

JOHNSON, VERMONT LOCAL HAZARD MITIGATION PLAN 2022– 2027

FEMA Approval Pending Adoption:

Town Selectboard Adopted:

Village Board of Trustees Adopted:

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1. INTRODUCTION

The impact of expected, but unpredictable, natural, and human-caused events can be reduced through community planning. The goal of this multi-jurisdictional Local Hazard Mitigation Plan for the Town and Village of Johnson, Vermont (Plan, or LHMP) is to provide an all-hazards local mitigation strategy that makes the community of Johnson more disaster resistant.

Hazard mitigation is any sustained action that reduces or eliminates long-term risk to people and property from natural and human caused hazards and their effects. Based on the results of previous recovery efforts nationwide, FEMA and State agencies have come to recognize that it is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck. This Plan recognizes that communities have opportunities to identify mitigation strategies and measures during all phases of emergency management: preparedness, response, and recovery. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where the hazards are most severe, and identify local actions that can be taken to reduce the severity of the hazard.

Hazard Mitigation Strategies and Measures **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, or **avoid** the hazard by stopping or limiting development. These include projects such as:

- Flood-proofing structures
- Tying down propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters
- Ensuring adequate and safe 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
- Road maintenance and construction to current best practices and standards
- Ensuring critical facilities are safely located
- Buyout and relocation of structures in harm's way
- Establish and enforce appropriate building codes
- Inform and educate the public

1.1 PURPOSE

The purpose of this Local Hazard Mitigation Plan is to assist the Town and Village of Johnson (Johnson) in recognizing natural hazards facing their community and identifying strategies to reduce risks from acknowledged hazards.

Johnson strives to be in accordance with the strategies, goals, and objectives of the Vermont State Hazard Mitigation Plan, including an emphasis on proactive pre-disaster flood mitigation for public infrastructure, good floodplain and river management practices, and fluvial erosion risk assessment initiatives.

Prior to 2017, previous Johnson Hazard Mitigation Plans were developed as an annex to the Lamoille County Multi-Jurisdictional All-Hazards Mitigation Plan. The previous plan adopted in 2017, was a “unified” multi-jurisdictional plan for the Town and Village of Johnson. While the Village is a political entity with a legislative body located within the Town of Johnson, due to shared resources, responsibilities, and geographic boundaries, there is a clear advantage for the Village and the Town of Johnson to share a multi-jurisdictional Hazard Mitigation Plan.

1.2 COMMUNITY PROFILE

Johnson is centrally located in Lamoille County, at the confluence of the Gihon and Lamoille Rivers. The Town abuts Cambridge and Waterville to the west, Morristown to the south and east, Hyde Park and Wolcott to the east, and Belvidere and Eden to the north. It is located approximately 45 miles from the City of Burlington and approximately 40 miles from the state capital of Montpelier – two of Vermont’s largest job centers. The incorporated Village of Johnson exists with the Town of Johnson.

The population of the Town of Johnson is 3,491 and the Village of Johnson is 1,332 (US Census 2020). The Town of Johnson had a slight increase in population, about 45 residents. While the Village of Johnson experienced a reduction of about 111 people compared to the 2010 Census. This may have been due to Norther Vermont University holding classes remotely during 2020 because of the pandemic. This could have impacted what qualified as a primary residence for students if they were not in the area. Both the Village and the Town had an increase in the number of housing units. The Village housing stock increased by 64 units, and the Town housing stock by 173 units. The town housing occupancy status is at 88% of the total 1,518 units. The Village has a 92% occupancy rate with only 43 vacant units. Most of the Village units are rented (72%) while the Town has a higher percentage of owner-occupied housing (57%).

There are approximately 74.12 miles of roadways in town: 13.4 miles are state highway, 14.1 are Class 2, 39.55 are Class 3 and there is 13 miles of Class 4 that is not maintained for year-round travel. Vermont Route 15 is the region’s primary east-west transportation corridor. Data from the Vermont Agency of Transportation (AOT) indicate daily traffic volumes of 7,115 vehicles along Route 15 through the Village of Johnson. A second state highway, Route 100c, runs northeast from the Village of Johnson, connecting to Route 100 in the village of North Hyde Park. Traffic volumes along Route 100C, as measured between Sinclair Road and Hyde Park town line, are 2,300 vehicles per day. These numbers are lower overall and were collected in 2020, when more people were working remotely due to stay at home orders and the Covid-19 Pandemic.

The Town and Village share a Johnson Municipal Office on Route 15. The Town is governed by a Selectboard, and the Village of Johnson is governed by a Board of Trustees. Both the Town and Village of Johnson share a jointly appointed Planning Commission.

All roads are funded and maintained through the Town’s Public Works Department, with one Road Foreman. The Village has no authority over roads. The Village has full authority over the Village of Johnson Water and Light department (VOJW&L) which manages the local electric, water, and wastewater systems, General and Fire Departments.

There is one Emergency Management Director (EMD) and one Emergency Management Coordinator (acting as an assistant to the EMD). The EMD and EMC are appointed by both the Selectboard. Flood hazard regulations include all structures in Johnson (whether “Town” or “Village”).

There are four electric utilities that provide service to the town: the Village of Johnson Water and Light Department (VOJW&L), Village of Hyde Park Water and Light, Vermont Electric Cooperative (VEC), and Morrisville Water & Light. Morrisville Water & Light and Vojw&l are co-owners of a 34.5 kV transmission system which provides primary transmission service to Vojw&l through a direct interconnect to the VELCO 115 kV substation in Stowe. Green Mountain Power, formerly Central Vermont Public Service Corporation (CVPS), provides back up sub-transmission services to the Vojw&l through its 34.5kV transmission line and substation. The Village of Johnson provides electric service to approximately 950 metered customers, including Northern Vermont University and encompassing an area approximately two miles in any direction from the center of the village. VEC provides electric service to a substantial portion of the rest of the town. The Hyde Park Electric Department and Morrisville Water & Light have small service territories in outlying areas of town. The town has a mapped sewer service area district within which connections to the existing sewer lines are permitted by application and 25,000 gallons per day sewage discharge capacity is allotted under an agreement between the Town and Village of Johnson.

Locally, fire coverage is provided by the volunteer Village of Johnson Fire Department, which serves under contract, the towns of Johnson, Waterville, and Belvidere. The fire station is located at 251 Lower Main Street, next to the Municipal Offices. The Johnson Fire Department participates in the Lamoille Mutual Aid Association, which functions as a mutual aid response network among all eight Lamoille County fire departments. Under statute, fire departments are required to provide mutual aid assistance if they have training and resources are available. The Village Fire Department also provides water rescue services statewide through a contract with Vermont Emergency Management.

There are two levels of law enforcement in Johnson: the Lamoille County Sheriff’s Department (LCSD) and the Vermont State Police. The town relies on the LCSD for law enforcement services, through participation in a three-town contract, along with Hyde Park and Wolcott. The LCSD dispatch is located on Main Street in Hyde Park Village. The Vermont State Police provides additional law enforcement support. The town’s appointed Constables are authorized to enforce limited local ordinances, but do not have law enforcement powers and duties.

Rescue services in Johnson are provided by the Northern Emergency Medical Services Division of Newport Ambulance Service, Inc. (NEMS), a private non-profit ambulance service that provides immediate response emergency medical care, backup emergency response services (to volunteer rescue squads) and medical transfer services. NEMS provides these services under contract to a five-town consortium, which includes Hyde Park, Waterville, Belvidere, and Eden. The ambulance is dispatched either through 911 calls received at the sheriff’s department or through direct calls to the service itself. The ambulance service is a private, non-profit organization that is supported, in part, with municipal funds under the above reference contract.

Medical care is provided locally by one local family physician while Copley Hospital in Morrisville provides additional medical support. Copley is a 32-bed treatment center servicing the community for acute, outpatient and long-term care. More specialized services are available in Burlington, Berlin and Hanover, New Hampshire.

The Town adopted a Local Emergency Management Plan (LEMP) in April 2021. This plan is updated annually each March/April by the Johnson Selectboard. The update process for the LEMP is led by Town Administrator in collaboration with the Emergency Management Director and representatives from the Town and Village. Review and use of each plan occurs the beginning of winter when it is used most. The municipal office and the Johnson Elementary School are designated as Emergency Operations Centers, and Northern Vermont University (Shape Facility) and Johnson Elementary School are certified Red Cross Emergency Shelters.

2. PLANNING PROCESS OVERVIEW

Vermont Emergency Management (VEM) released the State's Hazard Mitigation Plan in November 2018. The State's Hazard Mitigation Plan serves as a source of information and guidance for local jurisdictions in completing their own Hazard Mitigation Plans, identifying all hazards facing their community, and establishing strategies to begin reducing risk from identified hazards. The State plan and available guidance from FEMA provide the framework for this update.

2.1 PLANNING PROCESS AND PUBLIC PARTICIPATION

The previous Johnson Hazard Mitigation Plan was adopted by the Town of Johnson on September 18, 2017, and The Village of Johnson on September 11, 2017. The Johnson LHMP received FEMA final approval on September 29, 2017.

In developing this Plan, LCPC initiated conversations with the local Emergency Management Director, Emergency Management Coordinator, Town Administrator, Village Manager, the Town and Village Planning Commission, Town Selectboard, Village Board of Trustees, and the public at large. The following is the schedule of activities that made up the plan's development:

- Starting in September 2021, LCPC reviewed the 2017 LHMP and marked sections of the plan recommended for revision.
- On November 4, 2021, LCPC met with the Town Administrator to review the Hazard Mitigation Goals, Hazard Identification and Risk Assessment table, and Mitigation Actions.
- On December 8, 2021, LCPC met with the Johnson Planning Commission to review the Hazard Inventory/Risk Assessment Matrix, the Mitigation Action Status Table, the Mitigation Action table, and the Mitigation Action Prioritization Matrix.
- Based on the feedback, LCPC began updating the 2022 plan and developed a draft plan focused on incorporating new mitigation actions and a table to track status of mitigation actions.
- On January 26, 2022, LCPC attended a joint meeting with the Town Selectboard and Village Trustees to review the Mitigation Goals, the Mitigation Action Status Table, the Mitigation Action table, and the Mitigation Action Prioritization Matrix.
- On February 3, 2022, LCPC discussed fire events and emergency service response with the Village Fire Chief.
- In February, LCPC updated the 2022 plan based on the comments received from the Johnson Selectboard and Village Trustees in preparation for the public comment period.

- On February 17, 2022, a press release was published in the News and Citizen, notifying the public that the draft plan is available for review and the public comment period runs from March 1, 2022, until April 1, 2022.
- On 2/28/2022, the draft plan was posted on the LCPC website.
- On X, the draft plan was posted on the Town and Village website.
- On X, Johnson posted a notice on Front Porch Forum, notifying the public on the draft plan, public comment period, and the public meeting on March 9, 2022.
- On March 9, 2022, the Johnson Planning Commission held the publicly warned meeting to discuss the draft plan and receive public comments. The Johnson Planning Commission is a joint planning commission for composed of residents from both the Town and Village of Johnson.
- There were X comments received and a summary of the input and how it was incorporated is below.

2.2 PLANNING PROCESS AND NEIGHBORING COMMUNITIES

Neighboring communities have been encouraged to provide input into the development of this plan and review the draft plan. On 2/28/2022, this Plan was posted on LCPC's website and at LCPC's Facebook page. On X, a notice was posted on Front Porch Forum in Johnson and made viewable to the surrounding communities. On 2/28/2022, the plan was distributed to the Regional Emergency Management Committee (REMC). The REMC is composed of emergency management professionals and volunteers from Lamoille County and includes the following representatives: the Emergency Management Directors from Belvidere, Cambridge, Eden, Elmore, Hyde Park, Morristown, Stowe, Waterville, and Wolcott; other members include Cambridge Fire and Rescue; Eden Fire Dept; Hyde Park Fire Dept.; Morristown Fire, Rescue, and Police; Stowe Fire, Rescue, and Police; and the Wolcott Fire Dept. The REMC members and all public comments were instructed to provide feedback to Melanie Riddle, Lamoille County Assistant Planner via email or phone.

2.3 EXISTING PLANS, STUDIES, REPORTS, AND TECHNICAL INFORMATION

To develop this plan and to provide Johnson with relevant information necessary to develop hazard mitigation strategies, the following resources were utilized and referenced throughout this plan:

- 2018 State of Vermont Hazard Mitigation Plan
- 2016-2024 Johnson Town and Village Municipal Development Plan
- 2021 Johnson Local Emergency Management Plan
- Vermont Emergency Management
- Vermont Agency of Transportation
- Vermont Center for Geographic Information
- Emergency Response Guidebook
- National Flood Insurance Program
- Flood Insurance Rate Maps
- Ice Jam History and Preliminary Mitigation Assessment-USACE 2022
- U.S. Census, 2020
- American Community Survey, 2015 – 2019
- National Centers for Environmental Information, National Oceanic and Atmospheric Administration
<http://www.ncdc.noaa.gov/stormevents/>

- FEMA <https://www.fema.gov/disaster>
- State of Vermont – Flood Ready Information <http://floodready.vermont.gov>

2.4 PLAN MAINTENANCE PROCESS

The Town Administrator and Village Manager will collaboratively evaluate Johnson’s LHMP annually by reviewing the status of mitigation actions and assessing their effectiveness in meeting the hazard mitigation goals. Any significant disaster event may prompt a review of this plan by municipal staff, Emergency Management Director, and elected Boards (Selectboard/Village Trustees). One year prior to the expiration of the Plan, Town Administrator and Village Manager will initiate and lead the process of the Plan update-with potential assistance from LCPC. To involve the public, we will implement the process used during the update of this plan and described in detail in section 2.1 of the plan. The Selectboard and the Board of Village Trustees are the authorities to vote on the plan approval by reviewing the status of mitigation actions and assessing their effectiveness in meeting the hazard mitigation goals.

2.5 HAZARD IDENTIFICATION AND RISK ASSESSMENT (HI/RA):

The following assessment is based on the revised, 2021 Vermont HI/RA (Hazard Inventory and Risk Assessment) that was completed in November of 2021 with the assistance of the Johnson Town Administrator. The following table reflects the 2021 update. The first column is a list of hazards that could affect the community. The hazards were evaluated to have a Rare, Unlikely, Unusual, Likely, or Frequent probability of being a threat to the community. The severity and community vulnerability/risk of each hazard was assessed. The final column details what is most vulnerable if the hazard occurred.

CLASSIFICATION: PROBABILITY OF OCCURRENCE

- Rare: < 1% probability in the next 100 years; may never have occurred in Vermont.
- Unlikely: 1% to 4% probability in the next year, this type of event has occurred in Vermont.
- Unusual: 4% to 10% probability in the next year, or at least one chance in the next 100 years.
- Likely: 10% to 50% probability in the next year, or at least one chance in the next 10 years.
- Frequent: Greater than 50% probability in the next year; an event that occurs often but degree varies.

CLASSIFICATION: SEVERITY (PERCENTAGE OF THE COMMUNITY AFFECTED) BY THE HAZARD

- Minor: < 10% of properties damaged/Minimal disruption to quality of life.
- Serious: 10% to < 25% of properties damaged/Loss of essential facilities/services for up to 7 days/Few (< 1% of population) injuries possible.
- Extensive: 25% to 50% of properties damaged/Loss of essential facilities/services for > 7 days < 14 days/Major (< 10% of population) injuries/few deaths possible.
- Catastrophic: > 50% of properties damaged/loss of essential facilities/services for > 14 days/Severe (> 10% of population) injuries/multiple deaths possible.

The combination of the impact of the hazard (severity) and the probability was used to determine the COMMUNITY VULNERABILITY/RISK as High, Moderate or Low.

TABLE 1: JOHNSON TOWN AND VILLAGE HAZARD IDENTIFICATION AND RISK ASSESSMENT

Possible Hazard	Probability of Occurrence	Severity	Community Vulnerability /Risk	Most vulnerable areas or items
Inundation Flooding, Flash Flood, Fluvial Erosion, and Ice Jam	Frequent	Serious	Moderate	Utility Infrastructure, Transportation Network, Structure/Property, Water Quality, Agriculture
Wind: Wind Storms, Thunderstorms, Hurricanes, and Tropical Storms	Unusual	Serious	Moderate	Utility Infrastructure, Transportation Network, Structure/Property, Water Quality, Agriculture
Snow Storm, Ice Storm	Likely	Serious	Moderate	Utility Infrastructure, Transportation Network, Structure/Property
Infectious Disease	Unusual	Extensive	Moderate	Agriculture, Healthcare, Public Health, Economy, Infrastructure, Supply Chains, Workforce
Landslides	Unlikely	Minor	Low	Utility Infrastructure, Transportation network, Structure/Property, Water Quality
Drought	Likely	Minor	Low	Agriculture, Public Health, Economy, Water Quality
Invasive Species	Likely	Minor	Low	Severe damage to water resources, extinction of some species
Wildfire	Rare	Minor	Low	Silviculture, Structures/Property, Public Health, Economy, Agriculture, Water Quality
Hail	Rare	Minor	Low	Utility Infrastructure, Structure/Property, Water Quality, Public Health, Economy, Agriculture
Earthquake	Rare	Minor	Low	Utilities, Transportation Network, Structure/Property, Water Quality, Public Health, Economy
Tornado	Rare	Minor	Low	Utilities, Transportation
Extreme Heat	Likely	Minor	Low	Agriculture, Public Health, Infrastructure

Extreme Cold	Likely	Minor	Low	Agriculture, Public Health, Infrastructure
Dam Failure	Rare	Minor	Low	Utility Infrastructure, Transportation Network, Structure/Property, Water Quality, Public Health, Economy, Agriculture
Major Highway Accidents	Likely	Minor	Low	Utility Infrastructure, Transportation Network, Structure/Property, Water Quality, Public Health, Economy
Major Structure Fire	Likely	Minor	Low	Utility Infrastructure, Transportation Network, Structure/Property, Water Quality, Public Health
Hazardous Materials Spill	Unlikely	Minor	Low	Environmental / Ecological Damage, Water Quality, Public Health
Lighting and Electrical Hazards	Unlikely	Minor	Low	Utility Infrastructure, Structure/Property, Public Health, Economy

The Town and Village of Johnson identified the following moderate risk and serious or extensive severity hazards to discuss in depth in this plan:

- Inundation Flooding, Flash Flood, Fluvial Erosion, and Ice Jam
- Wind: Wind Storms, Thunderstorms, Hurricanes, and Tropical Storms
- Snow Storm and Ice Storm
- Infectious Disease

The remainder of the hazards are classified as low risk with minor severity and section 4 provides a brief overview of these hazards. For a more in depth and detailed description of these hazards, please refer to the Vermont State Hazard Mitigation Plan.

3. MODERATE RISK HAZARDS

3.1 INUNDATION FLOODING, FLASH FLOOD, FLUVIAL EROSION, AND ICE JAM

Hazard Definition: Inundation Flooding is the overflowing of rivers, streams, drains, and lakes due to excessive rain, rapid snow melt, or ice. Flash flooding is a rapidly occurring flood event usually from excessive rain.

Fluvial erosion is the removal of sediment from stream channel banks by the channel flow. This process occurs naturally over time as a stream channel adjusts. However, fluvial erosion can occur more quickly and severely during flood events and can pose a significant risk to infrastructure and buildings within the river corridor. Ice jams occur when warm temperatures and heavy rain cause snow to melt rapidly. Snowmelt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of the river. The ice layer often breaks into large chunks, which float downstream and often pile up near narrow passages or other obstructions, such as bridges and dams.

Extent: Johnson vulnerability to a flood is moderate and the probability of flood occurrence is frequent. The information provided by the National Weather Service identifies flood stage on Lamoille River in Johnson as the river height of 13 feet. The most significant historical event has been document in August 1995 when Lamoille crested at 19.88 feet. In April 2011, a devastating spring flood caused the Lamoille to crest at 16.97 feet. For ice jams, extent and historical occurrence data is not available.

Location: Inundation Flooding, flash flooding, and fluvial erosion are Johnson’s most commonly recurring hazards. Parts of community most at risk are those located in the floodplain and along river corridors. These areas are shown on the attached Flood Hazard Map. In the Village, most of the past damages occurred to properties along Main and Railroad Streets and impacted homes, municipal wastewater plant, municipal library, and the post office shopping plaza. In Town, primary impacts have been to town roads located along the Lamoille and Gihon Rivers and associated culverts and bridges. Ice jams can occur anywhere along the Lamoille and Gihon rivers.

There are 140 structures in Johnson located within a FEMA special flood hazard area. Of these structures, 60 are in the Town (areas of Johnson outside the Village) and 84 in the Village. Johnson also has structures that are susceptible to fluvial erosion and the State of Vermont has identified these structures as being located within a river corridor area. Often, special flood hazard and river corridor areas overlap however, river corridors also exist in places (e.g., along smaller streams) where flood hazard areas do not.

Table 2, listed below, details the history of major flood events that resulted in federal disaster declarations, starting in 1995. The list includes dates, public assistance funding received, and descriptions of disasters.

TABLE 2: FEDERAL DISASTER HISTORY AND INFORMATION

August 1995 (DR 1063)	\$496,594	Record setting heavy rains caused flooding in six north- central counties. Preliminary damage assessments indicated individual losses greater than damages to public infrastructure. Flood levels exceeded the 500-year event in several areas along the Lamoille River.
January 1996 (DR 1101)	\$5,290	A mid-winter flood event brought statewide destruction of private and public property with eleven counties included in the declared disaster area. This event left more than 150 communities eligible for public assistance.
July 1997 (DR-1184)	\$137,334	Excessive rain in several northern Vermont counties caused flash flooding and destruction of public and private property.

July 1998 (DR-1228)	\$7,262	Eleven of the fourteen Vermont counties experienced severe damage from excessive rainfall. The torrential rains came in much the same pattern as they had in the summer of 1997 but occurred further south than the 1997 floods. The flash flooding left many homes destroyed, roads and bridges damaged, and communities cut off from the rest of the state.
July 2008 (DR-1790)	\$104,954	Severe storms and flooding caused a federal disaster to be declared in Addison, Caledonia, Essex, Lamoille, Orange, Washington, and Windsor counties on September 12, 2008. More than \$104,954 in federal public assistance funds was used to repair flood damaged public infrastructure.
April/May 2011 (DR-1995)	\$68,985	Excessive rain and severe floods swept across northern Vermont, with a federal disaster declared for Addison, Chittenden, Essex, Franklin, Grand Isle, Lamoille, and Orleans counties. At the height of the storms on April 27, much of the Village of Johnson was inundated with flood waters from the Lamoille River. The Grand Union grocery chain – which served residents of Johnson, Hyde Park, Cambridge, Waterville, and Belvidere– ceased operations following the flood. As part of the recovery effort, Johnson worked extensively to recruit a new store operator. Between the Town and Village there was \$91,980 of eligible damage claims submitted to FEMA, of which FEMA reimbursed 75% or \$68,985. In addition, the Village had an insurance claim for damages to the wastewater treatment facility (WWTF) in the amount of \$112,268. The Village implemented significant measures to mitigate damage from future flood events when replacing equipment covered by insurance.
August 2011 (DR-4022)	\$19,622	High wind and flooding associated with Tropical Storm Irene devastated southern Vermont, causing localized damage to structures and property in northern parts of the state. While the impact was far less severe in Lamoille County than elsewhere in the state, Johnson experienced limited road, culvert, and power line damage from rain and high winds. The Town and Village had a combined expense of \$21,802, of which FEMA paid a 90% share of \$19,622.
May 29, 2012 (DR-4066)	none	Numerous thunderstorms with heavy rain, damaging lightning and some isolated large hail and strong winds resulted in flash flooding in Lamoille, Addison and Orleans counties with radar estimated storm total rainfall of 3 to 5 inches. Johnson did not submit a claim for this event.
May 23, 2013 (DR-4120)	none	Heavy rainfall produced flash flooding across Lamoille and Chittenden Counties. Excessive runoff in the steep terrains washed out bridges, culverts, and roads. Gradually the flash flooding transitioned to a flood event as larger rivers such as the Lamoille and Browns River responded to the increased flows. Johnson did not submit a claim for this event.
April 15, 2014 (DR-4178)	\$369,000	Heavy rainfall and snowmelt caused widespread minor to moderate flooding across Lamoille County, along and west of Route 100. Numerous highways were flooded and there was widespread damage to gravel roadsides and many culverts failed in Johnson, Belvidere, Cambridge, and Waterville. In Stowe, the recreation path sustained damage. In Johnson, a washed-out culvert stranded six families in the Coddling Hollow neighborhood for two days until a temporary bridge could be installed. The Lamoille

		River in Johnson exceeded its flood stage of 13 feet and crested at 14.16 feet. Total public assistance received to repair damages was \$1,844,155. Johnson received \$21,000 to repair damages to Rocky Road and was approved for public assistance funding of \$348,000 to repair and upgrade the culvert on Coddington Hollow Road.
Dec. 9, 2014 (DR-4207)	none	Heavy, wet snowfall across Lamoille County ranged from 6 to 18 inches. Johnson received 12 inches of snow. The heavy, wet nature of the snow resulted in widespread power outages and vehicle accidents. Total power outages were over 175,000 across Vermont. This storm caused the 2nd most power outages due to weather in Vermont.
Oct. 29, 2017 (DR-4356)	none	Rain began on October 29th and became heavy on October 30th. Total rainfall in Johnson was about 1.3 inches. Sustained winds of 25 to 35 mph with frequent wind gusts of 50 to 70 mph occurred during the early morning hours of October 30th across portions of Vermont due to fully mature mountain waves. A peak wind gust of 115 mph was observed at the summit of Mount Mansfield. The severe storm and rainfall caused flooding across the region, with a federal disaster declared for Addison, Chittenden, Essex, Franklin, Grand Isle, Lamoille, Orange, Orleans, Washington, and Windham counties on Jan. 2, 2018.
May 2, 2018 (DR-4380)	\$4,650	Rain started overnight on May 4th and increased on May 5th. Total rainfall in Johnson was around 1 inch. The severe storm and rainfall caused flooding across the region, with a federal disaster (FEMA-4380-DR-VT) declared for Chittenden, Grand Isle, Lamoille, Orange, and Orleans counties on July 30, 2018.
Oct. 31, 2019 (DR-4474)	\$28,651	Steady rain developed during the night of October 31st and became heavy at times through November 1st. Rainfall amounts ranged from 1.5 to 4 inches across Vermont. Numerous flooded streams and washed-out roads were reported. Several large rivers flooded, including the Lamoille. In addition to the large rain amounts, high winds were reported throughout the county. Gusts more than 50 mph caused downed trees and power outages. Roads and structures were damaged by trees being blown over.
Jan. 20, 2020 (DR-4532)	none	The COVID-19 pandemic was declared a disaster in Vermont on April 8, 2020. COVID-19 can cause people to experience fever, shortness of breath and difficulty breathing, and many other flu-like symptoms. This virus proved to be most harmful to the elderly and people who are immunocompromised. Prior to the end of 2021, Vermont has had over 60,000 positive cases. A vaccine has been approved for use in Vermont. At the end of 2021, 84% of Vermonters have been fully vaccinated.

3.1.1 NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

Both the Town and Village of Johnson participate in the NFIP, with the Village subsumed under the Town's Flood Hazard Ordinance. Since 1978, there have been 37 losses and a total of \$321,953 in claims. As of 2021, there have been 10 properties identified as repetitive loss structures. There were 26 individual insurance policies in effect, five in Town and 21 in the Village. The Town recognizes the importance of having NFIP available and will continue to regulate floodplain development through its floodplain zoning regulations. The floodplain zoning regulations are administered by Flood Zoning Administrator and hearings are held by the Zoning Board of Adjustments (currently designated as Johnson Planning Commission). It should be noted that NFIP does not

cover some important potential losses such as utilities located in basements and has a maximum coverage limit of \$500,000. That is a very limiting factor for businesses, which must obtain supplemental insurance at exceedingly high rates. NFIP should be encouraged to review and update coverage and limits as well as the Flood Insurance Rate Maps (last updated in April 1987).

3.2 SNOW STORM AND ICE STORM

Hazard Definition: Snow Storms lead to a heavy accumulation of snow, which can be accompanied by high wind causing drifting snow, low visibility, and hazardous travel. An Ice Storm is the ice accretion from freezing rain, which can weigh down trees and power lines, causing outages and potentially occurring in conjunction with flooding. Severe winter storms bring the threat of heavy accumulations of snow, cold/wind chills, strong winds, power outages, internet outages, and property damage.

Location: Winter storms with snow, ice and freezing temperatures in various combinations are commonplace in Johnson. During a snowstorm, an entire community is equally at risk.

Extent: The worst winter storm that can be anticipated in Johnson would be comparable to December 2008 ice storm where much of the region was impacted by 3-4” of ice accumulation, causing widespread, multi-day power outages, internet outages, and obstructing roads with downed trees and power lines. These are low probability events. Alternatively, the worst snowstorm that can be expected is snowfall of up to 30”, which has occurred multiple times (as shown in Table 2). While large snowfalls often disrupt business for one or more days, Vermont communities are well prepared for snow and such storms are less of a hazard than ice storms.

There have been no winter storms that resulted in FEMA disaster declarations since the storm in December 2014.

Johnson is well geared to manage most snow/ice storms. Due to the region’s mountainous terrain, it is not uncommon for precipitation to range from rain in the valley area, to ice in the middle elevations, with heavy snows in the higher terrain. This poses a challenge to highway maintenance personnel.

Johnson maintains snow removal equipment for all town highways, and Vermont Agency of Transportation maintains equipment for state highways. Snowfalls that are within normal snowfall limits are managed effectively; however, during heavy snowfall for extended periods of time, removal of snow becomes problematic. Historically, these events are not frequent and are short in duration. During such events, radio communications is maintained between highway crews and town emergency responders. Local construction equipment in the community has been used during past emergencies to augment community resources. Most residents are accessible during severe weather conditions, although access may be delayed. In the event of a winter emergency, the Town of Johnson Public Works Department will assist fire and ambulance crews by making private roads passable.

TABLE 3: JOHNSON SEVERE WINTER STORM HAZARD HISTORY 1978-2021

Date	Event	Extent in Lamoille County
January 13, 2018	Ice/snowstorm and ice jam	1” freezing rain & 4-8” snow
December 9-11, 2014	Severe winter storm	6-18” of snowfall

December 20-23, 2013	Severe winter storm	6-18" of snowfall
February 24-25, 2012	Severe winter storm	13-30+" of snowfall
March 6, 2011	Severe winter storm	18-30" of snowfall
February 23, 2010	Severe winter storm	Up to 20" of snowfall
December 12-13, 2008	Ice/freezing rainstorm	Ice accumulations of 3-4"
February 14, 2007	Severe winter storm	Up to 48" of snowfall
October 25, 2005	Severe winter storm	Up to 14" of snowfall
February 10, 2005	Severe winter storm	10-20" of snowfall
January 4, 2003	Severe winter storm	Up to 20" of snowfall
April 9, 2000	Severe winter storm	13-25" of snowfall
January 6, 1998	Ice/freezing rainstorm	Up to 0.5" of icing between 1500'-2500' elevations
December 29, 1997	Severe winter storm	Up to 21" of snowfall
January 15-16, 1983	Severe winter storm	Up to 24" of snowfall
February 6-7, 1978	Severe winter storm (Blizzard of '78)	Up to 30" of snowfall

Source: National Centers for Environmental Information

3.3 WIND: WIND STORMS, THUNDERSTORMS, HURRICANES, AND TROPICAL STORMS

Hazard Definition: Wind Storms are a high wind event without precipitation. Severe thunderstorms, hurricanes and tropical storms are compound hazards can produce precipitation, high winds, flooding, and fluvial erosion. Thunderstorm winds are short in duration, involving winds or gusts more than 50 mph. A tropical storm has a maximum sustained wind speed of 39–73 mph. A hurricane is a tropical cyclone with sustained winds that have reached speed of 74 mph or higher.

Location: Thunderstorms and associated hazards can affect the entire community however, parts of community most at risk have been the ones located in the floodplain and along river corridors. These areas are shown on the attached Flood Hazard Map. In the Village, most of the past damages occurred to properties along Main Street and Railroad Street. The damage impacted homes, the municipal wastewater plant, municipal library, and the post office shopping plaza. In Town, primary impacts have been to town roads located along the Lamoille and Gihon Rivers and associated culverts and bridges.

Extent: The worst windstorm that can be anticipated in Johnson would be comparable to that of the September 1938 hurricane, which caused widespread property damage throughout the state (reaching a force of 12 on the Beaufort Wind Scale, with estimated winds of 74 mph).

TABLE 4: JOHNSON WIND STORM HAZARD HISTORY 1938-2021

Date	Event	Extent in Lamoille County
August 28, 2016	Thunderstorm wind	Wind gusts up to 58 mph
July 19, 2013	Thunderstorm wind	Wind gusts up to 63 mph
December 21, 2012	High wind event	Wind gusts up to 70 mph
October 29, 2012	High wind event	Wind gusts up to 55 mph
August 28, 2011	Tropical Storm Irene	Sustained winds of 30-45 mph
April 16, 2011	High wind event	Wind gusts up to 60 mph
December 1, 2010	High wind event	Wind gusts up to 90 mph
September 19, 2003	High wind event	Wind gusts up to 50 mph
September 16, 1999	Tropical Storm Floyd	Wind gusts up to 60 mph
January 27, 1996	High wind event	Wind gusts of 30-50 mph
September, 1938	Hurricane	74 mph

Source: National Centers for Environmental Information

3.4 INFECTIOUS DISEASE

Hazard Definition: an infectious disease caused by micro-organisms, such as bacteria, viruses, and parasites. Some of these diseases return seasonally and therefore require continuous monitoring. An epidemic emerges when an infectious disease occurs suddenly and exceeds the normally expected number of cases. This threat is a danger primarily to emergency responders, healthcare providers, and schools, but is often present in the general population as well.

Influenza returns annually as a threat, although there has not been a serious outbreak in Vermont in recent history. However, more serious strains of flu may occur in an upcoming year that are not included in the annual flu vaccine. There are many other diseases such as HIV/AIDS, SARS, cholera, malaria, and antibiotic-resistant tuberculosis that are major problems elsewhere but are not prevalent here. Illnesses that are present in Lamoille County include Pertussis, Giardia, Salmonella, and Lyme disease. All these illnesses are present at normal levels. Some outbreaks that could occur in Johnson might involve a contaminated water supply, widespread food supply contamination, large-scale livestock outbreaks, or a bio-terrorist act. While climate change has not yet been linked to an increase in infectious disease cases, there is a speculated connection.

The pandemic of Coronavirus/Covid-19 emerged as a problem in early 2020, when the governor issued a State of Emergency on March 13, 2020, and a subsequent stay-at-home order. This disrupted supply chains, shut down tourism and resulted in major shifts in the economy, work-force, and quality of life. The Covid-19 pandemic continues to this day, although cases are not as severe in Vermont due to the development of a vaccine. This global pandemic is still a concern for the economy, supply chain, and public health. As of February 2, 2022, the Vermont Health Department reported 105,569 total positive cases of Covid-19. The vaccination

efforts have been widespread. Around 87% of eligible Vermonters have received at least one dose of the vaccine. The fatalities from Covid-19 total 545 people in Vermont.

4. LOW RISK HAZARDS

4.1 LANDSLIDES

Hazard Definition: The term "landslide" describes a wide variety of processes that result in the downward and outward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these.

The risk of a landslide is most often associated with Inundation Flooding, erosion, and other impacts of heavy rain. Roads located in ravines adjacent to steep slopes are particularly vulnerable to landslides. Such locations include portions of Plot Road, Wilson Rd, River Rd East, and Hogback Road, as well as Route 100c near the intersection of Route 15. The latter location poses an additional hazard due to the high traffic volume and numerous structures nearby, including critical facilities. This is a low probability and low impact hazard.

4.2 DROUGHT

Hazard Definition: Drought is defined as a water shortage with reference to a specified need for water in a conceptual supply and demand relationship. It is a complex phenomenon that is difficult to monitor and assess because it develops slowly and covers extensive areas, as opposed to other disasters that have rapid onsets and obvious destruction.

Droughts represent a hazard in late summer when local spring and well levels are reduced to minimal flows. The Village owned water system has in the past provided water to residents not on the water system and residents have also obtained water from Johnson Cold Spring. Drought poses low risk to the entire community and has a low probability.

4.3 INVASIVE SPECIES

Hazard Definition: The National Invasive Species Council defines an invasive species as one that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. They overwhelm native species and may force them out completely. Often, invasive species lack food value that native wildlife depends on. Others prey heavily upon native species or out-compete them for food. This can cause serious impacts in both directions of the food chain.

Species such as Japanese knotweed, phragmites, and purple loosestrife can alter soil composition, water tables, and disrupt insect cycles.

Invasive species are more of a hazard throughout the spring, summer, and fall. Johnson has a likely occurrence of invasive species, but community threat is low.

4.4 WILDFIRE

Hazard Definition: A wildfire is the uncontrolled burning of woodlands, brush, or grasslands. Across much of Vermont, small wild land and brush fires are common, but the probability of major forest fire is exceptionally low.

Every town in Vermont has a designated Forest Fire Warden, who receives daily updates from the Division of Forestry during periods of elevated risk. The risk of wildfires is most severe in outlying areas of development—away from the town’s major highways— where structures are surrounded by ignitable hard and softwood forests. The threat of extensive wildfires is low.

In 2010-11, LCPC developed a Community Wildfire Protection Plan (CWPP) for the towns of Johnson and Hyde Park. This is a low probability and low impact hazard. At the time of this update, the Planning Commission does not intend to update the CWPP as it is a low probability and low impact hazard.

4.5 HAIL

Hazard Definition: Hail is a form of precipitation composed of spherical lumps of ice. Known as hailstones, these ice balls typically range from 5–50 mm in diameter on average, with larger hailstones forming in severe thunderstorms.

With Vermont’s variable weather patterns, hail is a four-season threat to both public and private property. Smaller storms may damage homes and automobiles. This is a low probability and low impact hazard.

4.6 EARTHQUAKE

Hazard Definition: An earthquake occurs when two blocks of the Earth suddenly slip past one another. According to the U.S. Geological Survey (USGS), the risk of earthquakes in Vermont and much of northern New England is rated moderate, compared with the substantial risk attributed to much of the West Coast and lower-Midwest.

Lamoille County has not experienced any property damage or loss of life attributed to an earthquake in its history. This is a low probability and low impact hazard.

4.7 TORNADO

Hazard Definition: A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more.

Tornados, while uncommon in New England, can occur and endanger life and property virtually anywhere, at any time. According to NCDC, there have been only two tornado incidents in Lamoille County since 1960. The most recent touched down in Cambridge in 2008 and was measured between an EF0 and EF1 on the Enhanced Fujita Scale – which characterizes tornado wind speeds and degree of expected damage. This is a low probability and low impact hazard.

4.7 EXTREME HEAT

Hazard Definition: Extreme heat can have significant effects on human health, and the range of extreme depends on the local climate. The Vermont Department of Health suggests that the threshold in Vermont where hospitals see a rise in heat-related emergency room visits at 87°F.

In Vermont, a heat wave is defined as a period of three or more consecutive days during which the diurnal maximum temperature meets or exceeds 90°F.

Extreme heat and prolonged periods of hot weather often effect the frequency and occurrence of other hazards such as drought, wildfire, invasive species, and infectious disease. As Johnson experiences temperature increases these other hazards may increase as well. This hazard is likely with low community risk.

4.8 EXTREME COLD

Hazard Definition: Extreme cold can have significant effects on human health, businesses, and can significantly impact infrastructure. The definition of extreme cold depends on the local climate.

Extended periods of cold during winters are likely to occur. One of the most prolonged cold episodes lasted from January 18 to February 3, 1969. The temperature remained below 0°F consistently and water mains around the state burst in record numbers. Other instances include February 1993 and January 1997, both of which were caused by Arctic high-pressure systems. In the winter of 2015, below freezing temperatures were maintained for 27 days. Frigid Arctic air has continued to impact longer or very cold weather events in the past few years. There has been a trend down in temperatures as we continue to experience climate disruptions from greenhouse gas emissions. Johnson is well prepared for extreme cold which is a likely hazard with low community impact.

4.9 DAM FAILURE

Green River Dam in nearby Hyde Park– located approximately 4.3 miles above the confluence with the Lamoille River– poses a low risk with medium impacts. Morrisville Water and Light owns and operates the Green River Dam which has been utilized as a water storage project since its construction in 1947. Hydroelectric generating facilities have been installed at the site and are now in operation.

The worst estimated dam failure event would be a complete breach of the Green River Reservoir Dam, which would inundate properties in low-lying areas adjacent to the Lamoille River and VT Route 15. However, the number of acres or homes impacted would vary depending on the height of water behind the dam at the time of breach, as well as the height of rivers downstream. Furthermore, the dam has never breached; there is no publicly available data to quantify extent for such an incident.

In Johnson, the Lower Pond at Northern Vermont University (NVU) is classified as a dam on NVU's Inundation Map. According to the map, if the dam is ever breached the waters will raise the height of the Gihon River by 1.9 feet and the impacted areas would include School Street, lower Clay Hill Road, Crab Tree Lane, MacMudgett Drive and McLelland Hall at NVU. In discussions with the Town Administrator, it was determined that the probability of the Lower Pond's breach is minimal. In the worst-case scenario, an incremental release of the pond waters could occur in which case the water would empty out very slowly due to the large land mass between the edge of the pond and the embankment. The impact of this slow release on the community would be minimal.

4.10 MAJOR HIGHWAY ACCIDENTS

Johnson is transected by two major State highways: VT Routes 15 and 100c. Both serve as major inter- regional trucking and transportation corridors. The volume and type of traffic on the state highway network, creates potentially dangerous intersections with local roadways. The Vermont Agency of Transportation identifies five high crash locations in Johnson; one is located along Route 15 and the rest are along Route 100c. Forty-eight accidents occurred at these locations between 2012 and 2016. The Transportation Concerns Map details the high crash locations.

The Agency of Transportation also keeps a database of bridge inspection reports. In Johnson, all fifteen bridges have a federal sufficiency rating of greater than 50 (out of 100). Most of the bridge scores are around eighty.

There is no data or precedent to substantiate what is the worst anticipated major highway accident for Lamoille County. We consider the probability low and potential impact minor.

4.11 MAJOR STRUCTURE FIRE

According to data from the 2020 Census and Vermont Center for Geographic Information, there are 1,518 housing units and approximately 69 commercial buildings within the town. Housing units are typically built on multi-acre lots; however, homes in the village are much more densely sited. The risk of large-scale structure fires is low in Johnson. The most significant risks involve residences and businesses, particularly in the village where buildings are close together. A structure fire at the Johnson Woolen Mill represents a significant risk for two reasons. First is the age and wood frame construction of the old mill buildings and second is the presence of wool in the buildings. Under the right circumstances, burning wool can produce arsenic gas which is highly toxic. A major structure fire at the mill could require evacuation of portions of the village. This danger is well known to the Fire Department and contingency plans have been developed to deal with this risk in the event of fire. Northern Vermont University has also been identified as having significant risk due to its large population in dormitory buildings and issues associated with response to large populations. The probability of a major structure fire is low, and the impact is minor. It should be noted that Johnson has a highly trained fire department, first class equipment, and excellent mutual aid with other area departments. The fire department has noticed an increase in emergency response calls occurring during a natural disaster or flood event since the previous plan update.

Over the past few years, most structure fires have been typical emergency events with prompt emergency response. Subsequent clean up and repair of the structures has occurred in all locations, except for one residential building on Lower Main Street. This building has yet to be rebuilt since the cleanup and restoration work required has not been completed. This fire event is memorable since it occurred during the Halloween Storm on October 31, 2019 (DR-4474).

4.12 HAZARDOUS MATERIALS (HAZMAT) SPILL

In Vermont, businesses and facilities storing hazardous materials are required to file a Tier II report with DEMHS detailing the volume and type of substance. According to the Tier II statewide database, there are twelve sites in Johnson. A Tier II site is defined by federal law under the Emergency Planning & Community Right to Know Act (EPCRA) and is any facility which uses or possesses reportable quantities of chemicals requiring material safety data sheets by VOSHA, known human carcinogens, extremely hazardous substances, explosives which require licensing or certain threshold quantities of petroleum products.

In Johnson, 312 structures are within 1000 feet of a Tier II site. Using the median housing value estimate from the 2019 American Community Survey and assuming total loss of the structure provides the estimated potential loss from damage to these properties. The estimated potential loss for all properties, using the residential housing value, within 1000 feet of a Tier II is \$51,760,800. The estimated potential loss for the 568 properties within 500 feet of a major roadway is \$94,231,200.

Hazardous waste sites have the potential to contaminate and pollute water systems and other ecosystems, as well as threaten human health. The Vermont Agency of Natural Resources maintains a web-based atlas, which includes data about hazardous materials. According to the State Waste Management Interactive database, between 2015 and 2021, twenty-five incidents were reported involving hazardous materials spills in Johnson, as shown in Table 5. These spills mostly involved limited quantities of oil or other petroleum products.

TABLE 5. JOHNSON HAZARDOUS WASTE SPILL SITES (2015-2021)

Spill#	Facility Name	Address	Product Contaminants
2021WMD406	Fred's Plumbing & Heating Bulk Plant	3725 VT 100C	water/oil mix
2021WMD147	Miller Residence	55 Mountain View Park Loop	#2 Fuel Oil
2021WMD025	roadway	1442 RT 15	Motor Oil
2021WMD094	Roadway	College Hill	Hydraulic Oil
2020WMD384	Bidwell Residence	451 Wilson Road	#2 Fuel Oil
2020WMD532	Fred's Energy Bulk Terminal	3725 Vermont Route 100C	Diesel
2020WMD046	Residential Property	234 Main St	Hydraulic Oil
2020WMD366	Roadway	Clay Hill Road	Unknown/unspecified Petroleum
2020WMD478	Roadway/Roadside	Multiple roads and waterways	Paint/Stain
2020WMD425	Vermont Studio Center	29 Pearl St	#2 Fuel Oil
2020WMD280	VSC Cottage & Bldg.	86 Pearl St	#2 Fuel Oil
2020WMD278	VT Studio Center Miller House	72 School St	#2 Fuel Oil
2020WMD277	Wolf Kahn Studio/VT Studio Center	93 Pearl St	#2 Fuel Oil
2019WMD061	Fred's Plumbing & Heating Bulk Plant	3725 VT RT 100C	Diesel
2019WMD168	Private Residence	93 Whiteface Mountain Dr	isocyanate and/or poly resin (2-part insulation foam)
2018WMD270	Maplefields	143 Lower Main Street	Diesel
2017WMD656	Apartment Building	50 Main Street	#2 Fuel Oil
2017WMD296	Cote Residence	333 Lower Main West	#2 Fuel Oil

2017WMD641	Roadway	Route 15 between Johnson and Morrisville	Hydraulic Oil
2016WMD235	Merchant's Bank	103 Main St	#2 Fuel Oil
2016WMD383	Merchant's Bank	103 Main Street	#2 Fuel Oil
2015WMD336	Roadside	3241 Route 100C	MODF (mineral oil dielectric fluid)
2015WMD110	Roadway	217 Tree Farm Road	Diesel
2015WMD207	TT Accident	412 Route 15 East	Diesel
2015WMD329	VT Electric Coop	42 Wescom Rd	MODF (mineral oil dielectric fluid)

4.12.1 CRITICAL FACILITIES AND OTHER VULNERABLE SITES

The Critical Facilities Map depicts Johnson's critical facilities and sites vulnerable to natural hazards. The critical facilities are: Municipal offices (shared by Town and Village), Emergency Operations Center, Fire Department, Elementary School. A HAZMAT accident could disrupt functions of all these facilities.

VULNERABLE SITES INCLUDE:

- Village of Johnson (due to risk of inundation flooding)
- Wastewater Treatment Facility (due to risk of flooding)
- Village and VEC substations (risk of oil spills; the village substations have oil containment)
- Intersection of Rt. 15 and Rt. 100c (risk of hazardous spills)
- Northern Vermont University
- Brosseau Fuels Route 15 West
- Fred's propane and Heating Fuel on Rte. 100c
- Ambulance House
- Low lying areas in and around the floodplain

HIGH RISK POPULATIONS INCLUDE:

- Nazarene Church Day Care
- Northern Vermont University
- Laraway Youth and Family Center
- Mobile Home Parks: Katy Winn and Highland Heights
- St. John's Knoll - Elderly Housing
- Johnson Elementary School
- Lamoille Mental Health Residential Care
- Johnson Community Housing Project School Street Elderly units
- Johnson Water and Light electric "lifeline" customers

5. HAZARD MITIGATION PLAN INTEGRATION AND USE

Successfully managing hazards and strengthening the mitigation and preparedness actions in Johnson requires a unified planning effort. This hazard mitigation plan must align with the comprehensive Town and Village Municipal Development Plan that was adopted in 2016 and will be in effect through 2024.

Implementation recommendations from the Flood Resilience Element of the Municipal Development Plan were reviewed during the preparation of this hazard mitigation plan and incorporated into the list of mitigation actions.

Mitigation actions identified in this plan will be reviewed during the next update of the Municipal Development Plan. Additionally, the list of actions will be made available to state agencies for their incorporation into statewide plans including the Tactical Basin Plan for Lamoille River watershed of the VT Agency of Natural Resources, and the List of Priority Infrastructure Projects developed annually by the VT Agency of Transportation.

Johnson's staffing capacity is limited in terms of some technical capabilities and works closely with LCPC to accomplish certain hazard planning and mitigation actions including geomorphic assessments, flood modeling, infrastructure improvements, and Hazard Mitigation Grant Program applications and projects. Johnson does maintain and support other planning and preparedness mechanisms such as: funding for the fire and rescue squads; sustain positions of Emergency Management Director, Deputy Director and Coordinator; periodic review and update of bylaws and ordinances, including current Flood Resiliency efforts; capital planning and budgeting to improve infrastructure; annual LEMP updates.

Vermont Emergency Management encourages a collaborative approach to achieving mitigation at the local level through partnerships with Vermont Agency of Natural Resources, VTrans, Vermont Agency of Commerce and Community Development, Regional Planning Commissions, FEMA Region 1, and others. That said, these agencies and organizations can work together to provide assistance and resources to towns interested in pursuing hazard mitigation projects. Local officials and property owners can always contact the State Hazard Mitigation Officer with questions, technical assistance, or to find out about grant opportunities

5.1 CONTINUED PUBLIC INVOLVEMENT

There are three principal avenues for continued public participation during the maintenance of this plan:

- Community involvement through the local and regional planning process relating to updating existing planning mechanisms.
- Participation at the regular REMC meetings (REMC meetings are attended by a variety of parties: first responders, municipal officials, non-profit health care agencies, disaster assistance groups, communications industry officials and Tier II HAZMAT operators); and,
- Posting of the LHMP on the Johnson and LCPC websites for public comment.

The public will be notified of review and update efforts over the next five years through press releases to local newspapers, announcements by local radio stations, updates to the Johnson and LCPC websites and postings on Front Porch Forum and the Friends of Johnson electronic newsletter. Additionally, LCPC will reach out to other

regional stakeholders, including the Lamoille Mutual Aid Association and Lamoille County Sheriff's Department, to ensure mitigation planning efforts align with the county's public safety interests.

5.2 JOHNSON'S HAZARD MITIGATION GOALS, PROJECTS, AND ACTIVITIES

The following goals were evaluated and affirmed by the community. The goals are listed in order of importance/priority.

1. Reduce and avoid long-term vulnerabilities to major hazards.
2. Prioritize mitigation and preparedness activities related to inundation flooding, fluvial erosion, ice jams, major winter storms, ice storms, and severe windstorms.
3. Incorporate flood resiliency in evaluation of costs and benefits of community & economic development projects. Collaborate with the state and local agencies on mitigation efforts.
4. Maintain and update infrastructure such as roads, bridges, and culverts.
5. Evaluate and consider the expansion of dry hydrant installations, especially in rural areas, to better prepare for fire suppression activities.
6. Inform and educate the public about mitigation efforts and maintain enrollment in National Flood Insurance Program (NFIP).

Table 6 details actions and ongoing or recently completed mitigation programs, projects, and activities in Johnson. In parentheses, "T" or "V" indicate which authority, town or village, benefits from these activities. New mitigation actions for the 2022-2027 period are detailed below. There were seven actions completed including the replacement of the French Hill Road Culverts in 2018; The Johnson Village Form-Based Code was adopted 5/21/2018; The public library heating and electrical systems floodproofing was completed in early 2020; LCPC conducted a Windshield Survey of the River Corridors in Johnson and worked with Staci Pomeroy, VT DEC River Scientist to complete the ground truthing of river corridors in 2017; The Johnson Road Erosion Inventory was conducted in 2020 and LCPC is working with Johnson to refine the inventory; The Ice Jam History and Preliminary Mitigation Assessment was completed in 2021; Updating the Village Revolving Loan Fund to include projects to improve a structures' flood resiliency was completed in December of 2021.

Future actions are aimed at addressing the following significant hazards: Inundation flooding, flash floods, fluvial erosion, ice jams and severe wind events accompanied by rain. The Town and the Village considered the need to mitigate winter storm and ice storm hazard and determined that the continued focus of the Town of Johnson Public Works Department and the Village Public Works Department will be on managing the storms as they happen. Hazard mitigation priorities are determined by Johnson's ability to finance and implement these activities with the Town and Village's existing tax base. The mitigation activities will be completed as funding, time, and public support will allow. The list of mitigation actions is in Table 7 below. The actions, as prioritized, are in Appendix B.

TABLE 6. JOHNSON TOWN AND VILLAGE MITIGATION ACTION STATUS

ACTIONS COMPLETED
Replace two side by side culverts on French Hill Road. (T)
Create Johnson Village form-based code ordinance and regulation. (T)
Relocate public library heating and electrical systems from the basement to the first floor or higher. (T)
Request from ANR the ground- truthing of river corridor areas in places where such ground-truthing has not been done. (T)
The Johnson Road Erosion Inventory including assessing the field erosion along hydrologically connected segments along municipal roads. (T)
Completion of the Ice Jam History and Preliminary Mitigation Assessment by USACE in partnership with the Vermont Silver Jackets. (T)
Update borrowing guidelines for Village Revolving Loan Fund to enable borrowing for projects that improve structures’ flood resiliency. (V)
ACTIONS RE-WORDED AND INCLUDED IN THE 2022 PLAN
These items from the 2017 plan were reworded and moved to the Action Table (Table 6) and Evaluation Prioritization Matrix in appendix B.
Continue to improve the water crossing beyond the basic improvements made in 2021 to align with the 2013 Dubois and King Flood Mitigation Study recommendations for the Scribner Covered Bridge over Gihon River. (T)
Secure funding and implement, where feasible, restoration projects identified in the River Corridor Management Plan, the 2021 Lamoille Tactical Basin Plan, and the Ice Jam History and Preliminary Mitigation Assessment. (T)
Work proactively with the transmission service provider to upgrade the existing infrastructure and avoid long-term electric outages. (V)
ONGOING ACTIVITIES
Adopt and maintain a Local Emergency Management Plan (LEMP). (T, V)
Participate in the Regional Emergency Management Committee. (T, V)
Maintain an evacuation plan for village and critical facilities and community notification process. (T, V)
Ongoing emergency and mitigation training for Emergency Response and Management staff. (T, V)
Upgrade minimum culvert sizes to Town Highway Road and Bridge Standards and replace culverts in poor condition to lessen flood damage as identified in the Town Culvert Inventory. (T)
Update and maintain annual culvert inventory. (T)
Annual investment of local tax dollars in highway mitigation projects. The town budgets road, bridge, and culvert improvements in the annual Town of Johnson Public Works Department budget. (T)
Conduct general road maintenance included ditching and vegetation management. (T)
Upon request from the Town, review the Town and Village Flood Hazard Regulations to ensure that they meet minimum NFIP requirements. (T)
Utilize State and Federal funding for mitigation projects and activities such as the Vermont Better Roads Program. (T)
Annually evaluate road erosion and prioritize road erosion concerns for the Highway Maintenance Program. Refer to the Road Erosion Inventory (REI) that was completed in 2020. (T)
Ensure continued enrollment in National Flood Insurance Program (NFIP). (T, V)

NEW ACTIONS PRIORITIZED IN THIS PLAN UPDATE
Proactively manage hazard trees to reduce windstorm impacts on local utilities and Town infrastructure. (T)
Manage ash trees in accordance with the state recommendations regarding Emerald Ash Borer Best Management Practices as listed in the Johnson Town Plan, State, and Federal regulations. (T)
Research technology and improve capacity for remote/hybrid meetings. (T)
Maintain adequate PPE supply for Johnson municipal employees for current and future public health events. (T)
Ensure Best Management Practices are followed regarding winter maintenance equipment and replacement to manage all winter weather conditions and ice storms. (T).
ACTIONS NOT PRIORITIZED IN THIS PLAN UPDATE
These actions were removed because they were no longer applicable or not a high town priority.
Create Informational Database on elderly and special needs population (T, V)

Overall, the Town’s and the Village’s capabilities to address vulnerabilities and hazards are considered adequate in relation to the size of the community and the available financial resources. Added demands to improve emergency response and hazard mitigation would necessitate a need for more staffing and financial resources which, for small communities with a modest tax base, is a significant challenge. Currently, the ability to increase preparedness or mitigation capabilities beyond these action items does not exist within the Village or the Town of Johnson.

TABLE 7. JOHNSON TOWN AND VILLAGE MITIGATION ACTIONS

Mitigation Action	Hazard	Responsible Party(ies)	Funding Sources	Cost*
Town of Johnson	-	-	-	-
Continue to improve the water crossing beyond the basic improvements made in 2021 to align with the 2013 Dubois and King Flood Mitigation Study recommendations for the Scribner Covered Bridge over Gihon River.	Inundation Flooding, Fluvial Erosion, Ice Jams, Severe Windstorms	Town Administrator, LCPC	State and Federal Grants, Town	High – Very High
Upon request from the Town, review the Town and Village Flood Hazard Regulations to ensure that they meet minimum NFIP requirements.	Inundation Flooding	LCPC, REMC	Emergency management or hazard mitigation planning grants	Low
Secure funding and implement, where feasible, restoration projects identified in the River Corridor Management Plans, the 2021 Lamoille Tactical Basin Plan, and the Ice Jam History and Preliminary Mitigation Assessment.	Inundation Flooding, Fluvial Erosion, Ice Jams, Severe Windstorms	Johnson Conservation Commission; Lamoille Co. Conservation District; VT River Conservancy; VT Land Trust	VT River Conservancy; VT Land Trust; Ecosystem Restoration Grants; Vermont Better Roads; FEMA	Low-High
Upgrade minimum culvert sizes to Town Highway Road and Bridge Standards and replace culverts in poor condition to lessen flood damage as identified in the Town Culvert Inventory.	Inundation Flooding; fluvial erosion, Ice Jams, Severe Windstorms	VTrans, Selectboard, Town of Johnson Public Works Department	VT Agency of Transportation; LCPC Transportation Planning Initiative; Town budget	Very High
Explore funding to implement stormwater management systems that align with the new stormwater requirements and priorities outlined in the Johnson Stormwater Master Plan.	Inundation Flooding, Fluvial Erosion, Severe Windstorms	Selectboard, Town of Johnson Public Works Department	Watershed management, Emergency management or hazard mitigation grants	Medium – Very High
Proactively manage hazard trees to reduce windstorm impacts on local utilities and Town infrastructure.	Severe Windstorms	Utility Company, Town of Johnson Public Works Department	Town budget, Utility budget	Low-Medium

Manage ash trees in accordance with the state recommendations regarding Emerald Ash Borer Best Management Practices as listed in the Johnson Town Plan, State, and Federal regulations.	Severe Windstorms	Town of Johnson Public Works Department	Town budget	Low-Medium
Ensure Best Management Practices are followed regarding winter maintenance equipment and replacement to manage all winter weather conditions and ice storms.	Winter Storms, Ice Storms	Town Administrator, Town of Johnson Public Works Department, Selectboard	Town budget	Medium
Research technology and improve capacity for remote/hybrid meetings.	Infectious Disease	Town Administrator	Town budget, Emergency Management or Hazard Mitigation grants	Medium
Maintain adequate PPE supply for Johnson municipal employees for current and future public health events.	Infectious Disease	Town Administrator	Town budget, Emergency Management or Hazard Mitigation grants	Low-Medium
Village of Johnson	-	-	-	-
Work proactively with the transmission service provider to upgrade the existing infrastructure and avoid long-term electric outages.	Inundation Flooding, Fluvial Erosion Severe Windstorms	Village Trustee Board	Village of Johnson Electric Department	Very High
Explore funding to implement stormwater management systems that align with the new stormwater requirements and priorities outlined in the Johnson Stormwater Master Plan.	Inundation Flooding, Fluvial Erosion Severe Windstorms	Village Trustee Board	Watershed management, Emergency management or hazard mitigation planning grants	High – Very High

*Cost scale: "Low" (0-\$5,000), "Medium" (\$5,001 - \$15,000), "High" (\$15,001 - \$50,000) or "Very High" (More than \$50,000)

APPENDIX A. JOHNSON SUPPLEMENTAL DATA AND MAPS

Flood Hazard Map; Critical Facilities Map; Transportation Concerns Map; Ice Jam History Map

FLOOD HAZARD MAP












TOWN OF JOHNSON

For planning purposes only.
Not for regulatory interpretation.

Transverse Mercator,
VT State Plane,
Meters, NAD83.

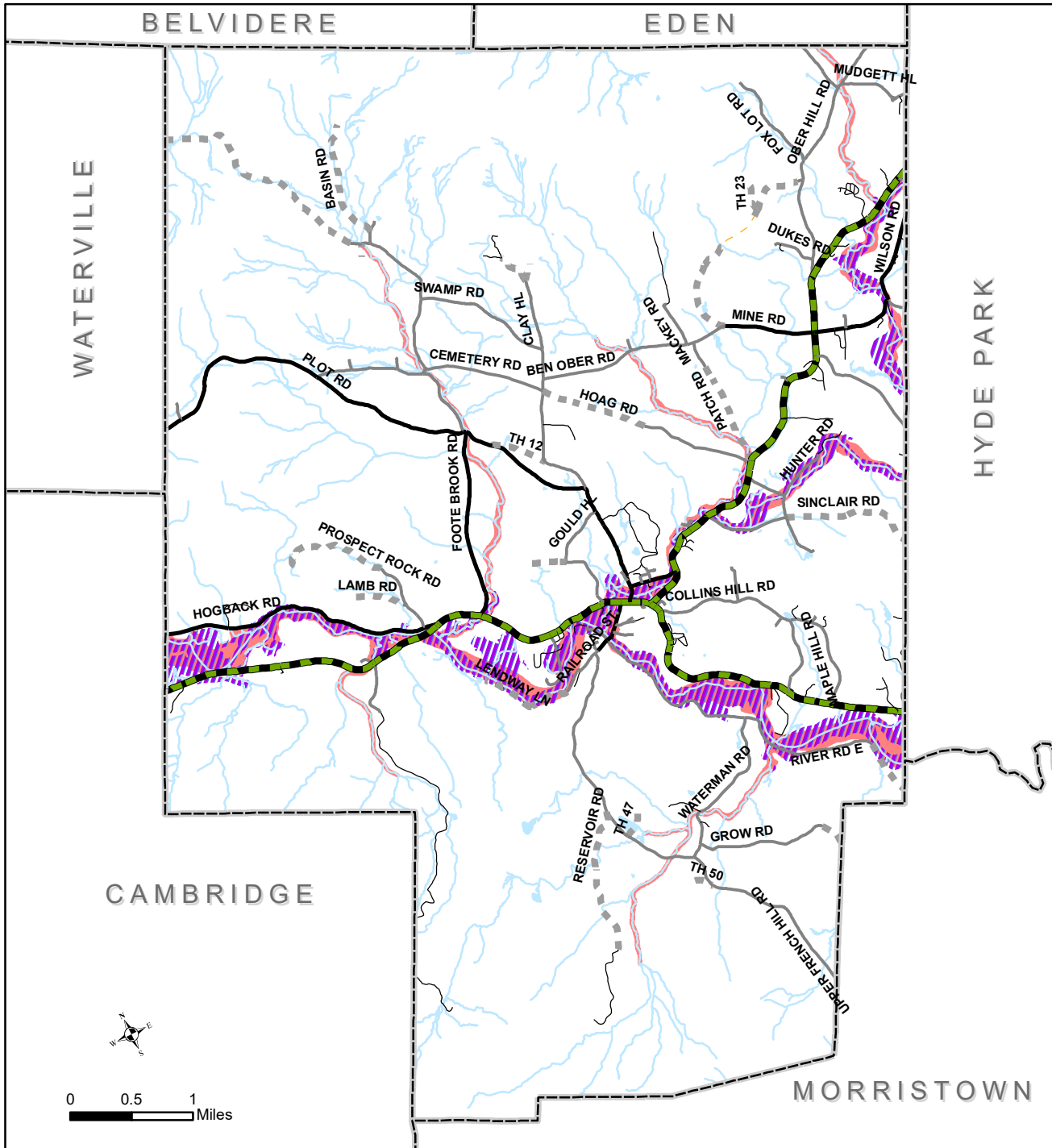
Lamoille County
Planning Commission
PO Box 1637, 52 Portland Street
Morrisville, VT 05661
802.888.4548 f 802.888.6938
www.lpcvt.org November, 2021

Legend

-  SPECIAL FLOOD HAZARD AREA
-  RIVER CORRIDOR/FEH
-  RIVER / STREAM
-  LAKE / POND
-  Unknown/Private
-  State Highway
-  Legal Trail
-  Town Highway Class 3
-  Town Highway Class 2
-  Town Highway Class 4
-  State Forest Highway

Data Sources:

Roads: E911 road centerlines, 2019.
100-Year and 500-Year Flood Zones: Digital Flood Insurance Rate Map (DFIRM), FEMA, 2000. Floodplains for planning purposes only.
River Corridor/Fluvial Erosion Hazard Areas: LCPC and VT ANR River Management, various dates. Much FEH boundary data is based on partial stream assessments and therefore is preliminary in nature.



CRITICAL FACILITIES

TOWN OF JOHNSON

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www.lcpcvt November 2021

Legend

CRITICAL FACILITIES

- Agriculture, Food, & Livestock
- Banking & Finance
- Education
- Emergency Response & Law Enforcement
- Energy
- Government & Military
- Health & Medical
- Information & Communication
- Transportation Facilities
- Water Supply & Treatment
- TIER II FACILITIES
- EHS FACILITIES

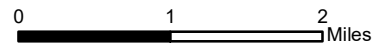
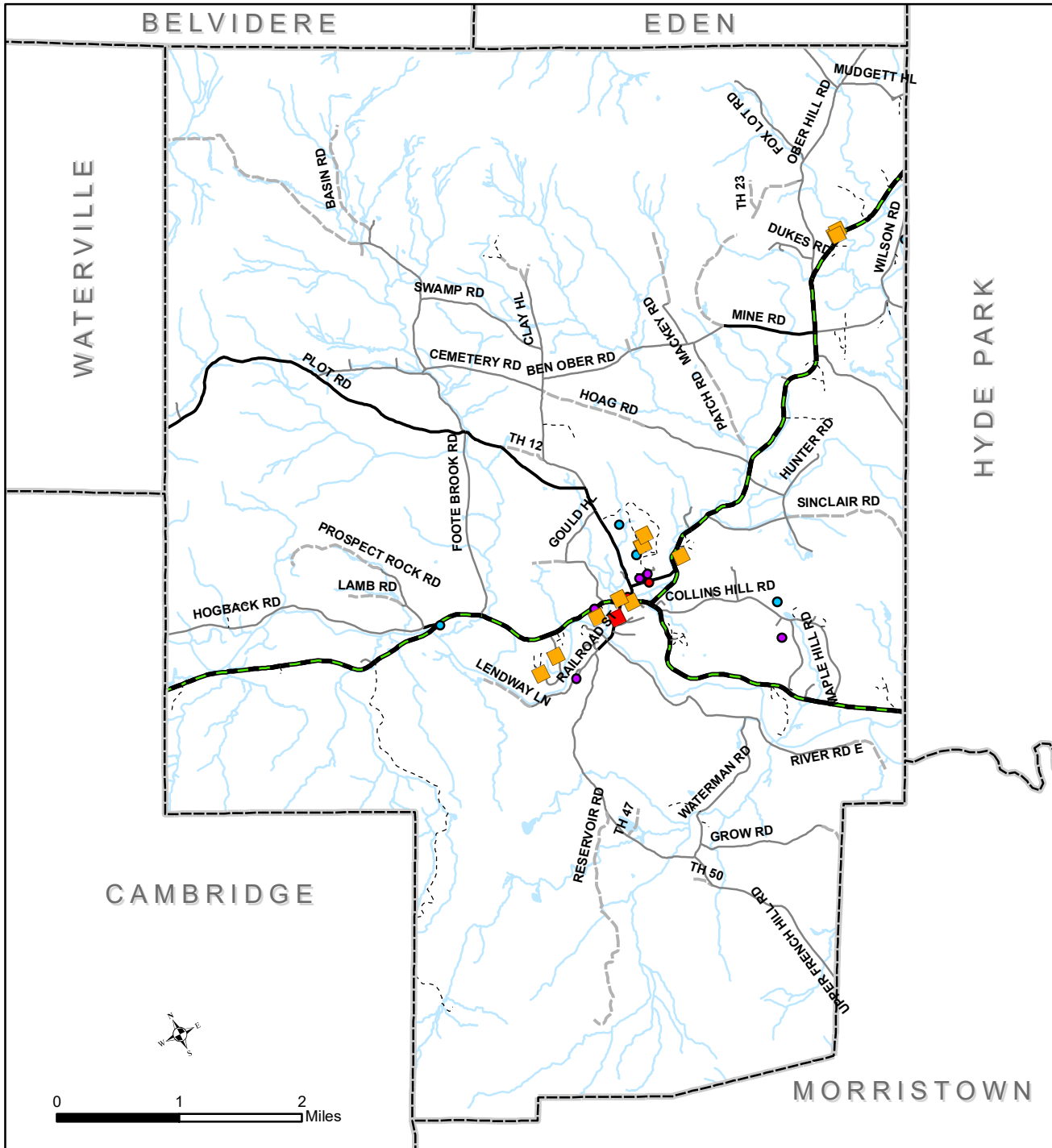
Data Sources:

CRITICAL FACILITIES, TIER II and EHS FACILITIES:
DEMHS, 2015.

ROADS: 1:5000 E-911 Road Data, 2019.

POLITICAL BOUNDARIES: 1:24000 USGS Quadrangles,
VCGI, 1991.

SURFACE WATER: On-screen digitized from 1:5000 digital
orthophotos using USGS 7 1/2' quadrangles and 1:20000 color
infrared aerial photography as additional source material, VCGI
for VHD-USGS, 2001



TRANSPORTATION CONCERNS















TOWN OF JOHNSON

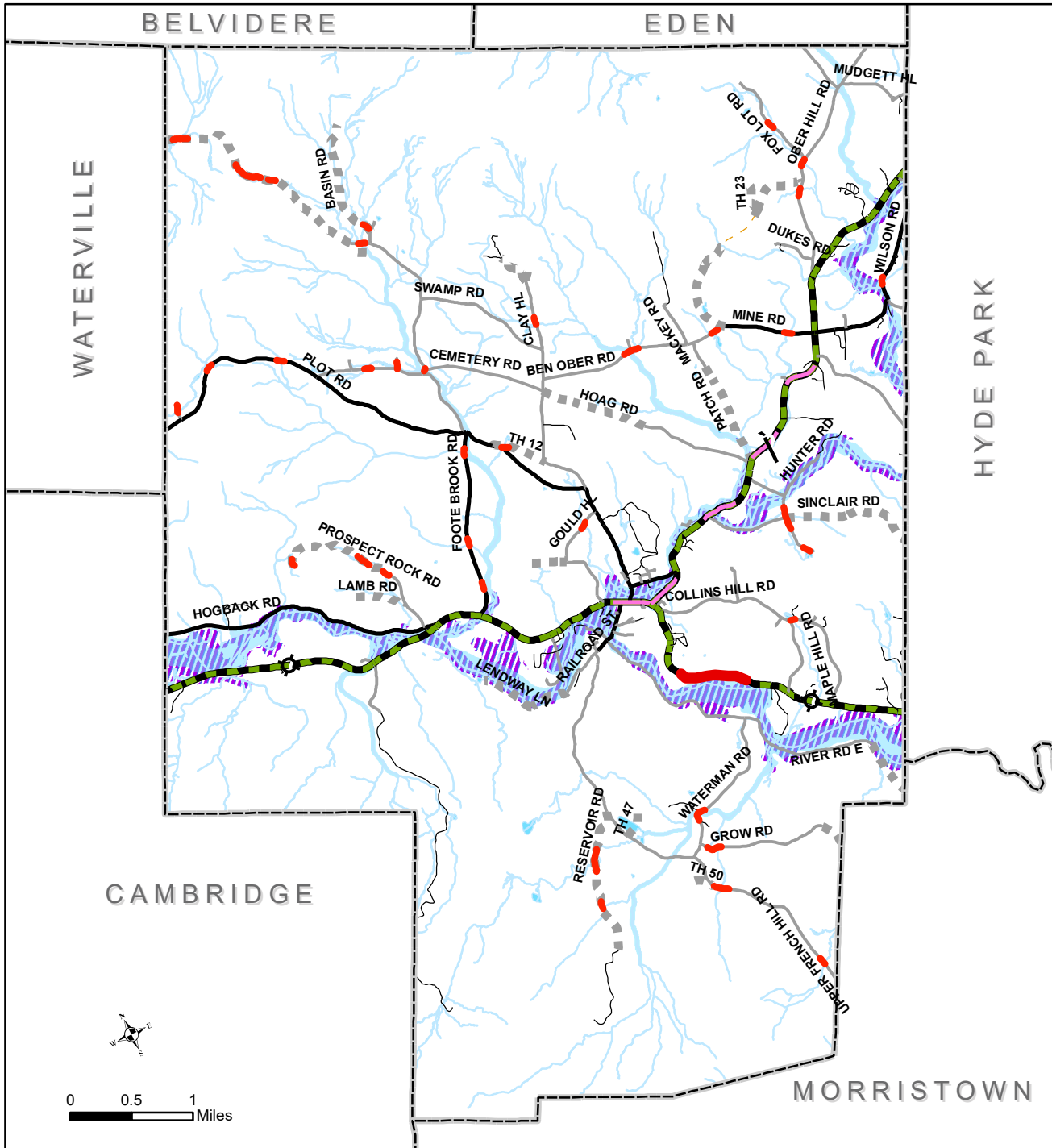
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Legend

-  HIGH ACCIDENT LOCATION
-  HIGH ROAD EROSION RISK
-  Public Road
-  Private Road
-  State Highway
-  Legal Trail
-  Town Highway Class 2
-  Town Highway Class 3
-  Town Highway Class 4
-  State Forest Highway
-  RIVER / STREAM
-  LAKE / POND
-  River Corridor/Fluvial Erosion Hazard Area
-  SPECIAL FLOOD HAZARD AREA



Data Sources:

High Accident Locations: VTrans, 2016.
Flood Hazard Areas: Digital Flood Insurance Rate Map (DFIRM), FEMA, 2006. Floodplains for planning purposes only.
River Corridor/Fluvial Erosion Hazard Areas: LCPC and VT ANR River Management, various dates. Much FEH boundary data is based on partial stream assessments and therefore is preliminary in nature.
High Road Erosion Risk: Derived from 2014 statewide GIS analysis using soils, slope, and proximity to surface waters. (edited by LCPC 2022 at request of the Town of Johnson)

Johnson Ice Jam History & Preliminary Mitigation Assessment Map

Figure 1: Map of historic ice jam occurrences in the Town of Johnson, VT. *Note: locations of ice jams shown on map are not exact*

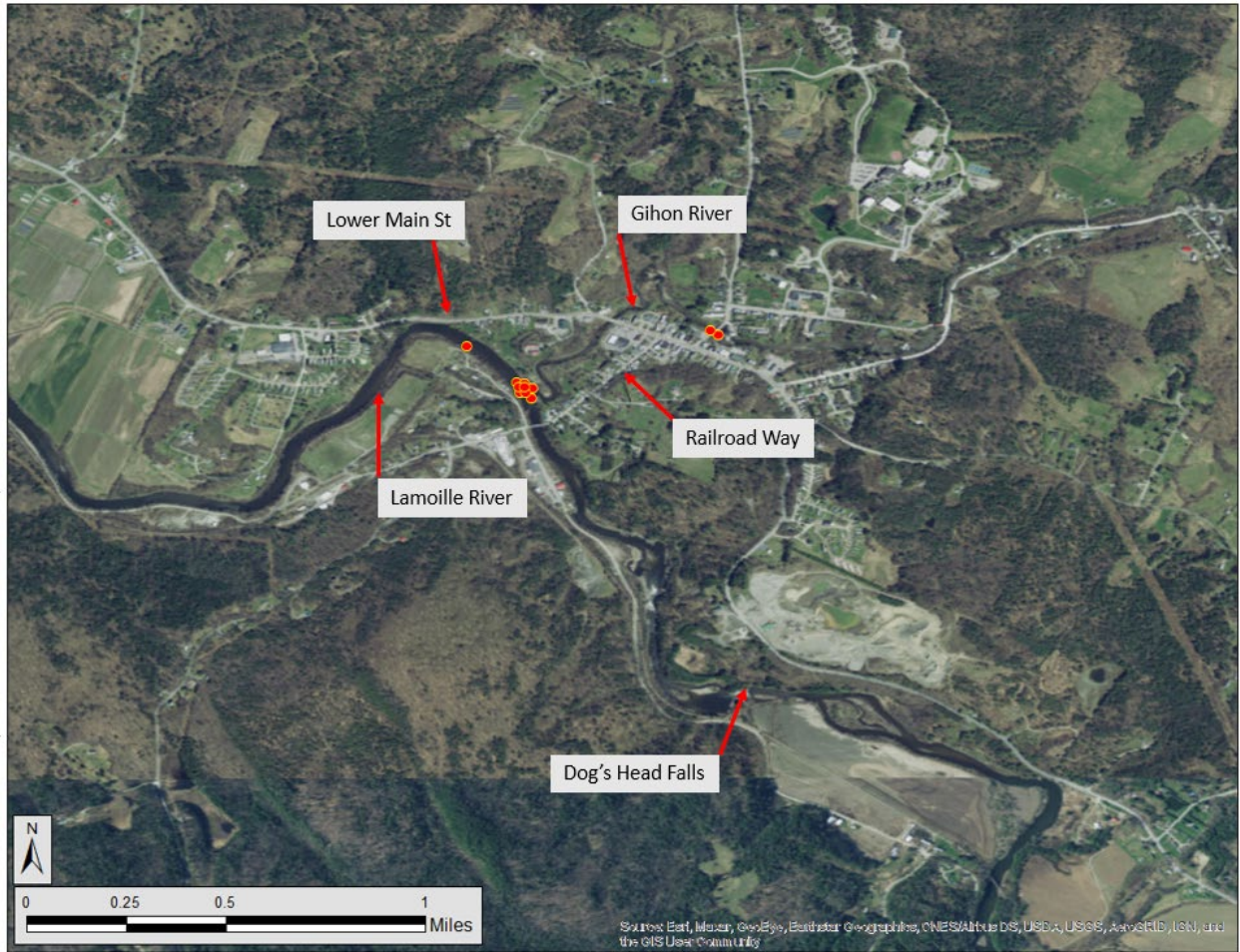


Table 1: Recorded historic ice jam occurrences in the Town of Johnson, VT (Source: USACE Ice Jam Database, 2021)

City	State	River	Jam date	Jam type
Johnson	VT	Lamoille River	01/13/2018	Breakup
Johnson	VT	Gihon River	02/21/2014	Breakup
Johnson	VT	Gihon River	01/10/2014	Breakup
Johnson	VT	Lamoille River	12/30/1985	Freezeup
Johnson	VT	Lamoille River	02/12/1981	Breakup
Johnson	VT	Lamoille River	03/06/1964	Breakup
Johnson	VT	Lamoille River	12/5/1961	Breakup
Johnson	VT	Lamoille River	04/03/1959	Breakup
Johnson	VT	Lamoille River	12/30/1940	Breakup
Johnson	VT	Lamoille River	01/08/1930	Unknown
Johnson	VT	Lamoille River	01/19/1929	Unknown

RESOLUTION

Approving the Johnson Local Hazard Mitigation Plan

The Selectboard of the Town of Johnson find that:

- A. The adoption of a multi-hazard plan is required as a condition for communities to remain eligible for future Federal Emergency Management Agency (FEMA) mitigation grant funds.
- B. The Town of Johnson has prepared the Johnson Local Hazard Mitigation Plan to meet FEMA's funding requirement, a copy of which is attached as Exhibit A and incorporated herein by reference.
- C. The Selectboard has reviewed and considered the Johnson Local Hazard Mitigation Plan.
- D. The mitigation strategies and actions identified in the plan will be implemented only when funding sources have been identified and projects have been prioritized as outlined in the Plan.

NOW THEREFORE,

BE IT RESOLVED BY THE SELECTBOARD OF THE TOWN OF JOHNSON, A MUNICIPALITY OF THE STATE OF VERMONT, AS FOLLOWS:

Section 1. Based on the above findings, which are hereby adopted, the Johnson Local Hazard Mitigation Plan attached as Exhibit A is approved as the official Comprehensive Local Hazard Mitigation Plan for the Town of Johnson.

Section 2. This resolution shall become effective immediately upon adoption.

The foregoing Resolution is hereby adopted this _____ the day of _____, 2022

Selectboard Chair _____

Selectboard Member _____

Selectboard Member _____

Selectboard Member _____

Selectboard Member _____

Town Clerk received _____

RESOLUTION

Approving the Johnson Local Hazard Mitigation Plan

THE BOARD OF TRUSTEES OF THE VILLAGE OF JOHNSON FIND THAT:

- A. The adoption of a multi-hazard plan is required as a condition for communities to remain eligible for future Federal Emergency Management Agency (FEMA) mitigation grant funds.
- B. The Johnson has prepared the Johnson Local Hazard Mitigation Plan to meet FEMA's funding requirement, a copy of which is attached as Exhibit A and incorporated herein by reference.
- C. The Board of Trustees has reviewed and considered the Johnson Local Hazard Mitigation Plan.
- D. The mitigation strategies and actions identified in the plan will be implemented only when funding sources have been identified and projects have been prioritized as outlined in the Plan.

NOW THEREFORE,

BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE VILLAGE OF JOHNSON, A MUNICIPALITY OF THE STATE OF VERMONT, AS FOLLOWS:

Section 1. Based on the above findings, which are hereby adopted, the Johnson Local Hazard Mitigation Plan attached as Exhibit A is approved as the official Comprehensive Local Hazard Mitigation Plan for the Village of Johnson.

Section 2. This resolution shall become effective immediately upon adoption.

The foregoing Resolution is hereby adopted this _____ the day of _____, 2022

Board of Trustees Chair _____

Board of Trustees Member _____

Board of Trustees Member _____

Board of Trustees Member _____

Board of Trustees Member _____

Village Clerk received _____

APPENDIX B. ACTION EVALUATION AND PRIORITIZATION MATRIX

Town and Village of Johnson Criteria evaluated on a scale of 1-5 with 5 being the highest score.

Mitigation Action	Responds to significant (likely or high risk) hazard	Likelihood of funding	Protect threatened infra-structure	Implemented quickly	Socially / Politically acceptable	Technically Feasible	Administratively Realistic	Reasonable cost to benefit ratio	Environmentally sound	TOTAL SCORE	Timeline
Town of Johnson	-	-	-	-	-	-	-	-	-	-	
Continue to improve the water crossing beyond the basic improvements made in 2021 to align with the 2013 Dubois and King Flood Mitigation Study recommendations for the Scribner Covered Bridge over Gihon River.	3	3	2	1	3	5	4	1	4	26	2022 - 2024
Upon request from the Town, review the Town and Village Flood Hazard Regulations to ensure that they meet minimum NFIP requirements.	4	4	2	3	3	5	4	5	4	34	2022
Secure funding and implement, where feasible, restoration projects identified in the River Corridor Management Plans, the 2021 Lamoille Tactical Basin Plan, and the Ice Jam History and Preliminary Mitigation	3	3	3	2	3	4	4	3	4	29	2022 - 2027
Upgrade minimum culvert sizes to Town Highway Road and Bridge Standards and replace culverts in poor condition to lessen flood damage as identified in the Town Culvert Inventory.	3	3	4	4	4	4	4	1	4	31	2022 - 2027

Mitigation Action	Responds to significant (likely or high risk) hazard	Likelihood of funding	Protect threatened infra-structure	Implemented quickly	Socially / Politically acceptable	Technically Feasible	Administratively Realistic	Reasonable cost to benefit ratio	Environmentally sound	TOTAL SCORE	Timeline
Town of Johnson	-	-	-	-	-	-	-	-	-	-	
Explore funding to implement stormwater management systems that align with the new stormwater requirements and priorities outlined in the Johnson Stormwater Master Plan.	3	4	3	3	4	4	4	4	4	33	2022 - 2027
Proactively manage hazard trees to reduce windstorm impacts on local utilities and Town infrastructure.	3	5	4	3	4	4	4	4	5	36	2022 - 2027
Manage ash trees in accordance with the state recommendations regarding Emerald Ash Borer Best Management Practices as listed in the Johnson Town Plan, State, and Federal regulations.	5	5	4	3	5	4	4	4	5	39	2022 - 2027
Ensure Best Management Practices are followed regarding winter maintenance equipment and replacement to manage all winter weather conditions and ice storms.	4	5	4	3	5	5	4	3	3	36	2022 - 2027
Research technology and improve capacity for remote/hybrid meetings.	3	4	2	3	3	3	4	3	3	28	2022 - 2023
Maintain adequate PPE supply for Johnson municipal employees for current and future public health events.	5	5	5	3	4	3	4	3	2	34	2022 - 2027

Mitigation Action	Responds to significant (likely or high risk) hazard	Likelihood of funding	Protect threatened infrastructure	Implemented quickly	Socially / Politically acceptable	Technically Feasible	Administratively Realistic	Reasonable cost to benefit ratio	Environmentally sound	TOTAL SCORE	Timeline
Village of Johnson	-	-	-	-	-	-	-	-	-	-	
Work proactively with the transmission service provider to upgrade the existing infrastructure and avoid long-term electric outages.	5	1	5	2	5	4	5	3	5	35	2022 - 2025
Explore funding to implement stormwater management systems that align with the new stormwater requirements and priorities outlined in the Johnson Stormwater Master Plan.	5	2	5	2	4	3	3	3	5	32	2022 - 2027