-scale environmental impacts may be due to sedimentation deposit, loss of crops and loss of water quality. There is also potential for moderate to severe, but isolated damage to infrastructure, particularly roads. Inundation may also leave roads impassable due to standing water.

Greensboro adopted floodplain regulations in 1985, which reference the FEMA Flood Insurance Rate Map (FIRM), which was first identified and made effective in 1985. This map depicts inundation flooding risk. Inundation flooding, which is characterized as the rise of riverine and lake water levels, occurs during significant levels of precipitation from rainstorms, thunderstorms, or hurricanes or tropical storms. It can also occur due to rapid snow and ice melt during rapidly rising temperatures in the late winter or spring.

Greensboro's FIRM is a paper map (i.e. not georeferenced) and is organized on 14 separate panels, two of which are not printed by FEMA because they contain no information. FEMA did not conduct a Flood Insurance Study, so the map lacks critical detail such as base flood elevations (how high the water might be expected to rise in a significant flood event) or delineation of floodways (portions of the stream channel where flood waters run the deepest and fastest during a flood). Most areas of special flood hazard appear as an "approximate Zone A" and Whetstone Brook, Long Pond, Horse Pond, Mud Pond, minor portions of Sawmill Brook, Edson Brook and Webber Brook, Paine Brook, Mud Pond Brook, Greensboro Brook, and the Lamoille River. Eligo Pond and Caspian Lake are also "Approximate A" zones. The limited map data suggests that most of structures in the inundation hazard area are 86 second

homes on the lakefront, which, as long as lake levels are managed by the dam, should not be extremely vulnerable. On the other hand, there are two mobile homes known to be vulnerable. FEMA is planning to release a new digitized FIRM soon, so reviewing the new map data will be necessary.

Development in the Zone A areas on the FIRM require a permit. Because the paper map is difficult to interpret, most of the permits for development have been found to be located outside of the flood hazard area.

Dam failures can be a source of flooding risk. There are three dams in Greensboro. Two of them are privately owned and are rated low hazard potential by the state. The earthen dam at Caspian Lake was built in 1929 and reconstructed in 1948. The dam is seven feet high and 205 feet in length. Approximately 2300 ac-ft of water is stored in Caspian Lake under normal conditions. Its maximum storage capacity is 4,300 ac-ft of water. The Caspian Lake Dam, because of the storage volume, is called a “jurisdictional dam” by the Dam Safety section of the Vermont Department of Conservation. This dam is classified as “significant hazard potential” by the Dam Safety section because a dam failure could result in “a few fatalities and/or appreciable economic loss”. (The rating refers to the potential for damage, not the condition of the dam.) Dams with this classification must be inspected every 3-5 years. Three most recent inspections were 2011, 2017, and 2022.

The owner of the Caspian Lake Dam is Hardwick Electric. The conditions of the dam have been consistently “poor” since 2011.

A 2022 report released by the Vermont State Auditor documents that many high hazard dams remain in poor condition for years, endangering property and lives. (It has been at least 11 years for Caspian Lake.) During the most recent flood, the Vermont Department of Environmental Conservation authorized opening the weir when the lake level crested at 27” higher than it was on the Sunday before the heavy rain began. HED had the key to open the weir and could not respond right away because of the flooding in Hardwick.

Fluvial Erosion

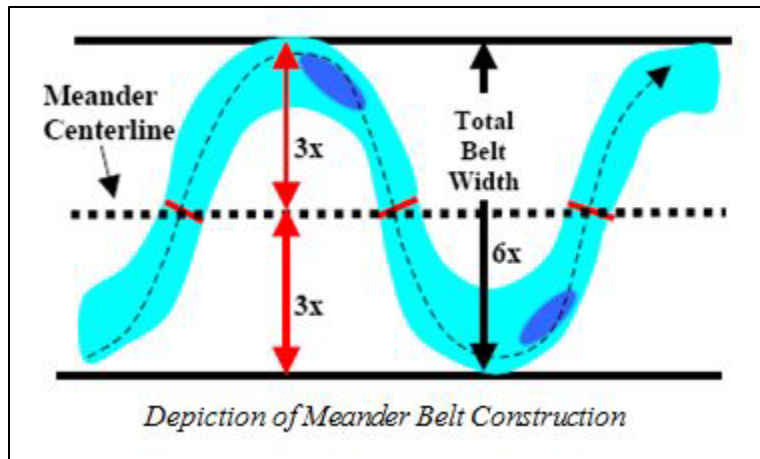
The Vermont Agency of Natural Resources estimates that inundation areas have only been mapped for about 20% of Vermont’s stream miles. The more common mode of damage is associated with the dynamic, and often catastrophic, physical adjustment of stream channel dimensions and location during storm events. These adjustments are often due to bed and bank erosion, debris and ice jams, or structural failure of or flow diversion by man-made structures. Fluvial erosion can lead to moderate to severe community-scale damage to infrastructure, which includes washed out roadways. There also can be major community-scale impacts to environment, which includes collapse of streambanks, and severe disruption of riverine habitat. Increased sedimentation loads can damage water quality. There are moderate-to-severe threats to personal safety, private property, and businesses from structural damage, but these are likely to occur on an isolated scale.

The Vermont Rivers Program of the Agency of Natural Resources has released statewide data on areas subject to fluvial erosion for all streams and rivers. These risk areas are defined by Vermont Statute as “River Corridors,” 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.

Mapped river corridors along streams with a drainage area of two miles or more consist of two components: a *meander belt* and a *riparian buffer*. The meander belt is an area calculated to accommodate the amplitude of stream meanders that have or will form in response to the laws of physics which dictate that channel depth and slope evolve toward a state of minimal work (i.e., equilibrium or least erosive

form). The width of the meander belt will vary depending on the amount of land draining to a given point on a stream, so the River Corridor width varies in part based on stream size. (See Figure 2B.2.2)

Figure 2B.2.2: River Corridor Meander Belt



Source: Vermont Agency of Natural Resources, <https://floodready.vermont.gov/>

The riparian buffer is an extension of the meander belt to provide additional protection. A naturally vegetated buffer helps to protect streambank stability if the meander moves to the edge of the meander belt. If this extension were not included and structures were planned at the very edge of the meander belt, a prospective home or business owner would need to armor the riverbank to protect the structure.

For streams with a drainage of less than two square miles, a riparian buffer of 50 feet on either side of the top of the streambank is deemed sufficient to accommodate lateral movement of the stream channel.

The Vermont Agency of Natural Resources (ANR) mapped the major river corridors along streams with a drainage of at least two square miles. In Greensboro, this includes the Lamoille River and Greensboro Brook, Mud Pond Brook and Sawmill Brook. The river corridor varies in width for the three streams and is about 450 ft for the Lamoille River along Greensboro Bend and includes properties currently outside of the FEMA mapped floodplains.

ANR's River Corridor Maps do not indicate any required action on the part of municipalities. They are developed to facilitate ANR's responsibilities in Act 250 to protect public safety from fluvial erosion hazards and to regulate activities exempt from zoning. Municipalities are strongly encouraged – but are not required – to regulate development in the river corridor as part of their flood hazard regulation. Given the amount of sediment load and stream instability in both of Greensboro's watersheds, there are significant advantages to adopting river corridor regulations. There is also a cost benefit to the Town: Communities that regulate river corridors can receive an extra 5% to cover their share of public assistance losses, which may be a significant amount of money when there are substantial losses. River corridor regulation essentially prohibits building any closer to the river than what is already there, so while there may be substantial economic and environmental benefit in doing so, it will likely affect property owners. The topic requires careful consideration and public discourse.

Most of the flooding that Greensboro experiences is flash flooding. Flash floods occur when severe storms drop high amounts of rainfall in short periods of time. Precipitation falls so quickly that the soil is unable to absorb the water, which results in surface runoff that collects in small, upstream tributaries, that then moves quickly downstream at a high velocity. Stream alteration from fluvial erosion will exacerbate the effects of flash flooding. Due to the town's topography, Greensboro typically experiences some fluvial

erosion with each major flooding event listed. However, extent data for fluvial erosion is unavailable due to a lack of a central repository for this information to be collected after flood and fluvial erosion events.

The traditional benchmark for flooding is the Flood of 1927. However, at the time of this writing, the entire state is still reeling from the impact of historic flooding from a powerful July storm that dumped as much as 9” of rain on soils already saturated by an unusually rainy summer. At least one person died, and hundreds of Vermonters were forced to evacuate their homes. Roads were closed statewide. Farm fields became inundated, and acres of crops were destroyed. Wastewater systems were compromised as well. Orleans County was only added to the FEMA disaster declaration 4720 on July 26, 2023, and while it is far too early to estimate the extent of damage, Greensboro has experienced the worst flooding in living memory.

As in previous floods, flood damage was generally restricted to roads and bridges. However, the Town’s losses are likely to meet or exceed \$1 million: Sparhawk, Gonyaw, Schoolhouse, Lake Shore, and Shadow Lake were all damaged, including two bridges. Personal property was destroyed as well. A house in the Bend was severely damaged by a culvert from the neighboring Lamoille Valley Rail Trail, displacing a home daycare. Two private bridges on residential driveways were damaged, leaving people unable to safely access their homes. A gravel slide down Schoolhouse Road destroyed a car. Several people experienced damage to land and drainage, and there were plenty of wet basements. The destruction of roads left people unable to travel. Caspian Beach was closed for a few days due to high bacteria levels. While there is some speculation that the contamination came from an old and flooded private septic system, the data is inconclusive. A second reading on bacterial levels showed that the lake was safe for swimming, suggesting that the initial reading was an aberration.

There is no truly effective forensic accounting to determine which losses could be attributed to inundation or fluvial erosion. There was one visible instance of streambank erosion in the Bend, but this pales in comparison to the seismic stream channel shifts that occurred in neighboring Hardwick, where the Lamoille jumped its banks to remove the entire westbound lane on Route 15, and a bend in the river collapsed and destroyed a landmark motel.

Earlier flooding losses are summarized below.

Table 2B.2.1: Significant flooding events in Greensboro

Date	Description and Impacts	FEMA Public Assistance
07/11/2007	On the afternoon of July 11 th , a warm and very moist airmass was draped across Vermont. In addition, a slow moving cold front entered Vermont from west to east during the afternoon. This front promoted the development of numerous tropical-like showers and thunderstorms, that repeatedly generated and moved over the same areas of central and eastern Vermont. Localized heavy rainfall exceeded 3 inches within a two-hour time frame with some localized storm totals approaching 6 inches across a very hilly or mountainous terrain, which resulted in flash flooding of several communities. A Presidential Federal Flood Disaster 1715 was declared in Washington, Windsor, Orange, Orleans, and Caledonia counties with an estimated storm damage total in excess of 3 million dollars. Flooded roadways and fields in and around Greensboro due to flooded streams spilling onto roads, including Wilson Street. Damage to corn crops as well. Road damaged included Hanks Hill, Hillcrest, Gebbie, Harrington Hill, Lakeview, Garvin Hill, Eligo, and White.	\$124,291

06/01/2011	A severe storm caused flash flooding resulting in FEMA declaration 1995. Greensboro public assistance from FEMA for debris removal in multiple locations, including Cemetery Ridge and Baker Hill.	\$11,823
09/01/2011	Tropical Storm Irene moved across southeast New York and southwest New England during the morning hours of August 28th and then proceeded to track north along the Connecticut River Valley in Vermont during the afternoon and evening. The main impact from Irene was widespread devastating flooding, especially for central and southern Vermont. Widespread rainfall amounts of 3-5 inches occurred across Vermont with 5 to 7+ inches across much of southern, central Vermont and elevations above 1000 feet along the spine of Vermont's Green Mountains and the Worcester range. This event resulted in disaster declaration 4022, and the Town FEMA public assistance, primarily for repairs to Atherton Road and Gebbie Road. The first day of school was cancelled due to flooded roads and disruption.	\$35,141

Table 2B.2.2: Flood Hazard Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Land adjacent to streams, lakes, and ponds, river corridors, inundation areas around dams, roadways and areas downstream of undersized culverts and bridges	Culverts, bridges, a significant hazard dams in poor condition. Properties around lake; septic systems. 2 structures probably in floodplain; others in river corridor possibly outside of floodplain	DR4720, with up to \$1 million in public infrastructure damages. Extent data on flooding due to fluvial erosion is unavailable. No historical data on dam failures	Damage and debris to roads; flooding to residential properties; some stream bank collapse; significant streambank erosion in neighboring Hardwick.	Highly likely: >75% in any given year

3. Wind

The Beaufort Wind Scale, one of the first scales to estimate wind speeds, was created by Britain's Admiral Sir Francis Beaufort in 1805 to help sailors estimate the winds via visual observations. The scale starts with 0 and goes to a force of 12. The Beaufort scale is still used today to estimate wind strengths. The table below, which focuses on specifications for land, provides perspective on the wind strengths that can be expected in Greensboro.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Wind

Table 2B.3.1: Beaufort Wind Scale

Speed				
Force	MPH	Knots (KTS)	Description	Specifications for Land
0	0-1	0-1	Calm	Calm; smoke rises vertically.
1	1-3	1-3	Light air	Direction of wind shown by smoke drift, but not by wind vanes.
2	4-7	4-6	Light Breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind.
3	8-12	7-10	Gentle Breeze	Leaves and small twigs in constant motion; wind extends light flag.
4	13-18	11-16	Moderate Breeze	Raises dust and loose paper; small branches are moved.

5	19-24	17-21	Fresh Breeze	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	25-31	22-27	Strong Breeze	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	32-38	28-33	Near Gale	Whole trees in motion; inconvenience felt when walking against the wind.
8	39-46	34-40	Gale	Breaks twigs off trees; generally impedes progress.
9	47-54	41-47	Severe Gale	Slight structural damage occurs (chimney-pots and slates removed)
10	55-63	48-55	Storm	Seldom experienced inland; trees uprooted; considerable structural damage occurs.
11	64-72	56-63	Violent Storm	Very rarely experienced; accompanied by wide-spread damage.
12	72-83	64-71	Hurricane	This is approaching a Category One Hurricane, according to the Saffir-Simpson Wind Scale: 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.

Source: NOAA

Hurricanes are rare in Vermont, as are tornadoes. The National Oceanic and Atmospheric Administration (NOAA) lists three types of wind events that have affected Greensboro from 1/1/1990 to 3/31/2022:

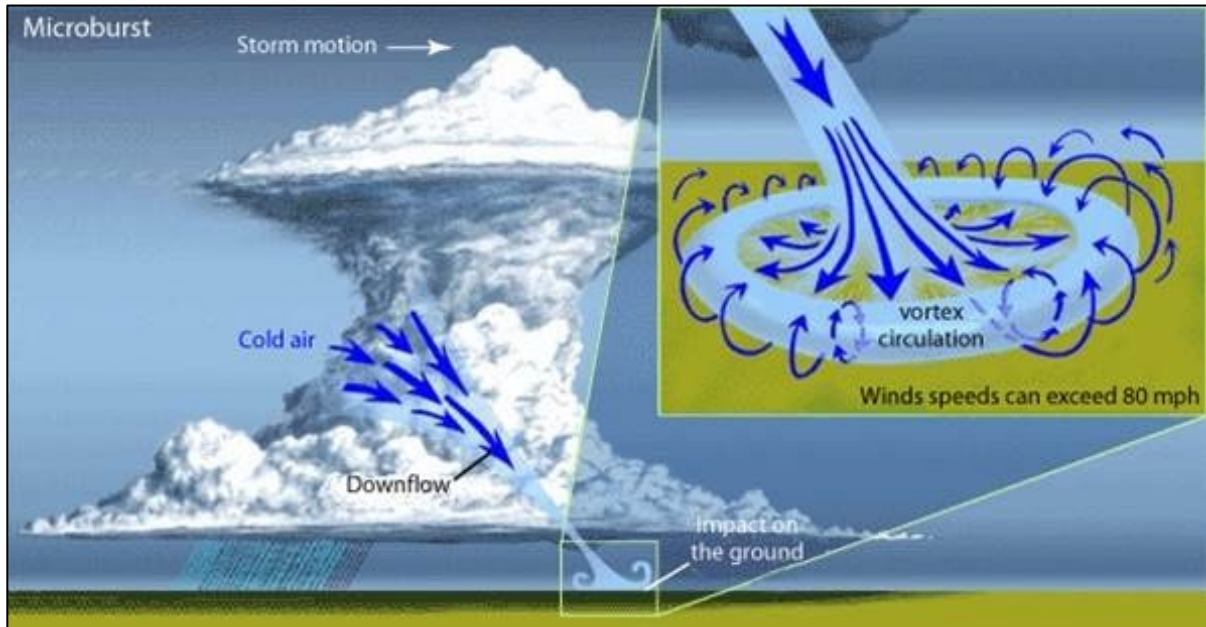
- **Thunderstorm Wind:** Winds arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 50 knots (58 mph), or winds of any speed (non-severe thunderstorm winds below 50 knots) producing a fatality, injury, or damage.
- **Strong Wind:** Non-convective winds (i.e. not associated with a thunderstorm) gusting less than 50 knots (58 mph), or sustained winds less than 35 knots (40 mph). There were 23 events reported in the NOAA Storm Event Database from 1/1/ to 9/30/2021 in Caledonia County.
- **High Wind:** sustained non-convective winds of 35 knots or greater lasting for 1 hour or longer, or winds (sustained or gusts) of 50 knots for any duration, on a widespread or localized basis.

Greensboro residents frequently experience downed trees and power outages from wind and they occasionally experience structural damage. Twenty-eight survey respondents indicated they had experienced wind damage in the past 10 years. Most respondents cited downed trees and power outages; one respondent indicated that a tree came crashing through their window. Since many residents are on private wells, they also lose their water when the power goes out.

The most damaging winds that Greensboro experiences are “straightline” winds, i.e. thunderstorm winds that are not rotational like a tornado. Of particular concern are thunderstorm winds associated with a microburst, which can rapidly approach 11 or 12 of the Beaufort Scale.

The National Weather Service defines a microburst as a localized column of sinking air (downdraft) within a thunderstorm, that is usually less than or equal to 2.5 miles in diameter. (Figure 2B.3.1)

Figure 2B.3.1: Microburst



Source: NOAA

Ideal conditions for microbursts occur in hot humid conditions and can be exacerbated by instability, high levels of precipitative water, and converging air in the middle of a thunderstorm. It occurs when large amounts of water or hail are suspended in the updraft. Evaporational cooling and sinking air weaken the updraft to the point where it can no longer hold up the large core of rain or hail. Subsequently, the core plummets to the ground, spreading out in all directions. The location where the microburst first hits the ground incurs the greatest damage, which include high winds. The phenomenon usually lasts just a few minutes, but the damage can be intense.

Forecasting for microbursts is near to short term (6-12 hours) and is based on the atmospheric conditions likely to lead to a microburst. However, microbursts can also occur without any warning at all because they can form quickly between radar scans.

Non-convective winds, though of lesser magnitude, have also inflicted damage property damage in Greensboro.

Table 2B.3.2: Significant Wind Events in Greensboro, 1990 to present

Date	Type	Magnitude	Description and Impacts	Damage
5/17/2014	Thunderstorm wind	65 kts	An unseasonably strong upper atmospheric low delivered a weak cold front and surface wave across Vermont during the early morning hours of May 17th. A thunderstorm developed across central Vermont and moved across neighboring Craftsbury, where it produced a localized microburst. Nearly a dozen trees uprooted, roof blown off barn, collapsed green-houses and minor damage to a house on Wild Branch road.	\$25,000
7/4/2012	Thunderstorm wind	55 kts	A moderately strong upper level disturbance ahead of a surface cold front moved across southern Quebec during the afternoon and	\$20,000

			evening hours of July 4th. These disturbances moved into a warm and unstable air mass and developed thunderstorms in southern Quebec, which moved across northeast Vermont during the afternoon hours and the Champlain Valley during the evening. Both episodes contained widespread wind damage and frequent lightning.	
11/01/2019	Strong Wind	48 kts	Strong winds with wind gusts in excess of 50 mph at times caused numerous downed tree limbs and subsequent power outages. Also, due to saturated soils many trees were uprooted as well, leading to closed roads and some structural damage. <i>(Note: This event resulted in FEMA Disaster Declaration 4474)</i>	\$75,000
9/17/1999	High Wind	--	The remnants of Tropical Storm Floyd moved into southern New England Thursday night (9/16/99) and then across eastern New England Friday, September 17th. Strong winds combined with saturated soils from heavy rain resulted in many trees and power lines being blown down. Approximately 10,000 people were without power. Trees were blown down blocking many area roads. Many schools were closed with numerous area events cancelled. <i>[Note: this event resulting in a federal disaster declaration 1307, and the Town of Greensboro received \$4,368 in public assistance for debris removal.]</i>	\$100,000

Table 2B.3.3: Wind Hazard Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Town-wide	Downed trees, downed power lines, extended power outages; potential for injuries from falling debris or power lines; disruption to services and businesses	Microburst on 5/17/14 with winds approaching 65 kts in neighboring Craftsbury	Trees lost, roads blocked, power outages, structural damage to houses a	Highly Likely: > 75% in any given year

4. Severe Winter Weather (Cold, Snow, and Ice)

Winter weather often results in temporary road closures, school and business delays, and even power outages. Given the high amount of snowfall this region experiences, the town and residents are generally well prepared to deal with normal winter weather conditions. Severe winter storms, however, have been shown to affect the entire region resulting in:

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Cold, Snow, and Ice

- Extensive damage to above-ground power and utility lines and extended power outages (as what happened in the ice storm of 1998);
- Road shutdowns, making general travel, transport, and emergency vehicle access difficult;
- Shutdown of schools, businesses, and local government services, limiting access to goods and services;
- Structural failure from excessive snow loading, especially barns (as in the storm of 2007);
- Injuries and fatalities from poor driving conditions, frostbite, hypothermia, heart attacks from overexertion, and carbon monoxide poisoning from blocked vents.

Severe winter weather affects the entire planning area. According to the *2018 Vermont State All-Hazards Mitigation Plan*: “Severe winter storms develop through the combination of multiple meteorological factors. In Vermont and the northeastern United States, these factors include the moisture content of the air, direction of airflow, collision of warm air masses coming up from the Gulf Coast, and cold air moving southward from the Arctic. Significant accumulations of ice can cause hazardous conditions for travel, weigh down trees and power lines, and cause power outages. Freezing rain can also be combined with snowfall, hiding ice accumulation and further hindering travel, or with mixed precipitation and potentially ice jams or flooding.”

The National Weather Service (NWS) has a new prediction tool (still in prototype) called the Winter Storm Severity Index. The purpose of this tool is to provide National Weather Service (NWS) partners and the public with an indication of the level of winter precipitation (snow and ice) severity and its potential related societal impacts. The WSSI does not depict official warnings and should always be used in context with official NWS forecasts and warnings.

Table 2B.4.1 NWS Winter Storm Severity Index (Prototype)

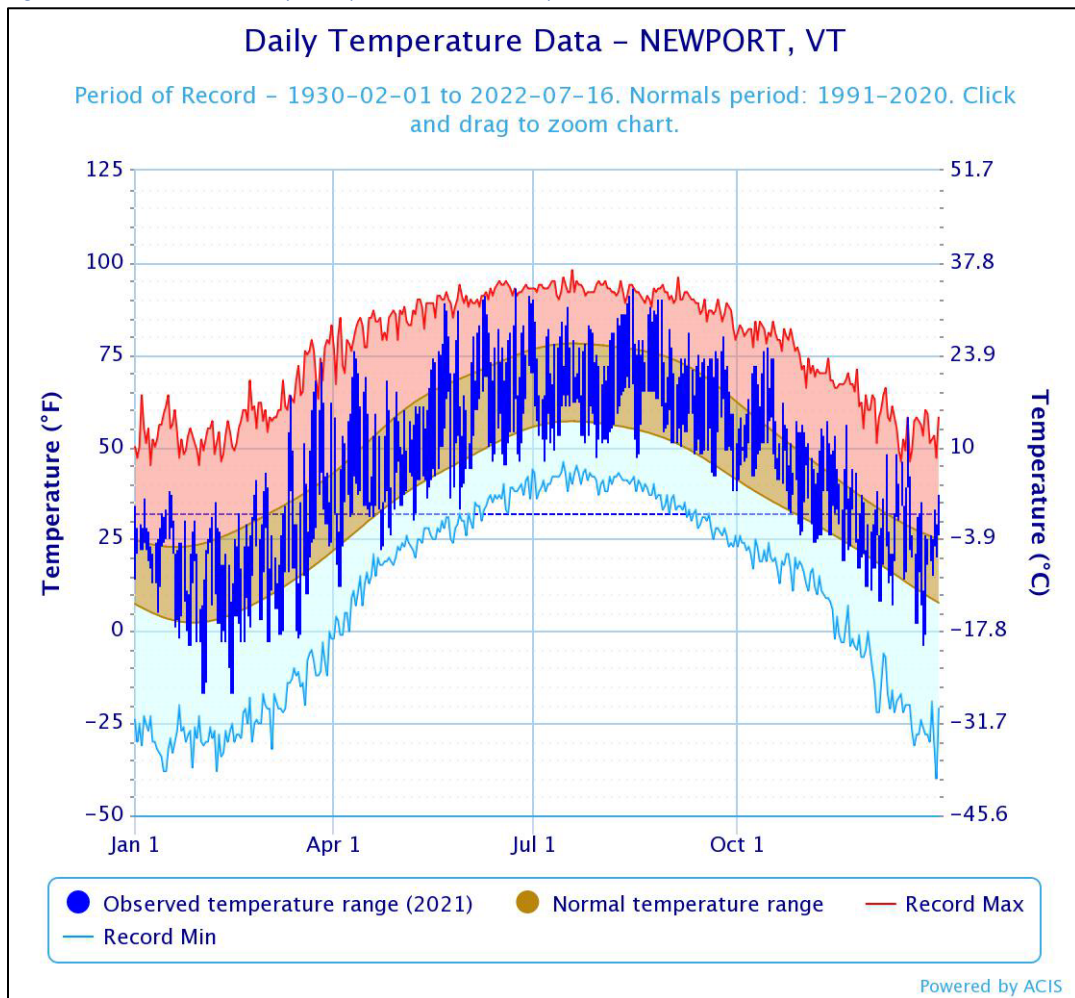
WSSI Descriptor	General Description of Expected Storm Severity Impacts
None	No snow or ice forecast. No potential for ground blizzard conditions.
Limited	Small accumulations of snow or ice forecast. Minimal impacts, if any, expected. In general, society goes about their normal routine.
Minor	Roughly equates to NWS Advisory Level criteria. Minor disruptions, primarily to those who were not prepared. None to minimal recovery time needed.
Moderate	Roughly equates to NWS Warning Level criteria. Definite impacts to those with little preparation. Perhaps a day or two of recovery time for snow and/or ice accumulation events.
Major	Significant impacts, even with preparation. Typically several days recovery time for snow and/or ice accumulation events.
Extreme Historic	Widespread severe impacts. Many days to at least a week of recovery needed for snow and/or ice accumulation events.

Any given storm will have different levels of impact from these individual components.

- Snow Amount
- Snow Load

- Ice Accumulation
- Blowing Snow Index
- Ground Blizzard
- Flash Freeze
- Figure 2B.4.1 depicts historic winter temperatures in the area (Newport, which has the most complete historic data records) to the present. The blue bars illustrate the observed temperatures for 2021, juxtaposed with the normal temperature ranges from 1990-2021 shaded in brown. Historic highs (red) and lows (blue) for each day are also shown, with records going back to 1930. The coldest temperature on record is -40° on December 30, 1933, although wind chill factors have probably approached or even exceeded that benchmark on occasion.

• *Figure 2B.4.1: Historic Daily Temperatures 1930 to present.*



• Source: NowData (National Weather Service)

“Cold” and “extreme cold” have relative meanings for different parts of the country, but sub-zero temperatures are considered extremely cold in northern Vermont. According to National Weather Service data from the past 30 years, sub-zero temperatures in the area usually occur between December and March.

- *Table 2B.4.2: First and Last Sub-Zero Temperatures in Orleans County (Newport), 1990-present*

	First Date	Last Date
Mean	December 14	March 10
Earliest	November 14 (2019)	February 6 (2010)
Latest	January 17 (2007)	March 26 (2014)

Extreme cold is likely to impact everyone town-wide, causing moderate-to-severe impacts to infrastructure, life, and economy. Water pipes can freeze or burst, and car batteries can die. Extreme cold can disrupt outdoor recreation. Unseasonably cold temperatures can damage agricultural crops. School buses may not be able to start.

The NOAA Storm Events Database has seven extreme cold/chill events for Orleans County going back to 2007. There are no reports of deaths or injuries, nor are there estimates for damage. However, ten respondents to the Greensboro Hazard Mitigation Survey indicated they had been adversely impacted by extreme cold in the past ten years.

- *Table 2B.4.3 Extreme Cold in Orleans County, 2007 to present*

Date	Description
01/25/2007	An arctic cold front moved across Vermont on the 24th and delivered very cold temperatures of zero to -25° by the morning of the 25th. However, on the night of the 25th into the morning of the 26th, a secondary cold front combined with a strengthening area of low pressure near New Brunswick accounted for the combination of brisk northwest winds of 10 to 15 mph and temperatures -5° to -20°, for wind chill readings of -25° to -40°. Morning lows recorded on the 25 th were -15° in Greensboro and -14° in East Albany.
03/06/2007	An arctic cold front swept across Vermont during the afternoon and evening of the 5th and delivered frigid temperatures along with blustery winds. Temperatures plummeted to below zero just after midnight on the 6th and were -5° to -20° by dawn. These frigid temperatures, accompanied by winds of 15 to 30 mph created dangerously cold wind chills of -20° to -40°. Brisk winds with temperatures around zero continued through the daylight hours of the 6th with wind chill readings from -20° to -30°. The winds subsided after sunset on the 6 th , but it remained extremely cold through the morning of the 7 th . Morning low on the 9 th was -18° in East Albany.
03/09/2007	Arctic high pressure settled across New England during the night of the 8th and morning of the 9th with more frigid temperatures similar to a few days earlier across Vermont. Morning low on the 6 th was -20° in East Albany.
01/14/2009	An arctic cold front moved across Vermont during the early morning hours of January 14 th , 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. These extremely cold temperatures led to numerous cold weather-related problems including numerous dead vehicle batteries and broken home and business water pipes. Morning lows for January 15 th were -24° in North Troy, -21° in Morrisville, and -20° in Newport.
01/07/2015	An arctic cold front pushed across Vermont during the afternoon hours of January 7th with plummeting temperatures and brisk, strong winds (15 to 30+ mph) causing dangerously cold wind chills of -25° to -40° during the evening of January 7th into the morning hours of January 8th. These dangerously cold wind chills led to delayed school openings or cancelled classes on the morning of January 8th. Morning low on the 8 th was -28° in Greensboro.
01/11/2022	Arctic high pressure moving from central Canada across the Great Lakes into the northeast on January 11th. Brisk northwest winds of 10 to 20 mph delivered sub-zero air temperatures that combined created apparent temperatures (wind chill) in the -20° to -35° range across

	north-central and northeast VT and higher elevations. Numerous school districts closed school and after-school activities due to the cold and COVID-related complications.
01/14/2022	An arctic cold front moved across VT with a strong area of high pressure across south-central Canada building into VT by late Saturday into Sunday, delivering sub-zero temperatures Friday night through Sunday morning. Simultaneously, a powerful ocean storm was moving into Newfoundland Canada Friday afternoon that created brisk north-northwest winds of 15 to 25 mph with higher gusts that, combined with the arctic airmass, created dangerously cold wind chills of -25° to -40° overnight Friday night into Saturday morning. Overnight air temperatures were -10° to -20° Friday night-Saturday morning and -10° to -25° Saturday night-Sunday morning. These dangerously cold temperatures caused some postponements of outdoor activities, including festivals and some ski resorts.

Those who are especially vulnerable to the impacts of extreme cold are residents in older structures and energy-burdened households. According to most recent American Community Survey 5-year estimates (2021), more than a third of Greensboro housing units were built before 1940. Older structures are likely to be “leaky” and poorly insulated, which can nearly double average heating energy use. Heating challenges are further exacerbated by energy burden, which is measured as energy spending as a percentage of income. Energy burden, according to a 2019 study by Efficiency Vermont, is high in the rural Northeast Kingdom. Greensboro’s overall energy burden is considered “moderate” at 9%. The greatest determinant of energy burden is income, not fuel cost, so even though many residents are able to reduce their costs by burning wood, they still struggle to make ends meet.⁵ Greensboro has an energy coordinator who can help raise awareness of low- or no-cost home weatherization services, such as HEAT Squad and Northeast Employment and Training.

Structure fires are a vulnerability of extreme cold since fires are more likely to occur during the winter heating months. According to FEMA, Vermont’s crude death rate (per million in population) of 17.6 is well above the national crude rate of 11.2. These rates should be viewed with caution, since they are based on very small numbers of actual deaths. Nevertheless, the relative risk of fire in Vermont is 1.6, still slightly above the overall national risk of 1.0.⁶ The age of Greensboro’s housing stock as well as its dispersed settlement pattern may be complicating factors. Residents living in remote areas accessible by class 4 roads may face a delayed response time for emergency vehicles.

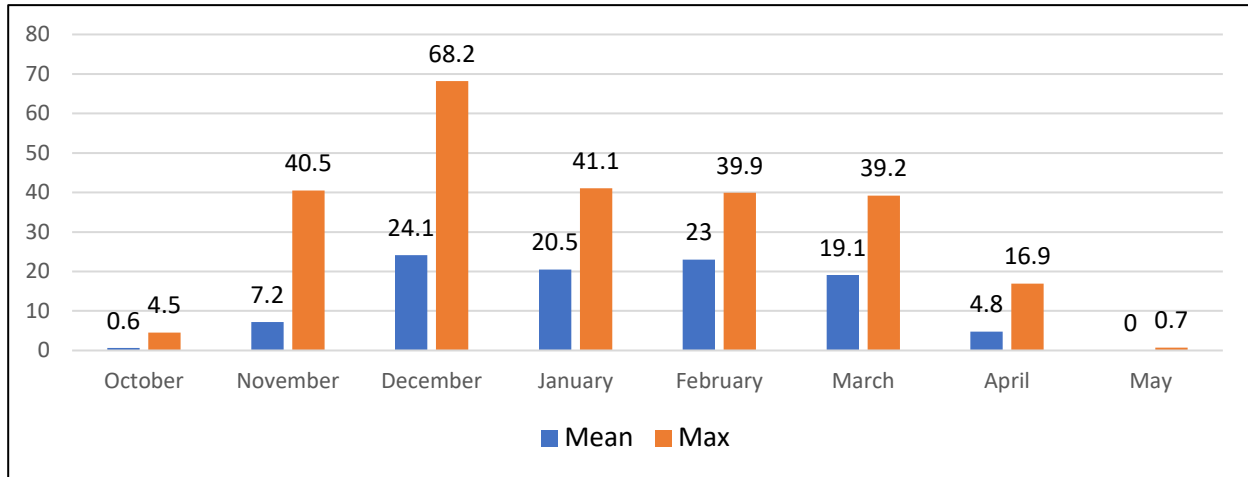
Snow

In general Greensboro residents and business owners are accustomed to snow and businesses are unlikely to shut down because of heavy snowfall. The likeliest moderate-to-severe impacts to infrastructure would be short term because roadways are not passable during a storm. Heavy snow accumulations have caused barn roofs in neighboring Craftsbury to collapse in the past.

⁵ Efficiency Vermont: 2019 Energy Burden Report <https://www.efficiencyvermont.com/news-blog/whitepapers/vermont-energy-burden>

⁶ FEMA: Fire in the United States, 2008-2017, November 2019, 20th Edition. <https://www.usfa.fema.gov/downloads/pdf/publications/fius20th.pdf>

Figure 2B.4.2 Monthly Total Snowfall for Orleans County (Newport)



Source: NOWData, NOAA

Orleans County's snow season can extend from October through May, with the heaviest monthly snow accumulations in December. The heaviest total monthly accumulation is December but the biggest snowstorms tend to occur in February/early March. The mean average snowfall for the entire season (from 1990-2000 through 2021-2022) is 98.4".

The nearest most complete data on snowfall and accumulation is in Newport. The mean number of days per year with more than 1" snow cover is 128 days. The maximum number of days with snow cover was in 1972 at 161 days, and the minimum was in 2010 with 95 days.

Historic data on snowfall in Newport have gaps, but the existing data suggests a downward trend in the annual snow cover. This trend is consistent with statewide data and loss of snow cover, which can be attributed to rising temperatures. Reductions in snow fall may leave exposed ground more vulnerable to freezing during extreme cold events, which can cause significant impacts to building infrastructure. The loss of snow cover could have a devastating economic impact on the region, which relies heavily on all-season outdoor recreation. An early snow melt contributed to a very challenging mud season. One Greensboro Hazard Mitigation Survey respondent reported the mud prevented trucks from reaching their business.

According to the NOAA database, the record snowfall extreme for Orleans County occurred on February 5-6, 1995, in Jay Peak with 1-day, 2-day, and 3-day totals of 42", 48" and 48" respectively.

"Heavy Snow," according to the National Weather Service, is snowfall accumulating to 4 inches or more in depth in 12 hours or less; or snowfall accumulating to 6 inches or more in depth in 24 hours or less. The NOAA Storm Event database records five heavy snow events in Orleans County from January 1, 2000 through January 31, 2022. There were no direct injuries or deaths, but all events incurred property damage.

NOAA defines a *winter storm* as an event that has one significant winter weather hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice) and meets or exceeds locally/regionally defined 12 and/or 24 hour warning criteria for at least one of the precipitation elements. Orleans County has 111 winter storm events reported in the NOAA Storm Events database from January 1, 2000 to April 30, 2023.

Table 2B.4.4: Notable Events Involving Snow Accumulation (from Heavy Snow or Winter Storms (2000-2023))

Date	Description	Total Property Damage
2/14/2007	Snow fell heavy at times from late morning through early afternoon in southern Vermont and early afternoon through early evening elsewhere, before dissipating during the night. Snowfall rates of 2" to 4" per hour and brisk winds of 15 to 25 mph caused near whiteout conditions at times, along with considerable blowing and drifting of the snow, making roads nearly impassable. Further, temperatures in the single numbers above zero combined with these brisk winds created wind chill values of -10° or colder. Snowfall totals ranged from 15" to 25" in the Connecticut river valley to 20" to 35" elsewhere across Vermont. Greensboro received 19". The deep snowfall caused numerous problems, including the blocking of numerous heat vents that resulted in the build-up of carbon monoxide and sent dozens of people seeking treatment at area hospitals. There were additional indirect injuries resulting from this storm, including vehicle accidents and cardiac arrests due to overexertion during snow removal. Snow removal operations took several days and up to a week in some urban communities. In addition, the weight of the heavy snowfall on some weaker roofs resulted in the partial or total collapse of 20 or more barn roofs and the deaths of more than 100 cattle.	\$200,000
2/13/2014	A winter storm responsible for record ice and snow across the southeast United States on February 12th moved and redeveloped off the southeast US coastline on February 13th. This storm intensified as it hugged the eastern seaboard on February 13th, moved across southeast Massachusetts and into the Gulf of Maine by February 14th. Snow began to overspread southern Vermont during the mid-morning hours of February 13th, not reaching the Canadian border until the evening commute. There were two bands of heavy snowfall, snowfall rates of 1-2+ inches an hour, that moved across the region. The first band moved across southern and eastern Vermont during the afternoon hours of February 13th and again during the early morning hours of February 14th. 13" reported in neighboring Craftsbury.	\$15,000
2/02/2015	A storm system moved from the Desert Southwest on Saturday (1/31) to the Mississippi Valley on Sunday (2/1) and across the Ohio River Valley and south of New England on Monday (2/2). This brought snowfall across Vermont during the early morning hours and continued into the late afternoon. A widespread 6" to 12" of snow fell across the region and it was cold with temperatures only near zero degrees. Greensboro recorded 10". <i>[Note: This was FEMA disaster declaration 4207.]</i>	\$15,000
2/06/2001	10" snow reported in Greensboro. Barn roofs collapsed in Craftsbury and Holland, apparently due to the weight of snow after the storm ended.	\$75,000
03/05/2001	19" reported in Newport. Snow didn't taper off until March 6. FEMA disaster declaration EM-3167 provided \$4,002 in assistance to the Town of Greensboro for snow removal.	\$75,000
10/25/2005	Steady rain on the 25th of October changed to snow by early afternoon in the higher terrain counties of Vermont. The snow was very wet and became heavy at times, accompanied by gusty winds. With foliage still on the trees, the weight of the snow easily took many trees and tree limbs down with extensive power outages. Thousands were without power. A	\$100,000

	local radio station in Derby was off the air due to power outages. Numerous accidents were reported. Some schools were closed on the 26th. By the evening of the 25th the impact of the storm was clearly being felt with 4" to 6" snowfall. Total snow accumulations in this area were 8" to 18" with lesser amounts in the sheltered valleys. Barton (Orleans county) reported 16.5", while Cambridge (Lamoille county) received 14".	
12/09/2014	The heavy, wet nature of the snowfall with snow to water ratios of 8:1 or less accounted for snow-loaded trees that resulted in more than 175,000 power outages in the region from December 9th through December 12th. This was the 2nd most power outages due to weather in the state of Vermont. 15" of snow reported in Greensboro.	\$150,000
11/26/2018	Light rain changed to a pasty, heavy wet snow that resulted in downed tree limbs and power outages across VT. Snow accumulation was 18" in Greensboro. The heavy wet snow accounted for more than 40,000 outages, leaving 100,000 customers without power due to snow loading on power lines.	\$100,000

Twenty respondents to the Greensboro Hazard Mitigation Survey reported that they had experienced adverse affects from heavy snow accumulation, with some siting a concern about impacts to their roofs. Running school buses in Greensboro can become a challenge, especially on back roads. Vulnerable populations such as nursing home residents may be at increased risk if roads are impassable to emergency vehicles.

Ice

Ice accumulation is becoming a regular concern for winter weather, especially with rapidly fluctuating temperatures in winter months. Ice accumulation can lead to moderate to severe community-scale damage to infrastructure and economy, which includes downed trees and power lines, dangerous roadways, and extensive power outages that lead to closure of schools, services, and businesses. Ice accumulations can also lead to isolated but moderate to severe impacts to trees and plant life. Twenty-nine respondents to the Greensboro Hazard Mitigation Survey indicated they had experienced adverse impacts from ice in the past ten years. Respondents cited unsafe travel, power losses, as well as damage to property – roofs, docks, and shorelines.

The Vermont State Hazard Mitigation Plan considers ice to have greater impacts than hazards associated with snow. Our warming winters can lead to prolonged patterns of melting and refreezing, not to mention wintry mix of freezing precipitation. Pre-storm road temperatures and surface conditions affect the potential for ice accumulation on roads and walkways. Roads and walkways washed clear of salt and sand by rain, for example, are more likely to form ice. Subsequent snow accumulation can hide the icy layer beneath. A search of NOAA winter storm records reveals that ice accumulation was involved in 16 of Orleans County’s 104 winter storm events. Impacts were treacherous driving conditions leading to road accidents, as well as accumulation on powerlines leading to significant and prolonged power outages.

According to the NOAA Storm Event database, Greensboro has experienced two significant ice storms. Both resulted in federal disaster declarations.

Table 2B.4.6: Ice Storms in Orleans County

Date	Description
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1/06/1998	<p>A storm system moved from the Tennessee Valley on Wednesday (January 7) and Thursday (January 8) into New England thereafter. A cold front across New England and New York associated with an arctic high-pressure system across Canada resulted in a flow of low-level cold air into Vermont. Warm moist air riding over this low-level cold air resulted in icing across portions of this area. Significant icing was generally restricted between 1500- and 2500-foot level.</p> <p>Ice accumulations during this event were generally 1/4" or less. The impact on the region ranged from ice accumulations damaging tens of thousands of trees. Downed power lines resulted from the weight of the ice, leaving thousands without power. Farmers who lost electricity were unable to milk cows with loss of income and damage to cows. Automobile travel was negatively impacted with several roads closed due to ice and fallen trees. There were numerous traffic accidents. Indirect injuries were reported due to carbon monoxide poisoning while improperly using generators. Falling tree limbs and other debris was a significant hazard during and following the storm. \$80,000 reported in damages. <i>[Note: This was FEMA Disaster Declaration 1201.]</i></p>
12/21/2013	<p>A stationary boundary was draped across the Adirondacks of New York into portions of central and northern New England from December 20th through 22nd with several disturbances delivering precipitation. An impressive battle between mild to warm moist air, south of the boundary with temperatures in the 50s, overriding a very cold, dense shallow air mass with temperatures in the teens and 20s in northwest Vermont but single digits just north across the border into Canada. First round of wintry precipitation fell across northwest Vermont, especially along the Canadian border during Friday afternoon and evening (December 20th). Most of the precipitation fell as freezing rain, approximately 1/4" to 1/3" of ice accumulation, along with some sleet. The second round began during the early afternoon hours of December 21st and peaked during the evening and overnight hours. An additional 1/2" to 3/4" inch of ice accumulation as well as 1" to 2" inches of sleet occurred in portions of northern Vermont. Very cold temperatures (-10° to teens) followed the event with no melting, thus ice stayed on trees and utility lines through December 28th-29th, prolonging recovering efforts. The greatest impact was in northwest Vermont, especially along the Canadian border, with widespread tree and utility line damage as well as numerous vehicle accidents. More than 75,000 customers were without power from hours to days across the region. The areas impacted were similar to the Ice Storm of January 1998, but not the severity, as precipitation and ice accumulation were half of the 1998 storm. Ice jams also developed during this time period as runoff from melting snow and rainfall swelled area rivers. River rises were enough to break up and move ice cover, resulting in scattered ice jams. <i>[Note: This was FEMA Disaster Declaration 4163.]</i></p>

Table 2B.4.7: Severe Winter Conditions Hazard Summary Table

Hazard	Location	Vulnerability	Extent	Observed Impact	Probability
Cold	Town-wide	People living in older structures; energy burdened households Structure fires Damage to water pipes Damage to agricultural crops	-40° recorded on December 30, 1933	Burst water pipes and flooding; school cancellations and delays; outdoor recreation events cancelled;	Highly Likely: > 75% in any given year

				school buses cannot start	
Snow	Town-wide	Roofs prone to collapse from weight; Power lines and trees; impassable roads due to snow drifts; indirect injuries from overexertion; Unsafe travel, especially for school buses and ambulances	February 5-6, 1995, county wide extreme snow fall, with 1-day, 2-day, and 3-day totals of 42", 48" and 48" respectively. (Jay Peak); 19 inches recorded in Greensboro on 2/14/2014	Two barn roof collapses; \$4,002 in snow removal assistance from FEMA; power outages	Highly Likely: > 75% in any given year
Ice	Town-wide	Road accidents, power outages, damage to property, docks, shorelines	1998 ice storm	Extended power outages; lost income from dairy operations; road accidents; carbon monoxide from improper use of generators.	Highly Likely: > 75% in any given year

5. Wildfire

Although wildfires are relatively uncommon in Vermont, they have potential for moderate to severe community-scale damage to town infrastructure, personal safety, as well as loss of wildlife and wildlife habitat. Wildfires can also have moderate to severe damage to economic operations, such as outdoor recreation and forestry.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Wildfire

The risk for wildfire is usually greatest in the spring, shortly after snowmelt extending into the beginning of June. During this period weather conditions are favorable for drying wildland fuels, dead grasses, leaves and twigs. Low humidity and gusting winds, combined with dry wildland fuels, can make controlling a wildfire difficult and dangerous. Hot and dry conditions in the summer can also elevate wildfire risk. Campfires, logging operations, and even lightning strikes can cause a summer fire. In the fall, after leaf drop, warm and dry conditions and a delayed snowfall can raise the risk of wildfire as well.

Fire danger ratings are determined by forest fuel conditions, recent weather conditions, and various fire start risk factors. During non-snow periods of the year, the Department of Forests, Parks and Recreation monitors forest fire danger levels daily. Open burning is regulated in every town in Vermont and Town forest fire wardens are responsible for issuing open burning permits, if fuel and weather conditions are safe for outdoor burning. Fire wardens have the authority to ban open burning in their towns during times of high fire danger or hazardous local conditions. Unfortunately, routine disregard of open burning regulations contribute to the risk.

Extended periods of warming due to climate change, combined with an extended period of drought conditions and an early snowmelt, have raised the risk of wildfire. In Richmond, approximately two acres burned in early May 2022. Several acres burned in Putney, and two to three acres of woodland burned in Rochester, resulting in a fatality. In New Hampshire, 250 acres burned in Crawford Notch State Park, and in June a bullet in a firing range sparked a grassland fire. Four respondents to the Greensboro Hazard Mitigation Survey were adversely impacted by a wildfire in the past ten years, although no respondents described impacts. Twenty respondents were mildly concerned about future wildfires, and 16 respondents were very concerned.

Table 2B.5.1: Wildfire Hazard Summary Table

Location	Vulnerability	Extent/Observed Impact	Likelihood/Probability
Townwide (town is 76%% forested)	Early snow melt; drought conditions, dry, gusting winds; destruction of interior forest blocks, wildlife and wildlife habitat, forestry operations and outdoor recreation	Occasional brush fires, four survey respondents reporting adverse impacts in the past 10 years.	Likely: >10% but < 75% in any year; at least one chance in next 10 years

6. Drought

Drought is defined as a shortage of water relative to need. According to the Vermont 2018 Hazard Mitigation Plan, drought is a complex phenomenon for several reasons:

- It is difficult to monitor and assess because it develops slowly and covers extensive areas, as opposed to other disasters that have rapid onsets and obvious destruction.
- The effects of drought can linger long after the drought has ended.
- Drought is an inherent, cyclical component of natural climatic variability and can occur at any place at any time, making it difficult to determine the onset, duration, intensity, and severity, all of which affect the consequences and corresponding mitigation techniques.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Drought

Extended periods of drought during a Vermont growing season can be devastating for agriculture. USDA data show occasional payouts from crop insurance due to drought damage, but this data is at the county level,. Furthermore, not all local growers carry crop insurance. Forestry operations are susceptible to drought as well, because extended warm and dry seasons can increase risk of disease. Drought also weakens or kills wildlife, and the dieback of vegetation and increased risk of wildfire destroys habitat.

Drought can also result in loss of potable water when wells run dry. Although the surface waters may appear to have recovered from a period of drought following a return to normal precipitation, replenishing groundwater levels is a longer process. Low water levels in wells can yield higher concentrations of metals (uranium, iron, sulfur, arsenic, and manganese) in drinking water, making the water unsafe to drink.

Drought conditions are also favorable for wildfires. Low water levels can also affect recreation and fishing. Low water levels, paired with rising temperatures, can trigger occurrence of blue-green algae in lakes and ponds.

High winds, low humidity, and extreme temperatures can all amplify the severity of the drought. The severity of a drought depends on the duration and extent of the water shortage, as well as the demands on the area’s water supply. Drought classification categories range accordingly:

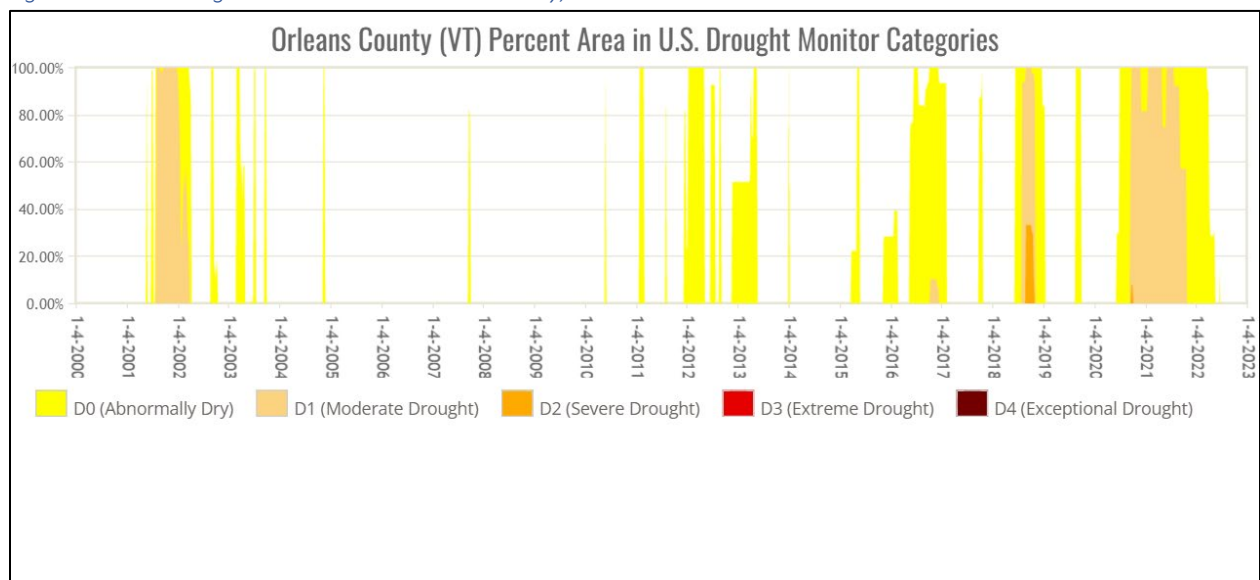
Table 2B.6.1: Drought Severity Table

Classification	Description	Possible Impacts
DO	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 loss; Shortages of water in reservoirs, streams, and wells creating water emergencies.

Source: U.S. Drought Monitor <https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx>

It seems paradoxical that while climate change is generally bringing increased levels of precipitation that Vermonters should experience drought. However, climate change also is linked to climate instability and extremes. According to the US Drought Monitor, Orleans County has recently experienced the longest period of dry/drought conditions in decades (Figure 2B.6.1). All of Orleans County experienced a minimum of abnormally dry conditions (DO) from July 7, 2020 through March 28, 2022. Nearly all of Orleans County experienced moderate drought (D1) from September 22, 2020 to November 1, 2021. Minor portions of the county also experienced severe drought (D2) from September 29 to October 12 of 2020.

Figure 2B.6.1: Drought Conditions in Orleans County, 2000-Present



Source: US Drought Monitor

In late 2020, USDA Farm Services Agency issued a declaration of drought-related disaster conditions, making all Vermont farmers eligible to apply for emergency loans. With drought conditions persisting for more than a year, the State of Vermont reactivated its Drought Task Force in July 2021.

The Agency of Natural Resources maintains a crowd-sourced database called the ANR Drinking Water Drought Reporter. <https://anrmaps.vermont.gov/websites/droughtreporter/>

The database does not identify any water outages or shortages for Greensboro, but 14 respondents to the survey indicated they had been affected by drought in the past 10 years. One respondent indicated that their water supply was not drinkable, and they had to purchase bottled water. Moreover, 21 respondents were “mildly concerned,” and 16 respondents were “very concerned” about future impacts from drought.

Table 2B.6.2: Drought Risk Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Town wide	Crop loss, loss of drinking water, higher occurrence of algae blooms; increased risk of wildfire	2+ years of abnormally dry/moderate drought conditions, county wide.	Loss of drinking water	Likely: >10% but < 75% in any year; at least one chance in next 10 year

7. Invasive Species

Invasive species are defined as plants, insects, and other organisms that were either accidentally or intentionally introduced from other place and that can negatively impact agriculture, recreation, forestry, human health, the environment, and the economy. Invasive plants, which are categorized as either terrestrial or aquatic, can cause environmental devastation by changing soil composition, changing water tables, and disrupting insect cycles. They often lack food value upon which wildlife depends. Invasive animals can threaten biodiversity by preying upon native species or out-competing for food and nutrients.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Invasive Species

Human activity can contribute to the spread of invasive species. Non-native insects, for example, can inadvertently get transported into the region via wooden shipping crates or firewood. Aquatic invasives (such as zebra mussel larvae, which are invisible to the naked eye) can be introduced on the ballasts of boats. Just a tiny piece of milfoil on a boat’s hull can lead to an infestation. Once established they are very difficult, if not impossible, to eradicate. Landscaping and cultivating can spread invasives as well, as is the case with garlic mustard and Japanese knotweed, and these plants can readily establish a monoculture. Invasive species do not, by their nature, have geographic boundaries. This concept was clearly demonstrated during Tropical Storm Irene, when floodwaters uprooted Japanese knotweed plants along Vermont’s waterways. Years later, the fight to eradicate the knotweed has become even more protracted as it spreads along streambanks and areas beyond, choking out native plant communities and destabilizing banks.

Climate change significantly contributes to the spread of invasives. For example, warmer temperatures weaken native species such as maple, yellow birch, and American Beech while allowing forest pests such

as the hemlock woolly adelgid to overwinter and reproduce. Twenty seven Greensboro Survey respondent indicated that they had experienced adverse impacts from invasives in the past ten years. One respondent indicated that tree affected by invasives crashed onto their house, requiring repairs. Several respondents indicated ongoing struggles with Japanese Knotweed. Twenty-seven were “very concerned” about 25 were “mildly concerned” about future risks in from invasives.

The Greensboro Association’s Lake Protection Committee spearheads an aggressive greeter program from Memorial Day to Labor Day. Their objective is to inspect all entering trailers/boats to ensure they are free of all aquatic nuisance species such as Eurasian Water Milfoil, Zebra Mussels, Water Chestnuts, Spiny Water Fleas before entering Caspian Lake. The greeters have been trained by VT DEC personnel. The inspection allows greeters to educate boaters about aquatic nuisance. To date, Caspian Lake remains free of invasives. The Association has recently obtained grant funds to install a hot water pressure wash next spring.

Eligo Lake has had an ongoing struggle with milfoil. Pulling only helps to propagate more growth, and a lake mat was not effective. The use of milfoil weevils was helping to manage the infestation. Weevil larvae burrow into the plant, impairing its ability to regrow the following season. The Agency of Natural Resources, however, stopped the practice because the weevils were brought in from New Hampshire.

The timing of roadside mowing can help to spread invasives, such as wild parsnip, which can burn the skin when exposed to sunlight. Mowing too early can allow for targeted revegetation, and mowing too late can distribute seed heads. Perfectly timed mowings can be difficult to achieve, simply because the mowing services may be available at ideal times. Nevertheless, VTrans and Vermont Invasives offer training and information on best practices for management roadside invasives. There is some concern that the Town’s gravel supply may contain wild parsnip.

Table 2B.7.1: Invasive Species Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Town wide, with habitats specific to individual species, such as roadways, and lakes.	Forests, agriculture, waterways, native species; risk of downed trees in public rights of way from EAB and other pests.	Eurasian milfoil in Eligo, Japanese Knotweed on properties and along most major waterways;	Compromised natural habitat, including lakes and streambanks Compromised soil stability along waterways. Overgrowth in shallow waters that kill off other plants and block sunlight. Damage from downed tree affected by invasives.	Highly Likely: > 75% in any given year

8. Heat

The Centers for Disease Control reports that more people die from heat than other weather-related events. The actual number of deaths are most likely underreported because heat can exacerbate other underlying conditions such as heart and respiratory disease, leading to death.⁷ The impacts of extreme heat can be particularly challenging in regions such as the Northeast Kingdom where residents are not accustomed to high temperatures and are less likely to live in air-conditioned structures.

This section of the Plan satisfies the requirements of 44 CFR §201.6(c)(2)(i) and 44 CFR §201.6(c)(2)(ii): Hazard Identification and Risk Assessment for Heat

As a rule, the National Weather Service considers “excessive heat” to be an event when the maximum heat index is expected to be 105° or higher for at least two days and nighttime air temperatures will not drop below 75°. However, these criteria can vary widely across the county, especially in areas like Orleans County which is unaccustomed to extreme heat conditions. The primary impact of extreme heat or prolonged periods of hot weather is to human life. Hot conditions, especially when combined with sun and high humidity, can limit the body’s ability to thermoregulate properly. Prolonged exposure to hot conditions can lead to heat cramps, heat exhaustion, heat stroke, or exacerbate other pre-existing medical conditions. Some of these impacts require medical attention and can be fatal if left untreated. Children and the elderly are especially vulnerable to heat-related illnesses.

Vermonters are at greater risk for serious heat-related illnesses, and even death, when the statewide average temperature reaches 87°F or hotter.⁸ Working with the Vermont State Climate Office, the Vermont Department of Health analyzed 14 years of temperature and mortality data, and ten years of surveillance data for emergency department (ED) and urgent care visits. The research found that on days when the statewide average temperature reached 87°F, ED visits for heat-related illnesses such as heat exhaustion and heat stroke increased eightfold, and there was one additional death per day among individuals aged 65 and older. Deaths due to heart disease, stroke, and neurological conditions were relatively more common on these days reaching at least 87°F, as compared to cooler days.

The NOAA Event Database has no extreme heat events for Orleans County. July is traditionally the hottest month of the year in Greensboro with the greatest number of days over 87°, but hot days can occur from May through September, with occasional outliers as early as April.

⁷ Centers for Disease Control, Heat Related Illness: Picture of America Report,

⁸ Vermont Department of Health: Heat Vulnerability in Vermont, Local Indicators of Heat Illness Risk. 2016. https://www.healthvermont.gov/sites/default/files/documents/2016/12/ENV_EPHT_heat_vulnerability_in_VT_0.pdf

Using 87° as a standard, the hottest July on record for the East Albany area was 2018, with 10 days reaching 87° or more. (Complete records for the East Albany area only go back to 2003.) The highest temperatures recorded in the area are 88°. The nearest comprehensive analysis on hot days on a *climate scale* (three decades or more) is St. Johnsbury, and the data indicate that the number of days per year with temperatures of 87° or higher is rising. The Vermont Department of Health anticipates a statewide increase to an average of 33 days per year by end of century.⁹ Responses from the Greensboro Hazard Mitigation Survey align with this projection: Eight respondents to the Greensboro Hazard Mitigation Survey indicated they had been “adversely impacted” by extreme heat events, although no respondent provided details of the impacts they experienced.

Twenty-nine respondents indicated that they were “very concerned” about future extreme heat events.

Just because the Northeast Kingdom is one of the cooler regions of Vermont, our population is not less vulnerable to heat. In fact, Department of Health data indicate that Orleans County has some of the highest concentrations of communities with high heat vulnerability indices. The Vermont Heat Vulnerability Index draws on 17 different measures from six different themes: population, socioeconomic, health, environmental, and heat illness. Greensboro’s heat vulnerability index exceeds the state mean by more 1.5.

While excess summer heat can lead to increased evapotranspiration and soil drying, stressing or even depleting water supplies. Additionally, hot weather can increase thermal stratification in water bodies, where shallow water layers are much warmer and do not readily mix with cooler, deeper water layers. The stratified water layers create more favorable conditions for cyanobacteria blooms, which can create health risks for boaters and swimmers who use Greensboro’s lakes and ponds.

The primary impact of extreme heat or prolonged periods of hot weather is to human life. Hot conditions, especially when combined with sun and high humidity, can limit the body’s ability to thermoregulate

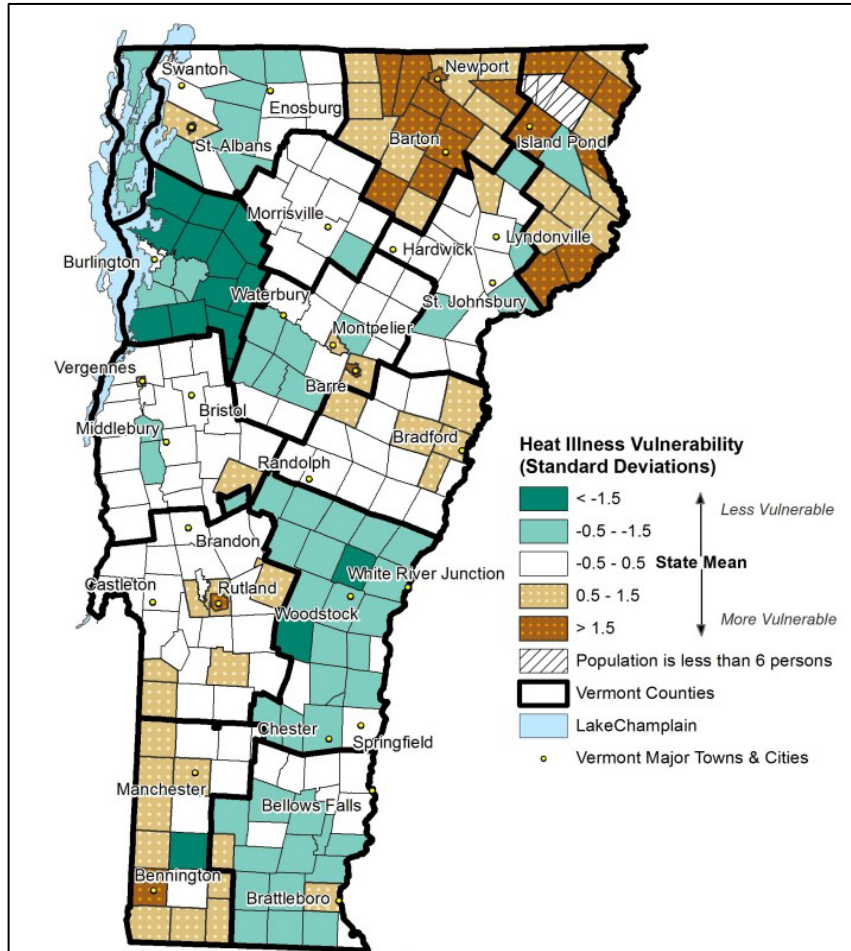


Figure 2B.8.1 Heat Vulnerability Index: Vermont Dept. of Health

⁹ Vermont Department of Health: Vermont Climate and Health Profile Report: Building Resilience Against Climate Change in Vermont, September 2016

properly. Prolonged exposure to hot conditions can lead to heat cramps, heat exhaustion, heat stroke, or exacerbate other pre-existing medical conditions. Some of these impacts require medical attention and can be fatal if left untreated.

New guidance released by the Vermont Department of Health highlights the health risks from extreme heat. The report is informed by the 2021 heat wave in the Northwestern US and Western Canada, an area with a similar summer climate to Vermont. More than 1,400 people died during that event. (A similar scale in Vermont would have been about 45 deaths.

Between 2009 and 2019, the Vermont Department of Health reports that there were an average of 104 heat-related emergency department (ED) visits per year and 12 total heat-related deaths across Vermont. Heat-related ED visits have trended up over that period by more than 2 additional ED visits each year. 2018 was the deadliest year in recent record, with 173 heat-related ED visits and 5 heat-related deaths in total, including 90 ED visits and 4 deaths during a 6-day heat wave in early July. These numbers only include ED visits and deaths specifically attributed to heat in a hospital or death record, so individuals with underlying conditions may not be captured in these figures. (Data at the Orleans County level is not available.

Elders are especially susceptible to heat illness. Nearly all the Vermont heat deaths recorded by the Department of Health were individuals over the age of 50.

The Greensboro Nursing Home anticipates that heat will be a bigger problem over time. Fans were adequate until the past two years. In the meantime, the nursing home has installed two air conditioning units in the common area. More extensive cooling systems may be needed over time.

Table 2B.8.1: Extreme Heat Hazard Summary Table

Location	Vulnerability	Extent	Observed Impact	Probability
Town-wide	Children, elders, people with underlying conditions, people below the poverty line; water supplies and water bodies; livestock	July 2018, with 10 days 87° or higher	Increased hospitalizations due to heat-related illness (VT Dept. of Health data), five heat-related deaths reported statewide in the summer of 2018	Likely: >10% but < 75% in any year; at least one chance in next 10 years

C. Hazard Specific Information for Non-Profiled Risks

1. Landslide

Landslides are sudden failures of steep slopes and can cause significant damage to streams, infrastructure, and property. While landslides can be linked to fluvial erosion, they can also be caused by slope steepening due to non-fluvial erosion, increased loading on the top of a slope, or pore-water issues. Landslides can destroy or damage structures and infrastructure that lie either above or below the slope.

The 2018 Vermont State Hazard Mitigation Plan notes that while minimal data exists on damages associated with landslides, they often occur in tandem with periods of significant rainfall and erosion. Disaster declarations and estimates specific to landslide-only damages are not well defined. The 2018 Plan also notes that “Vermont has not previously developed a landslide inventory or an adequate

tracking system to establish frequency of this hazard.” The nearest landslide risk is probably the rock-lined portion along Route 15 just at the entry to downtown Hardwick. There is no similar land formation in Greensboro. Nevertheless, a small land slide did occur during the recent flooding. Gravel came rushing down Schoolhouse Road due to saturated soils. The slide was heading toward a house, but it was stopped by a parked car, which was destroyed.

2. Earthquake

The risk of earthquake is quite low in Vermont -- low enough that it is not prudent to invest in mitigation. According to FEMA Seismic Hazard Maps, Greensboro (and nearly all of the state) is in a “Seismic Design Category B” area, which means that only moderate shaking is to be expected in an earthquake. Although the sensation can be extremely disconcerting, the potential for damage is slight. The nearest reported earthquake was of a 2.2 magnitude about 11 km ENE from Ticonderoga, NY, which occurred on June 30, 2017 and was felt by people in Montpelier and Plainfield, VT.

3. Hail

Hailstorms usually occur in Vermont during the summer months and typically accompany passing thunderstorms, when updrafts carry raindrops into extremely cold areas of a cloud. The raindrops form into chunks of ice known as hailstones. The size of the hailstone is directly related to the severity and strength of the thunderstorm. As long as the ice is continually pushed back into the cold areas, it continues to hit water droplets, which then freeze to the hailstone, adding another layer of ice. The ice accumulations continue until the hailstones become too heavy to remain in the cloud, or the updraft slows down.

Hailstorms occur infrequently in Vermont and it is not clear that climate change will increase their frequency. The NOAA Storm Events Database reports 41 hail events in Orleans County since 2000, but because hailstorms tend to be extremely localized, so it is highly unlikely that many of these events had impacts in Greensboro. The last reported hail event in Greensboro was in 2015 with dime- to penny-sized hail. No damages were reported.

3. MITIGATION STRATEGIES

A. Mitigation Goals

- Prevent/reduce the loss of life and injury resulting from all-hazard events.
- Prevent/reduce the financial losses and infrastructure damage incurred by municipal/residential, agricultural, and commercial establishment due to disasters.
- Include hazard mitigation planning in the municipal planning process, including the Town Plan, municipal budget, and Local Emergency Management Plan.
- Ensure the general public is part of the hazard mitigation planning process.

This section of the plan satisfies 44 CFR § 201.6(c)(3)(i): Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards?

B. Evaluation of Mitigation Strategies

Once the priority hazards had been chosen, the consultant provided the planning team with a comprehensive list of possible strategies to consider using to mitigate the impact of future disasters of those type. That list was provided to the town’s planning team to whittle down, based on what they knew would be feasible.

The broad list was then presented at a publicly warned selectboard meeting, August 9th. Based on input from the selectboard, the group then used an abridged STAPLEE evaluation worksheet (Appendix A) to score the strategies on social and political readiness, administrative and technical feasibility, range of public benefit, range of environmental benefit, local cost, and availability of outside resources. Based on the scoring, the planning team then made final choices among mitigation strategies. Taking staff and volunteer capacity into consideration, the group determined how much they felt the Town could commit to over the next five years, to lessen the impacts and possible losses for Greensboro from hazard events in the future.

When determining the proposed mitigation actions for the 2023 plan, the Hazard Mitigation Team also evaluated the prioritized mitigation actions from the original plan. Priority actions from the previous plan that are marked with an asterisk are to be carried forward into the plan update.

This section satisfies 44 CFR § 201.6(c)(3)(ii): Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? AND

44 CFR § 201.6(d)(3): Was the plan revised to reflect changes in priorities and progress in local mitigation efforts?

Table 3B.1: Update on Mitigation Actions from 2017 Greensboro Hazard Mitigation Plan

Hazard	Mitigation Strategy	Priority	Update
ALL	Integrate hazard mitigation plan into town plan and bylaw.	High	The 2019 Town Plan was updated to reflect the 2017 Hazard Mitigation Plan. Another Town Plan update is currently under development.*
All	Appoint and support a committee (a version of a local Community Resilience Organization, such as the current Hazard mitigation committee, who helped develop this plan) to build broad community resilience.	High	This group was active for a while. It will be reinstated, using the members of the local hazard mitigation team (used to develop the update) as a basis.*
ALL	Support existing public education and outreach program.	High	This has been ongoing in partnership with the Vt Dept. of Environmental Conservation, the regional planning commission, and Vermont Emergency Management.*
ALL	Maintain regional and state partnerships.	High	This is ongoing and essential to supporting public education and outreach.*
Unsafe travel from severe winter weather or thunderstorms	Plan for a budget to maintain road infrastructure.	High	This is ongoing.*

Unsafe travel from severe winter weather or thunderstorms	Consider including wind mitigation strategies on critical road segments during site plan review.	High	One site plan review incorporated a snow fence into a road segment that was prone to snow drifts. The snow fence was in place for one winter season, but it needs further evaluation.
Extended power outages from severe winter weather or thunderstorms	Help utilities maintain their corridors	High	This is ongoing.*
Extended power outages from severe winter weather or thunderstorms	Encourage additional generator capacity, if possible, at Fellowship and St. Michael's Parish Halls.	High	The United Church Fellowship Hall does not have a generator, but it continues to an on-going discussion about acquiring one.* St. Michaels does not have a generator either, and there have been no discussions about acquiring one.
Unsafe travel and extended power outages from severe winter weather or thunderstorms	Update plan and organize assistance for vulnerable residents.	High	The plan is now being updated, and we have made several attempts to include vulnerable residents, such as the nursing home and the Lauredon apartments. Additionally, our plan will now focus on outreach to energy burdened households with weatherization assistance.*
Unsafe travel and extended power outages from severe winter weather or thunderstorms	Conduct public education/outreach on hazards related to severe winter storms.	High	The Town publishes the Highway Department's Winter Operations Plan in the Town Report every year.*
Large structural fire in village	Develop and implement a fire prevention plan for villages. Public outreach on fire prevention. Maintain mutual aid agreements with neighboring fire departments.	High	Structural fires are considered a man-made hazard, and VEM and FEMA do not review data on man-made hazards, and man-made hazards are not eligible for hazard mitigation funding. This plan addresses fires/structural fires as a vulnerability of extreme cold and drought. As appropriate, the plan includes mitigation strategies that reduce fire risk associated with those hazards.
Severe Wind	Tree maintenance to protect public buildings, roads and powerlines	High	Ongoing*
Severe Wind	Consider wind mitigation efforts in site plan review.	High	This has not happened, and is not realistic for the pending update of the zoning bylaw.
Flooding	Update flood hazard bylaws to prohibit new structures in floodplains	Medium	This was not done. The flood hazard regulations will likely need revisions when FEMA releases the draft map updates. However, amending the regulations to include more robust no adverse impact standards will require a substantial amount of public dialog.

Flooding	Require new critical facilities to be 1' above the 500 yr base flood elevation.	Medium	This was not. A more appropriate measure would be to prohibit NEW critical facilities from the 500 year floodplain altogether. No critical facilities are currently in the floodplain.
Flooding	Limit impervious surfaces in the floodplain	Medium	This does not appear to have been done; however, the Town has taken local delegation of shoreland regulations, which has the effect of limiting impervious surfaces in many floodplains. Maybe a more effective strategy is to continue to maintain local delegation of the shoreland regulations?
Flooding	Encourage the state and NVDA to complete updated GIS flood maps for the Town.	High	FEMA is releasing new digitized flood insurance rate maps soon, although there is not ETA at this point.
Flooding	Encourage residents keep private culverts clear of debris.	High	Ongoing. Additionally, the Fire Department cleans out private culverts that intersect with town roads.*
Flooding	Encourage education and outreach on floodproofing private property.	High	This has not happened, and flood proofing existing structures may not be the most effective action to make the town more flood resilient.

Priority Actions for 2023 Greensboro Hazard Mitigation Plan

***cost definitions: Low is < \$5,000, Medium is \$5,000 to \$50,000, and High is \$50,000 or more.**

A. ALL HAZARDS:

1. Integrate this Hazard Mitigation Plan into the Town Plan and bylaw.

- Why: The Town Plan establishes the legal basis for regulatory programs, such as the Flood Hazard Bylaws.
- Who: The Planning Commission updates the Town Plan and amends the bylaws, and they are adopted by the Selectboard.
- Cost*: Low to medium, depending on the use of consultants.
- Resources: Planning consultants, Regional Planning Commission, Municipal Planning Grant Program (offered annually)
- When: The Plan officially expires in 2027, but it can be amended at any time.

2. Appoint and support a Community Resilience Organization

- Why: In addition to mitigating hazards and mobilizing emergency response, a Community Resilience Organization can support broader goals of sustainability and empowerment in a changing climate.
- Who: The CRO requires a cross section of capabilities in the community, and the roster may expand or contract to adapt to specific tasks. Personnel and participation should include the Emergency Management Director/Fire Chief, the Town Clerk, Road Foreman, representative from the Sheriff’s office, Energy Coordinator, Health Officer, Greensboro Association, Conservation Commission, Spark, the Food Shelf, Rescue Squad, clergy,

representative from Hardwick Electric, and representative from the Communications Union District. Members would be appointed by the Selectboard.

Cost*: Low

Resources: Other Vermont communities have established CROs. <https://gocros.org/>

When: Immediately upon adopting Local Hazard Mitigation plan. Group should be formed within the next three months and prepared to table at Town Meeting Day, 2024.

3. Establish an Emergency Communications Plan that keeps reaches multiple audiences.

Why: Diversity and inclusivity should be at the core of an emergency communications plan. Not everyone has or uses the internet, and messaging needs to incorporate redundant communications modes that overlap and reach potentially isolated and vulnerable populations. Vermont Emergency Management maintains a template for a long-form Local Emergency Management Plan, which can address communications and information sharing. Consider adopting this form of LEMP in the future.

Who: The CRO

Cost: Low to medium, if an onside consultant is hired to design the plan.

Resources: Vermont Emergency Management, the Regional Planning Commission, other CROs, communication consultants

When: The plan should be in place six months of adopting this plan.

4. Establish a community-led resilience hub.

Why: It's the proverbial shelter from the storm but so much more. The hub is a safe place for emergency power, communication, heating, and cooling, but it's also a way to disseminate information and resources for adapting and thriving in a changing climate. It provides access to weatherization and home fortification services for low- and moderate income households and provides education and education for effective adaptive strategies.

Who: The CRO

Cost: Medium to high, but costs can be incurred over time as the hub adds services.

Resources: Vermont Climate and Energy Action Network, regional energy planners, other community resilience hubs (there is one in Craftsbury!)

When: 18 months from adoption of Local Hazard Mitigation Plan.

5. Develop and implement a Climate Action and Resilience Plan.

Why: Nearly all survey respondents see the connection between natural hazards and climate, and they are concerned about facing a myriad of new challenges over time. The Climate Action and Resilience plan can help to minimize future natural hazard risk while addressing and adapting to their primary cause. Initiatives can include but are not limited to weatherization, maintaining healthy ecosystems, promoting road network resilience, and education and outreach. The plan can also inform the services and activities of the resilience hub.

Who: The CRO
Cost: Low to medium, depending on the use of outside consultants.
Resources: Vermont Climate and Energy Action Network, regional energy planners, Municipal Planning Grants, Vermont Community Foundation, and other grant funding sources
When: Two years from adoption of Local Hazard Mitigation Plan.

B. FLOODING

1. Review the FEMA draft maps when they become available

Why: Greensboro's current maps are severely lacking in detail. New maps will be digitized and include base level engineering to more accurately illustrate inundation hazards, but the draft maps should be reviewed by the entire community before they become effective.
Who: The Planning Commission
Cost*: Low
Resources: Vermont DEC, regional planning commission
When: The draft maps were expected in the spring of 2023, so this could happen at any time.

2. Amend Greensboro's flood regulations to make the community more flood resilient

Why: Greensboro's regulations address inundation hazards, and in most cases they are minimally compliant with FEMA standards. There are many opportunities to make the regulations more robust, such as prohibiting new critical facilities from flood hazard areas, limiting impervious surfaces, limiting new development in floodplains, and limiting new development in areas vulnerable to fluvial erosion. Some of these measures will also allow the community to receive more state financial assistance in the next federal disaster.
Who: The Planning Commission
Cost*: Low to medium, depending on the use of outside consultants
Resources: Vermont DEC, regional planning commission, land use consultants, VLCT
When: When FEMA releases the draft maps, the town's flood hazard regulations will be reviewed by FEMA's legal counsel for ongoing compliance with the National Flood Insurance Program. **The regulations must be deemed compliant within two years of the draft map release date.** Now is a good time to start the review and amendment process, but regulatory amendments will affect property owners. The process will require extensive public dialog to ensure that compliant regulations are in place in the next two years.

3. Ensure the Town's bridge and culvert data is online and current.

Why: We need to have culvert and bridge data in one place that is easy to locate.
Who: The Road Foreman
Cost*: Low

Resources: The regional planning commission transportation planner

When: Within 18 months of adoption of Local Hazard Mitigation Plan.

4. Continue to bring hydrologically connected Road Segments up to standard to reduce sediment deposit in water bodies.

Why: Ongoing compliance with the Municipal Roads General Permit requirements appears to be working. Roads that were brought up to compliance through rock-lined or seeded ditching and grading and crowning improved our roads' ability to convey the excessive rainfall experienced in the latest flood.

Who: The Road Foreman, aided by the road erosion inventories

Cost*: High, as a single-year could cost as much as \$50,000. This can be implemented over time, and grant funds, such as Grants-in-aid are available.

Resources: Regional transportation planner, Vermont Local Roads, the Conservation District,

When: Ongoing to 2035, when we are expected to reach full compliance.

5. Tighten coordination between the Vermont DEC, the Greensboro Association, and Hardwick Electric Department

Why: The tool to open the weir to Caspian Lake was not readily available during the July flood, because it was stored in Hardwick, which could not be accessed, due to flooding

Who: Greensboro Association, Vermont DEC, HED

Cost*: Low

Resources: None

When: Six months from adoption of Local Hazard Mitigation Plan

C. SEVERE WINTER HAZARDS, ICE, COLD, AND SNOW

1. Provide ongoing education about fire safety and prevention.

Why: Ongoing chimney inspections, education and outreach about CO detectors and testing can prevent tragedies in heavy snow and extreme cold events.

Who: The Fire Chief

Cost*: Low

Resources: The CRO can help to get the word out.

When: Ongoing

2. Help energy-burdened households improve weatherization and energy efficiency.

Why: Energy burdened households will be less likely to resort to dangerous measures in an extreme cold event, and they will be safe and comfortable.

Who: The energy coordinator, the CRO, and the Greensboro Free Public Library, which is partnering with the Craftsbury Energy Committee to conduct education and outreach on weatherization

Cost*: Low

Resources: HEAT Squad, NETO, VECAN, Municipal Energy Resilience Grants, Efficiency Vermont

When: Ongoing

3. Maintain virtual meeting capacity.

Why: Eliminate needless travel when road conditions are treacherous.

Who: The Selectboard and the Town Clerk

Cost*: Low

Resources: The communications union district, Internet services provider.

When: Ongoing

4. Provide information about natural vegetation snow fencing.

Why: The Vermont DEC can offer site visits to advise on attractive natural vegetation strategies to manage snow drifts.

Who: The Vermont Department of Environment Conservation

Cost*: Low

Resources: The CRO can help to publicize

When: Ongoing

5. Continue to publish the Greensboro Highway Department Winter Operations Plan in the Town Report every year.

Why: This is an easy and low-cost way to instill safe driving practices in inclement weather.

Who: The Road Foreman and the Town Clerk

Cost*: Low

Resources: None needed

When: Ongoing

6. Keep driveway plowing in the Town budget.

Why: The Town contracts to plow every resident driveway in the winter, adding a cost of about \$135,000 to the annual budget. The cost per taxpayer is minimal, when compared to how much each one would have to pay a private contractor. This also saves a considerable amount of money for low-income households and ensures that vulnerable people can be accessed by emergency, rescue, and home health services in inclement weather.

Who: The Selectboard and the budget committee

Cost*: High – but it is extremely cost effective for taxpayers

Resources: None

When: Ongoing

D. Severe Winter Weather AND Wind

1. Understand HED’s maintenance plan for maintaining utility corridors.

Why: HED appears to be proactive in doing this. Before the Town can offer direction on site plan considerations, there needs to be a productive dialog with HED.

Who: Selectboard, CRO

Cost*: Low

Resources: None

When: Within the next 18 months of the adopting the Local Hazard Mitigation Plan

2. Identify generator capacity and work to fill the service gaps.

Why: For a resilience hub to be effective, the Town needs to know where backup power is most needed, and it needs to know which entities and vulnerable populations need assistance in securing them.

Who: The CRO

Cost*: High, for the cost of generators, but this can be covered with grant writing

Resources: Hazard mitigation grants

When: Initial inventory complete within 12 months of adoption the Local Hazard Mitigation Plan, then ongoing support with grant writing

E. EXTREME HEAT

1. Help energy-burdened, low-income households improve ventilation and cooling. (HEAT Squad and NETO can provide these services.)

Why: Service providers can address cooling and ventilation, but residents are not always aware of their availability

Who: The energy coordinator, The Greensboro Free Library (in partnership with the Craftsbury Energy Committee)

Cost*: Low

Resources: HEAT Squad, NETO, regional energy coordinator, Efficiency Vermont, Stay Cool Vermont

When: Ongoing

2. Continue to support grants to improve the Greensboro Nursing home

Why: The nursing home has two air conditioning units in the common area, but these will probably not be sufficient in a few years.

Who: The Selectboard
Cost*: High (for the nursing home), but this can be covered with grants
Resources: Grant funding sources; the CRO, once operational, may be able to assist with grant writing
When: Ongoing

F. DROUGHT AND WILDFIRE

1. Educate the public about drought and fire risk

Why: Public awareness signage during the pandemic (signs were at the Willey's Store) were effective during the pandemic. Similar signs at the Willey's Store and at Smith's Grocery would be effective in drought periods and at periods of burn bans
Who: The Emergency Management Director
Cost*: Low
Resources: The County Forester
When: Ongoing

2. Maintain mutual aid agreements with neighboring fire departments

Why: Ensures ongoing protections in challenging emergencies
Who: The Selectboard, The Emergency Management Director
Cost*: Low
Resources: The Regional Emergency Management Committee, to support training and preparedness drills
When: Ongoing

G. INVASIVES

1. Attend road foreman trainings on managing and minimizing invasives.

Why: The right-of-way environment creates long, linear habitats that serve as pathways for the spread of invasive plants into new regions and onto adjacent lands. Training is available for identifying and managing invasives.
Who: The Road Foreman
Cost*: Low
Resources: Vermont Local Roads, regional planning commission Road Foreman Trainings
When: Ongoing

2. Support the efforts of the Lakewise program to keep Caspian milfoil-free.

Why: The Lakewise greeter program is effective in keeping milfoil and other invasives out of the lake. Next spring, the program will be enhanced by a hot water, high pressure boat wash decontamination station.

Who: The Greensboro Association

Cost*: Medium to high

Resources: Grants

When: Ongoing

3. Support outreach and education on invasives.

Why: Residents often unwittingly introduce invasives to our environment through mowing, boating (such as wakeboats, which can be a vector for zebra mussel larvae), and through inappropriate or ineffective management practices, such as pulling or digging. Brochures to identify invasives will make residents better stewards of our environment.

Who: Conservation Commission

Cost*: Low to medium

Resources: Grants

When: Ongoing

H. INFECTIOUS DISEASE

1. Support efforts to establish ubiquitous high-speed Internet in Greensboro.

Why: Hi-speed internet is a necessity, not a luxury. It was essential during the pandemic, when residents relied on extended periods of social isolation and remote working.

Who: The Communications Union District

Cost*: High

Resources: Grants, such as the recent USDA Grant

When: Ongoing

2. Evaluate and remain current on protocol and communications.

Why: Survey respondents commend the clear direction and communication regarding social distancing, masking, and vaccination requirements during the pandemic. Routine review of Town functions will better prepare us for the next outbreak: how to and when to close offices to the public, protocols and procedures to assess need, disseminate health and safety information, regarding quarantining how to access care or to ask for assistance. Information needs to be disseminated through a comprehensive, multimodal communication strategy that includes include populations who don't use the internet.

Who: Selectboard, The Town Clerk, Town Health Office, Emergency Management Director

Cost*: Low

Resources: Vermont Department of Health

When: Ongoing

C. Municipal Capacity

Greensboro is a very active place, but a small town, dependent on an engaged base of volunteers to get much of the work done. The town is too little populated to need, or to be able to support many professional staff. The town depends on volunteers for its fire department and contract with Hardwick Rescue to cover emergency response and with the Orleans County Sheriff's office for police coverage. The Town has a three-member Selectboard. Their Town Clerk, covers many of the responsibilities normally carried by the town manager and the town planner in larger communities. She is actively supported by the Assistant Town Clerk, and a Treasurer, and a Zoning Administrator. The Town has a Road Foreman.

**This section satisfies 44 CFR § 201.6(c)(3):
Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs?**

The Town remains current on its Town Plan and Zoning, Subdivision, and Flood Hazard Regulations. What cannot be quantified here is the seemingly boundless sense of community spirit and cooperation. Many residents give freely of their time by serving of multiple board and committees. Neighbors help neighbors, often showing up with backhoes and excavators at a time of crisis. As one resident stated, "that's why we live in a small community, because somebody's got your back."

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Table 3B.3: Status of Community Resources and Capabilities

Resource	Description	How it can help implement Hazard Mitigation Goals	Opportunities to expand capabilities?
Greensboro Town Plan	Plans for coordinated town-wide planning for land use, municipal facilities. Establishes the legal basis for land use regulations.	The plan addresses flood resilience, which became a statutory requirement in 2014.	The Town Plan is current but is set to expire in 2026. Amendments to the plan should incorporate relevant findings and strategies from this Local Hazard Mitigation Plan.
Greensboro Planning Commission	Drafts amendments to the town plan and the zoning, subdivision and flood hazard regulations, which were first adopted in 1985 and amended in 2015.	Helps to keep flood risks at the forefront with the general public and ensures ongoing participation in the National Flood Insurance Program.	The flood hazard regulations could be made more robust to address risks such as fluvial erosion and loss of floodplain storage. This effort will take outreach and education to build public consensus. The planning commission can lead that effort, with technical assistance from the regional planning commission, the basin planners, and the Vermont River Management Program.
National Flood Insurance Program (NFIP), joined 1985	Enables all residents in Greensboro to obtain flood insurance, whether or not a structure is	Covers damage caused by flooding and informs residents of flood risk. Effective in ensuring that	The Flood Insurance Rate Maps are paper maps that are lacking critical detail. New digitized draft maps

	located in a mapped flood hazard area. The most effective date of the Flood Insurance Rate Map used to administer the regulations is 9/27/1985. There are three policies in effect with a total coverage of \$456,000. There have been no claims made or paid, and there are no repetitive loss structures.	future development is safe from flooding.	will be released by FEMA soon. When the maps are released, FEMA will request a review of the local regulations for compliance with the FEMA’s standards.
Flood Hazard Regulations Administrator	Ensures compliance with zoning and flood hazard regulations.	Administers the local flood regulations to minimize flood hazard risk.	Flood hazard regulations are highly technical, and all local administrators rely on the State River Management Program for ongoing support and training.
Local Emergency Management Plan	Establishes basic municipal procedures for emergency response. This gets updated annually.	The LEMP establishes a game plan for call-outs, evacuations, etc.	The long-form LEMP provides more detail and establishes a communications plan for emergencies.
Community Resilience Organization (CRO)	A grass roots community resilience hub that builds capacity and support in response to natural hazards.	This group, comprised of the key individuals who created this plan, can oversee the implementation of this plan, as well as re-activated emergency management committee.	An effective CRO can build local resource sovereignty and social connectivity.
Energy Coordinator	Helps guide the Town and its citizens into a more sustainable energy future.	Can assist with outreach regarding effective weatherization opportunities, as well as ways to improve cooling and ventilation in the home.	Regional organizations like HEAT Squad and Northeast Employment Training Organization can help with outreach.
Town Health Officer	Responsible for investigating possible health hazards and risks and taking action to eliminate them.	Facilitates and supports testing of drinking water and septic systems. Enforces health laws.	Can keep the public aware of health risks associated with natural hazards.
Greensboro Association	A membership-based organization that works with state agencies to protect the quality of Caspian Lake.	Maintains a fund that provides grants for the community and the lake environment, including \$65,000 in pandemic relief.	Its membership is a powerful outreach and communication network.

Conservation Commission	Works to protect Greensboro’s natural assets.	Maintains a conservation funds.	Outreach and education can help to stem the spread of aquatic and land invasives.
Regional Emergency Management Committee (REMC)	Volunteer organization involved in hazard mitigation efforts.	In 2021, the REMC replaced the two Local Emergency Planning Committees in the Northeast Kingdom with one organization to focus on natural AND man-made disasters, such as hazardous materials release. The Local Emergency Management Director and one emergency services representative from each town and city in the region serve as voting members of the committee.	We anticipate that a broader regional process will be more efficient. Since this is a relatively new board, local representatives to the board should monitor for necessary improvements to the planning process, as they arise.
Municipal Roads General Permit (MRGP)	State standards have been updated to include the MRGP to control runoff and drainage on hydrologically connected road segments. Compliance is being phased in over time.	Effective in controlling road erosion and stormwater runoff. Provides funding sources for compliance.	Work with regional planning commission to pursue grant opportunities to implement recommended improvements.
Infrastructure & Road Maintenance Programs	Town Bridge and Culvert Inventory	Effective in tracking and planning for upgrades to most vulnerable infrastructure	Technical assistance from the regional planning commission can be helpful.

4. KEEPING THE PLAN RELEVANT

A. Plan Maintenance and Monitoring

Each spring, during the process of the updating the Local Emergency Management Plan for Greensboro, the Town Clerk and the Selectboard will take that opportunity to also review the list of implementation commitments in this hazard mitigation plan. The annual check-in will serve as a reminder of upcoming commitments for the year and enable them to note those tasks completed, by updating their status. Key members of the planning team, the road crew and fire department will be invited to join in on that annual opportunity to review whether the goals of the plan are being met. The Selectboard meetings are also public meetings advertised via public notice, and the plan will be available on the Town’s web site.

B. Integration of the Plan

The bylaws and the Town’s comprehensive plan will be updated during these next five years, with the priority mitigation actions to provide for stronger integration of this plan’s goals and implementation

objectives with the Greensboro Town Plan and the town's land development bylaws. The Planning Commission, Selectboard members, and the Town Clerk will seek to maximize integration.

C. Next LHMP Update

The next update of this plan will be initiated by the Town Clerk in the spring of 2026. This effort will be assisted by the Community Resilience Organization, whose members have experience and responsibilities related to planning, safety, and infrastructure for the town.

The planning team will review the measures in this plan on the relative effectiveness of those completed and why any that were not completed were not addressed in the time period. The team will also update the information in this plan on natural hazards to include those experienced since 2023. The team will invite broad public input to help them determine those strategies that need continued work or revision and any new directions that should be included in an updated plan. That public process will definitely include at least one public meeting and could include the use of an online survey to reach more people, including the nonresident property owners. The team will also request public input on the scoring of the strategies using a system equal or very similar to the STAPLEE method. The team will aim to have a completed draft update of the plan by December 2027, acknowledging that time is needed by the state and federal reviewers before the final updated plan can be adopted.