

Town of Richford, Vermont HAZARD MITIGATION PLAN 2020



Approved Pending Adoption by FEMA: _____
Adopted by the Town of Richford Selectboard: Date: _____
FEMA Final Approval: _____

Whereas, natural and man-made disasters may occur at any time, we recognize that by lessening the impacts of these disasters we will save resources, property and lives in the Town of Richford, Vermont;

And whereas the creation of the Town of Richford Hazard Mitigation Plan is necessary for the development of a risk assessment and effective mitigation strategy;

And whereas, the Town of Richford is committed to the mitigation goals and measures as presented in this plan;

Therefore, the Town of Richford Select Board hereby adopts the 2019 Richford Hazard Mitigation Plan.

AUTHORIZING SIGNATURES

Date: _____

Selectboard Chair

Selectboard

Selectboard

Selectboard

Selectboard

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Vermont Emergency Management
Vermont Agency of Natural Resources
Vermont Fire Academy
Northeast States Emergency Consortium
Federal Emergency Management Agency
National Weather Service
Vermont Geological Survey

This plan should be considered a plan in work due to the continually changing environment in which these hazards present themselves. This plan must also be reviewed and adjusted as growth in population, industry, and overall community demographics change.

1. INTRODUCTION

The impact of expected, but unpredictable natural and human-caused events can be reduced through community planning. The goal of this plan is to provide an all-hazards local mitigation strategy that makes the Town of Richford 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 Project Impact efforts, 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 of the other 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 and could include projects such as:

- Flood-proofing structures
- Tying down propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters
- Identifying & modifying high traffic incident locations and routes
- Ensuring adequate water supply
- Elevating structures or utilities above flood levels
- Identifying & 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
- Buyout & relocation of structures in harm's way
- Establish & enforce appropriate building codes
- Public information

2. PURPOSE

The purpose of this Hazard Mitigation Plan is to assist the Town of Richford in identifying all hazards facing the county and their community and identify strategies to begin reducing risks from identified hazards. Once adopted, the local mitigation plan is not legally binding; instead, it outlines goals and actions to prevent future loss of life and property.

Adopting and maintaining the Local Hazard Mitigation Plan will provide the following benefits:

- Make certain funding sources available to complete the identified mitigation initiatives that would not otherwise be available if the plan was not in place.
- Ease the receipt of post-disaster state and federal funding because the list of mitigation initiatives is already identified including Vermont Emergency Relief Assistance Funding.
- Support effective pre- and post-disaster decision making efforts.

- Lessen the Town’s vulnerability to disasters by focusing limited financial resources to specifically identified initiatives whose importance has been ranked.
- Connect hazard mitigation planning to community planning where possible.

Figure 2.1

3. COMMUNITY PROFILE

The Town of Richford is located in the northwest corner of Franklin County (72°40’W, 44°59’N). Richford is bounded by the Province of Quebec on the north, the Town of Berkshire on the west, the Town of Jay on the east and the Town of Montgomery on the south. The total area of the town is approximately 27,673 acres or 43.24 square miles. The population of the community is 2,305 according to the 2015 American Community Survey.

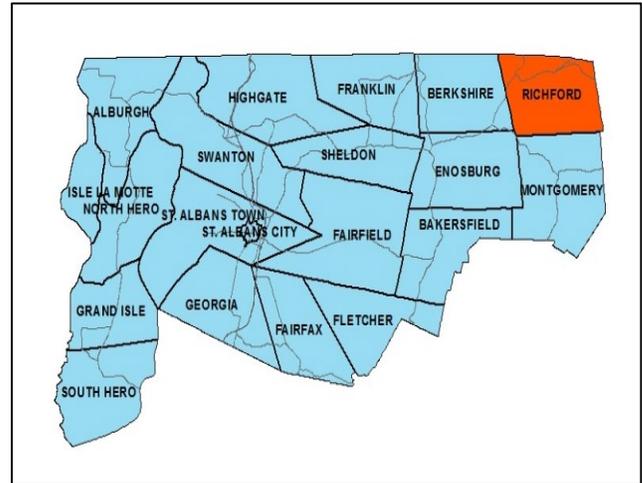
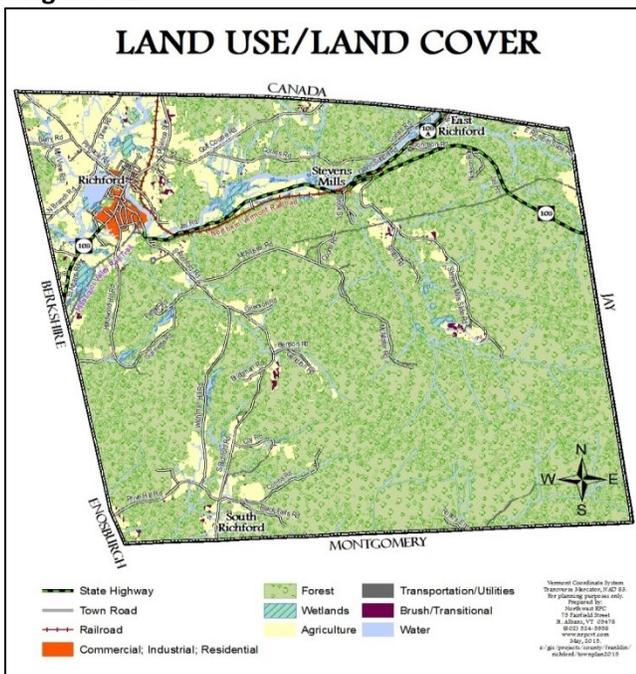


Figure 3.2



Richford is but one town in a region of diverse and changing communities. The old village area was a historic center of trading and commerce and is a major US Customs Port of Entry. The Town is a member of the Northwest Regional Planning Commission and borders Berkshire, Montgomery, and Enosburgh in Franklin County, as well as Jay in Orleans County, and Canada. It is linked to these communities via roadways, waterways, recreation resources, contiguous forestland (including Jay State Forest) and wildlife habitat, and through the sharing of important community facilities and services.

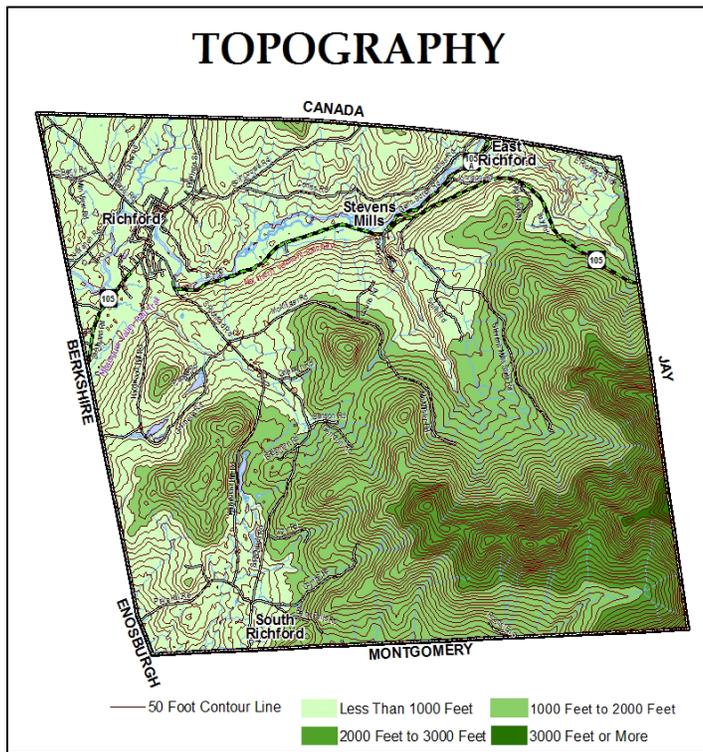
Existing Land Use

The town is primarily rural with 20,713 acres in forest and 3,601 acres in agriculture. Residential development in Richford covers approximately 180 acres, while commercial and industrial development covers approximately six acres. Residential development is mostly clustered along Route 105 and Route 139 through

the Village. The only industrial development is in the park on Route 105. There are zoning regulations and bylaws in place, including flood hazard regulations.

In addition to numerous flowing watercourses, Richford has two standing water bodies named Guilmette Pond and Paradise Pond. Guilmette Pond is the only major pond in town, located south of Hardwood Hill with access by secondary class III roads. There are a few single-family dwellings in the vicinity of the pond, and there is little development directly on the shoreline. Paradise Pond is smaller than Guilmette Pond and consists of two ponds separated by a beaver dam.

Figure 3.3



Most wetlands in Richford occur in low-lying areas along the Missisquoi where they absorb great quantities of water during flood season and gradually release the water throughout the summer. The recharging of groundwater supplies is especially important in wetlands, which occur in large areas of permeable sands and gravels. The indiscriminate development of these wetlands and their surrounding sand and gravel deposits could substantially lessen the amount and quality of water entering the ground.

Richford's varied topography includes weather resistant rock of the Green Mountains and the stream-cut valley of the Missisquoi River. The Missisquoi enters the town at the Canadian border near East Richford, flows through the village district, and leaves the town at the Berkshire-Richford town boundary.

The lowest point in Richford is along the Missisquoi River near Berkshire, approximately 400 feet above sea level. State Route 105 follows the flood plain

and adjacent low elevations of the river until East Richford where 105A branches to the north along the river and 105 continues east over the Green Mountains. The terrain is incised by Loveland Brook, Stanhope Brook, Mountain Brook, and Lucas Brook in the hills and mountains south of the Missisquoi. The land rises to 3,400 feet at the border of Orleans County, along the spine of the Green Mountains. Most human activity, houses, farming, and businesses can be found between 430 and 650 feet above mean sea level. There are three state highways in Richford: VT 105, VT 105A, VT 139.

Future Land Use

Mixed Use District - The Mixed-Use District is generally located in the designated Village Center around the intersection of Main and River Streets, and along Troy Street. This district provides for increased densities of development suitable for the traditional village environment. Development in the district shall promote the continuation of higher density commercial and residential uses while providing a pedestrian orientated environment. Much of the Mixed-Use District is located within state designated Village Center.

Village Residential District - The Village Residential District is generally located on both sides of Main Street, north of River Street, and east of Province Street. This district provides for increased densities of development suitable for the traditional village environment. Development in the district shall promote the continuation of higher density residential uses while providing a pedestrian orientated environment.

Commercial/Industrial District - The Commercial/Industrial District is located in the Troy Street area, the Province Street area, the South Main Street area, and completely encompasses the Richford Business Park. The District provides for increased densities of commercial and industrial development suitable for the traditional village environment and, in the business park, industry that may be inappropriate for the village setting.

Rural Residential District - The Rural Residential District is determined by the historical use of land in the area, proximity to other centers, and the soil's suitability for septic systems. The intent of the District is to accommodate

residential growth without burdening the town by extending sewer or water. This area may also accommodate small commercial or resource based light industrial development. For residential uses, cluster housing is encouraged.

Agricultural District - The Agricultural District is land in town which has somewhat limiting soils but not so much as to prevent all development. These areas have historically been, and continue to be, used for agriculture and forestry.

Recreation/Conservation District - The Recreation/Conservation District includes areas that offer unique environmental and public use opportunities within the Special District. It also seeks to conserve environmentally fragile areas and minimize any hardship that may arise as a result of nature’s acts. Residential development is not appropriate for this district.

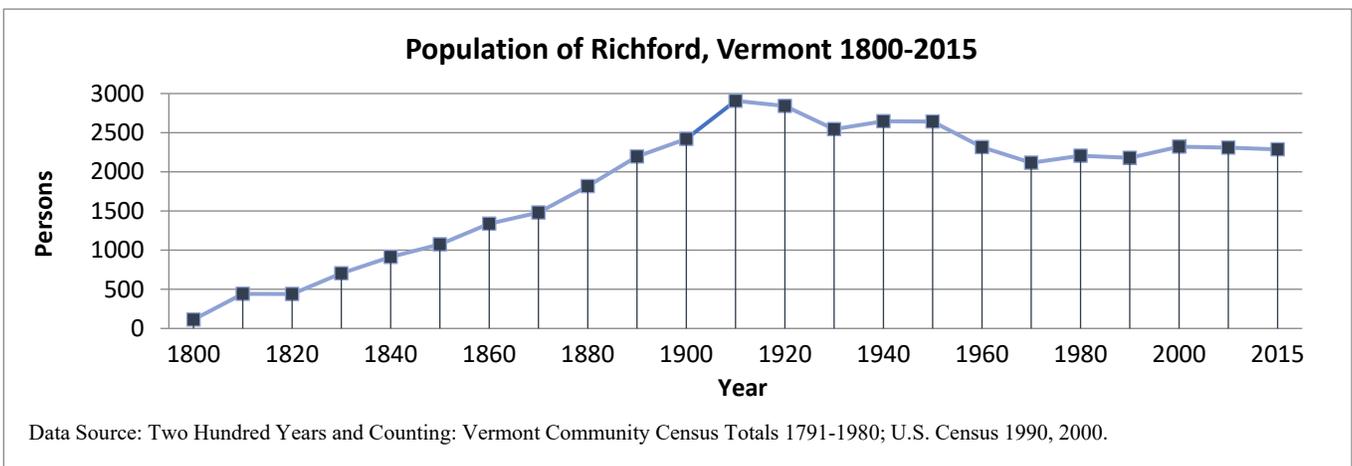
Forest/Conservation District - The Forest/Conservation District has limited suitability for community growth and development because of severe limitations, including remote locations, extreme topography, and shallow soils. It is intended to protect the scenic and natural resource values of this land for forestry, wildlife habitat, wetlands, and outdoor recreation. Only limited low-density development is allowed in this district.

Education District - The purpose of this district is to reserve areas for current and future educational facilities and their accessory uses within the central village area. Uses in this district must be compatible with the primary function of the area and the presence of school children.

Water Supply Protection District - The Water Supply Protection District is defined by the watershed that supplies the Stanhope Brook Reservoir. It is intended to protect Richford's municipal water system as well as other water recharge areas, including wetlands.

Flood Hazard Area Overlay - The Flood Hazard Area has been designated to minimize future and private losses due to floods by regulating future land development in hazard areas. Designation of this district is also required for continued town eligibility in the National Flood Insurance Program. Included are all areas in the 100-year flood plain as shown in the Flood Insurance Study and Maps prepared by the Federal Flood Insurance Administration; these are on file at the Town Clerks office.

Figure 3.4



Population

The US Census estimated that the population of Richford was 2,287 in 2015. There were 1,080 total housing units in 2015, of which 706 are owner-occupied, 204 are renter-occupied, and 170 are vacant or seasonal. Most housing units were counted as single units (71.6%).

Energy

Vermont Electric Cooperative, Inc. provides the electrical service to the Town. According to the 2011-2015 American Community Survey, fuel oil is the most popular home heating fuel and was used by 571 homes (62.7%). Wood is the second most popular home heating fuel, used by 215 homes (23.6%), propane was the third most popular home heating fuel with 61 units (6.7%) followed by electricity at 58 units (6.4%), other at 3 units (0.3%) and natural gas at 2 units (0.2%).

Emergency Services

Health Services

Richford Health Center, Inc. d/b/a Northern Tier Center for Health, (NOTCH), is a Federally Qualified Health Center (FQHC) that now serves the rural communities of Franklin and Grand Isle Counties in Vermont. Primary medical care, behavioral health counseling dental care, and pharmaceutical programs are provided within Richford. The nearest hospital is the Northwestern Medical Center in St. Albans, approximately 30 miles away.

Law Enforcement

Police protection is provided by the Franklin County Sheriff's Department and the State Police (the primary agent being the Franklin County Sheriff's Department). The United States Customs and Border Protection (USCBP) provides back-up assistance. Local Municipal Ordinance Enforcement and parking violations in the Special District can be enforced by any enforcement agency and the Town Constable.

Ambulance Services

The Richford Ambulance Service is owned by the Town of Richford and managed by the Richford Health Center. The Ambulance Service maintains 24-hour, seven day a week continuous service. Richford Ambulance Service is an ALS certified service equipped with 2 ambulances. Both are equipped with advanced life saving devices and staffed by qualified emergency medical technicians.

The Town of Richford offers a subscription service for residents at \$50.00 per year per household. Each subscription provides 12 months of service with assurance that the household will not be billed for services beyond insurance coverage.

Richford adopted a Local Emergency Operations Plan (LEOP) in May of 2016 to initiate response to serious crises. The LEOP is reviewed and updated as needed on an annual basis. The Town Selectboard has executed a National Incident Management System (NIMS) resolution and continually strives to remain current on NIMS compliance through training and reporting to Vermont Department of Public Safety.

Fire Services

Richford has a volunteer fire department made up of trained and dedicated volunteers. The Department responds to mutual aid calls in Montgomery, Enosburgh, Berkshire, and Sutton, Quebec. Members of the department are also active in the Richford Firefighters Association. The Association conducts fundraisers assisted by civic groups and organizations to purchase equipment not provided for in the town appropriation.

The department currently owns the following vehicles:

- 1968 75' ladder truck with 1000 gpm pump;
- 1989 E-one pumper with 1000-gallon tank and 1500 gpm pump;
- 2001 Ford E450 heavy rescue;
- 2004 Ford F350 grass fire pickup with 225-gallon tank and cascade system;
- 2006 International pumper/tanker with 1800-gallon tank with 1250 gpm pump; and
- 2011 International 3050-gallon tanker with 500 gpm pump and portable 400 gpm pump.

Water Supply

The primary source of village water is the Stanhope Brook. The Loveland Brook serves as a secondary source. Most properties in the village district are connected to the water system and capacity still exists to serve future development. The 1889 water system serves as emergency backup for the current system. The slow-sand filtration system receives water from either the brook or the reservoir. After being filtered and chlorinated, water is stored in the 1-million-gallon covered reservoir until being drawn through transmission lines to the network of distribution lines.

Sewage Disposal

The town owns and operates a wastewater treatment facility. The facility was built in 1969/1970 and serves most of the village district properties and a small number of town properties. Waste flows by gravity from properties on the north side of the river to a pumping station at the playground on Intervale Avenue and from properties on the south side of the river to a pumping station located behind the bank on Main Street. A third pumping station is located in the Business Park on Route 105, west of the village district. Wastes are pumped from these collection points to the treatment plant.

The Town of Richford currently has a contract with Bruce Weatherby for the disposal of solid waste in the special district. Town residents outside of the district may either take the trash to transfer stations in Montgomery or Highgate or hire private haulers for collection. Richford is a member community of the Northwest Vermont Solid Waste Management District which has a regional solid waste management plan and a certified regional facility.

Transportation

Two State highways, a network of local roads, and one railroad provide important transportation routes in the Town of Richford. The nearest airports for passenger service are in Burlington and Montreal, though a limited amount of nonscheduled passenger and freight service is available at the Franklin County State Airport in Highgate. Federal Express, United Parcel Service, and local independent trucking firms provide daily service to Richford. Route 105 south and east from Richford provide access to interstates 89 and 91.

The Town Select Board's Road Policy specifies the requirements for upgrading present roads, admitting new roads to the town system, as well as driveway standards to ensure safe access onto public roads. The Town of Richford continues to be an active participant on the Transportation Advisory Committee (TAC). This committee provides greater local input into transportation planning.

Richford's roads are well maintained. Between 11-25% of the Town of Richford's annual expenditures are on transportation. The historic iron Main Street Bridge is located at the intersection of North Main Street and River Street, which faces and is flanked by three commercial buildings. This is a major truck route for Kent Nutritionals and for Kaytec, Inc., as well as for the distributors supplying area businesses. Though the turning radius is tight and the sight lines are short, a local ordinance for a 4-way stop has helped control traffic at this intersection. The Bridge received a new deck in late fall of 2010; the Town's portion of the cost was paid for with Historic Preservation Funding.

4. PLANNING PROCESS

Documentation of the Planning Process, Public Involvement and Input from Neighboring Communities

The Town of Richford held several planning meetings to discuss the development of a Hazard Mitigation Plan. All meetings were open to the public and some were held at regularly scheduled Selectboard meetings. Public in attendance at the meetings were encouraged to participate. All Selectboard meeting agendas were posted at 3

locations in the municipality in compliance with the requirements of Vermont Open Meeting Law. All meetings were chaired by the Chair of the Selectboard. Hard copies of drafts discussed at meetings were available to the public in attendance at meetings and upon request.

The Town of Richford held their initial planning meeting to approve the Hazard Mitigation Plan (HMP) project on March 5, 2018. A sample plan was reviewed before the project of completing an HMP was approved. Additionally, criteria for the Vermont Emergency Relief Assistance Fund, Hazard Mitigation Grant and Flood Mitigation Assistance programs were reviewed. River corridor bylaws were mentioned and an overview of the Municipal Roads General Permit program was also discussed. The meeting was at a regularly scheduled Selectboard meeting. On November 19, 2018, mitigation actions and priorities were reviewed and a draft plan was discussed at the scheduled Selectboard meeting. Public comment period was also discussed and agreed upon. Meeting agendas were posted in accordance with Vermont Open Meeting Law. No public comments regarding the plan were received at these meetings.

A draft of the plan was posted for public comment on the NRPC and Town websites between December 4, 2018 and December 18, 2018. Draft copies of the Plan were also sent to the town clerks of all neighboring communities of Berkshire, Enosburgh, Montgomery and Jay on January 3, 2019. Comments were requested to be sent to NRPC Planner Taylor Newtown by January 17, 2019. No comments were received. On March 4, 2019, Town Meeting Day and local elections brought some changes in leadership and local priorities, as did some staffing changes in late spring thus causing a delay in the planning process.

The Town of Richford warned a planning meeting to review the LHMP and LEOP activities on July 30, 2018. At this meeting, the new Selectboard members, new fire chief, new Road Foreman, new Road Commissioner and municipal staff members were provided with information on hazard mitigation planning, the Vermont Emergency Relief Assistance Fund, and emergency preparedness. They were given a draft of the plan. Local mitigation actions were updated. Comments and input were solicited. Another delay occurred due to the Halloween storm event and the plan review was postponed. On October 7, 2019, mitigation actions and priorities were reviewed and a draft plan was discussed at the scheduled Selectboard meeting. Public comment period was also discussed and agreed upon. A draft of the plan was posted for public comment on the NRPC and Town websites between October 9, 2019 and October 23, 2019. No comments were received. Draft copies of the Plan were also sent to the town clerks of all neighboring communities of Berkshire, Enosburgh, Montgomery Jay and Westfield on October 9, 2019. Comments were requested to be sent to NRPC by October 23, 2019. No comments were received.

Incorporation of Existing Plans, Studies, Reports and Technical Information

Mitigation plans from around the country, current State Mitigation Plans, FEMA planning standards, the FEMA Flood Mitigation Assistance Program requirements and the National Flood Insurance Program's Community Rating System were examined. Other materials examined consisted of community plans, including:

- Richford, Vermont Town Plan 2017-2025.
- Town of Richford, Vermont Zoning Bylaws and Subdivision Regulations 2015
- State of Vermont Hazard Mitigation Plan 2018
- Town of Richford Local Emergency Operations Plan 2016
- Town of Richford Flood Insurance Study, 1980
- Town of Richford Flood Insurance Rate Maps 1980
- Northwest Regional Planning Commission Regional Plan 2017

A complete list of references may be found in Attachment F.

5. RISK ASSESSMENT

Identifying Hazards, Profiling Hazards, Estimating Losses and Assessing Vulnerability

NRPC emergency planners and Town of Richford EMD collected data and compiled research on hazards including: severe winter storm /ice storm, flooding / fluvial erosion, thunderstorms (high winds, lightning, hail), loss of electrical service, structure fire, hazardous materials, drought, telecommunications systems failure, tornado, earthquake, major fire – wildland, civil disturbance, terrorism/WMD. Research materials came from local, state and federal agencies including FEMA, NOAA, NCDC and DOT. Research was also conducted by referencing historical local newspapers, texts, interviewing residents, and scientific documents. Internet references were widely utilized in historical research applications. Current mitigation activities, resources, programs, and potential action items from research materials and stakeholder interviews were also identified.

The information is based on surveys and interviews with local officials and the best available data sources found from federal, state, regional, and local agencies and departments. The risk and/or impact of several hazards were negligible and the state examination was considered sufficient in justifying the time spent on the analysis.

Hazard identification and risk estimation can be a highly complex, time consuming and very costly effort if sophisticated technical and engineering studies are undertaken. The Town of Richford does not have the resources to undertake hazard identification and risk assessment studies to this level of detail. The Town of Richford and the Northwest Regional Planning Commission used a module of Mitigation 20/20 software which included a hazard profile matrix (Attachment A) that was used to develop a risk rating for each identified hazard. The matrix is intended to be completed by relying on hazard identification and risk evaluation information that is available as well as the knowledge and judgment of planning participants. Health and safety consequences, property damage, environmental damage and economic disruption are classified as consequences of occurrence of each hazard. The following is a description of the risk characteristics used to classify each hazard primarily based on Mitigation 20/20 program:

Frequency of Occurrence:

1. Rare: Unknown but rare occurrence
2. Unlikely: Unknown but anticipate an occurrence
3. Possible: 100 years or less occurrence
4. Likely: 25 years or less occurrence
5. Highly Likely: Once a year or more occurrence

Magnitude or % Community Impacted:

0. Negligible: < 10% of properties damaged.
1. Limited: 10% to < 25% of properties damages/Loss of essential facilities/services for up to 7 days/few (<1% of population) injuries possible.
2. Critical: 25% to 50% of properties damaged/Loss of essential facilities/services for > 7 days < 14 days/Major (< 10% of population) injuries/few deaths possible.
3. Catastrophic: > 50% of properties damaged/ loss of essential facilities/services for > 14 days/Severe (> 10% of population) injuries/multiple deaths possible.

Health & Safety Impacts:

0. No health and safety impact
1. Few injuries or illnesses
2. Few fatalities but many injuries or illnesses
3. Numerous fatalities

Property Damage:

0. No property damages
1. Few properties destroyed or damaged
2. Few destroyed but many damaged
3. Few damaged but many destroyed
4. Many properties destroyed and damaged

Environmental Damage:

0. Little or no environmental damage
1. Resources damaged with short term recovery practical
2. Resources damaged with long term recovery feasible
3. Resources destroyed beyond recovery

Economic:

0. No economic disruption
1. Low direct and/or indirect costs
2. High direct and low indirect costs
3. Low direct and high indirect costs
4. High direct and high indirect costs

The risk estimation matrix (See Attachment A) for the Town derives a “relative risk score” using a qualitative process in which to compile estimates of the likely **frequency** of occurrence, the **extent** of the community that would be impacted, and the likely **consequences** in terms of public safety, property damage, economic impacts and harm to environmental resources. The total is considered in this plan to constitute the relative risk score. The hazards with the highest risk score are flooding, severe winter storms, fluvial erosion/landslide and high winds/thunderstorm/lightning. It should be noted that the community’s overall risk rating is low (209 out of a possible high of 1,200).

Vulnerability Scores

Vulnerability assessments build on the identification of hazards in the community and the risk that the hazards pose to the community. The vulnerability assessment process examines more specifically how the facilities and systems of the Town would be damaged or disrupted by the identified hazard.

The combination of the impact of the hazard and the frequency was used to determine the community vulnerability (risk score) as HIGH, MODERATE or LOW. The vulnerability classifications based on risk scores are as follows:

- 0-24 LOW

- 25-49 MODERATE
- 50-75 HIGH

For example, a Flood event is *highly likely* (nearly 100% probability in the next year) in many communities within Franklin County but the degree of impact varies, so a *highly likely* flood with *critical* or *catastrophic* impact rates the community vulnerability as HIGH. A community with a *highly likely* or *likely* (at least one chance in the next 10 years) flood with a *limited* impact would receive a vulnerability rating of MODERATE. The vulnerability of a community having the occurrence of an event as *possible* or *unlikely* with *limited* or *negligible* impact would be LOW.

In order to determine estimated losses due to natural and man-made hazards in Richford, each hazard area was analyzed; results are shown below. Human losses were not calculated during this exercise, but could be expected to occur depending on the type and severity of the hazard. Most of these figures exclude both the land value and contents of the structure. The median value of a home in Richford is \$ 124,800 according to the 2011 to 2015 Census estimates.¹

A full summary of hazards and impacts is provided in Table 4.1.

Table 4.1 Summary of Hazards and Impacts for the Town of Richford

| Hazard Type | Frequency Of Occurrence | Impact/Magnitude | Risk | Estimated Potential Losses (Dollars) | Vulnerability |
|---|-------------------------|-------------------------|------------------|--------------------------------------|--|
| Severe Winter Storm / Ice Storm | Highly Likely | Limited to Catastrophic | Moderate to High | n/a | Roads, bridges, commercial and residential structures, seasonal homes, public buildings, (Town Office, PSB, PWB, Rec Center, Library, cemeteries), school, church, and utilities. |
| Flooding / Fluvial Erosion | Highly Likely | Limited to Catastrophic | Moderate to High | \$2,935,800 | Loss of road access, power loss, telecommunications loss. Roads, bridges, commercial and residential structures, seasonal homes and utilities. |
| Severe Thunderstorm (High Winds, Lightning, Hail) | Highly Likely | Limited | Moderate | n/a | Falling limbs and/or trees, power loss, church, school, telecommunications loss, structural damage, crop damage. Commercial and residential structures, seasonal homes, public buildings (Town Office), utilities. |
| Loss of Electrical Service | Rare | Limited to Critical | Moderate | n/a | Pubic building (Town Office), church, utilities, residential and seasonal homes, commercial structures, including commercial farms. |
| Structure Fire | Unlikely | Limited | Low | \$489,300 | All structure types especially those lacking early detection systems. |
| Hazardous Materials | Unlikely | Limited | Low | n/a | Residential and seasonal homes, commercial structures, public buildings including Town Office, Public Safety Building, Public Works Building/Garage, Recreation Center, Library Buildings, State Garage, church, school, utilities, and the environment. |

¹ May not fully reflect current median home values. In the event of a hazard incident, a current home value data should be used to estimate losses.

| | | | | | |
|--------------------------------------|------|-------------------------|-----|-------------|---|
| Drought | Rare | Limited to Catastrophic | Low | n/a | Commercial structures – farms, livestock, private wells, public structures (water reservoir, water pumping station and wastewater treatment plant), residential and seasonal homes and vulnerable populations. |
| Loss of Water & Sewer Service | Rare | Limited | Low | n/a | Public Health, residential and seasonal homes, commercial structures, church, public structures (e.g. Water Reservoir and Wastewater Treatment Plant, Town Office, Public Safety Building). |
| Telecommunication Systems Failure | Rare | Limited | Low | n/a | Residential structures, seasonal homes, commercial, public buildings (e.g. Town Office) elementary school, utilities. Special needs populations. |
| Tornado | Rare | Limited | Low | \$3,443,483 | Falling limbs and/or trees, power loss, telecommunications loss. Structural damage to residential and seasonal homes, public buildings (Town Office, State Garage, Public Works Building/Garage, Public Safety Building, Recreation Center, State Garage, Water Pumping Station) commercial structures and utilities. |
| Earthquake | Rare | Limited to Catastrophic | Low | \$2,222,483 | Infrastructure (roads, bridges), structural damage to residences, seasonal homes, commercial building, public buildings (Town Office, State Garage, Public Works Building/Garage, Public Safety Building, Rec Center, Water Pumping Station, Water Reservoir), utilities. |
| Major Fire - Wildland | Rare | Limited | Low | n/a | Residential and seasonal homes, commercial structures, utility poles and lines, road closures, fires in rural areas lacking fire breaks. |
| Terrorism/WMD and Civil Disturbance* | Rare | Limited | Low | n/a | School, public building (Town Office, State Garage, Public Works Building/Garage, Public Safety Building, Rec Center, Water Pumping Station). |
| Extreme Temperatures* | Rare | Limited | Low | n/a | Fauna, public health. |
| Hurricane* | Rare | Limited | Low | n/a | Local and state transportation networks. Residences, businesses, Town Office, State Garage, Public Works Building/Garage, Public Safety Building, Recreation Center, Water Pumping Station and Elementary School. |
| Infectious Disease Outbreak* | Rare | Limited | Low | n/a | Fauna, public health. |
| Invasive Species* | Rare | Limited | Low | n/a | Agricultural crops, forests. |
| Rock Cuts* | Rare | Limited | Low | n/a | State highway 242. |
| Nuclear Power Plant Failure* | Rare | Limited to Catastrophic | Low | n/a | All flora and fauna. Public health, Agriculture. |
| Rockslide/Landslide | Rare | Limited | Low | n/a | State Highways 242 and 118. |

*Has never occurred.

All the hazards identified in the state hazard mitigation plan were considered. Several of the hazards were studied in depth in the previous Richford Hazard Mitigation Plan are summarized in table 5.1. The Committee decided it is not feasible to study each in depth as many of the hazards were considered unlikely or rare. The hazards not profiled in this plan are considered to be unlikely or rare in the Town of Richford and therefore will not be profiled in this plan. Those hazards that are not considered in this plan may have been profiled in the State Hazard Mitigation Plan. The hazards not addressed in this plan update along with the justification for not including them are outlined in the following table.

Table 4.2 Justification for Hazards Not Profiled

| Hazard Not Profiled | Justification |
|-----------------------------|---|
| Hazardous Materials | There are no large-scale hazmat storage sites or manufacturing facilities in town. Hazardous materials are mostly propane and gasoline. The Town Fire Departments follows set hazmat response protocols should a spill occur. |
| Drought | Has not occurred in memory. Dry conditions occur briefly in late summer if they occur at all. |
| Tornado | Has never occurred in Town. Generally profiled under high winds. |
| Earthquake | A moderate scale earthquake has never occurred in Town. The Town does not lie near any fault zone. Refer to Vermont State Hazard Mitigation Plan for further information regarding earthquake risk. |
| Major Fire – Wildland | Large wildland fire complex has never occurred in Town. Small grass fire in spring and summer occur rarely and typically less than an acre in size. Town fire department has response procedures to handle hazard. |
| Terrorism | Man-made. Has never occurred in Town. |
| Extreme Temperatures | The Committee agreed that extreme temperatures a non-issue because they are brief in duration if they occur at all. Hot spells in summer and cold snaps in winter are just part of life in Richford and not a concern. |
| Hurricanes/Topical Storms | The Town is too far north from the Atlantic coast. Vermont does not have any coastline. High Winds and Flooding/fluvial erosion as impacts of tropical storms are addressed. |
| Infectious Disease Outbreak | Has not occurred in Town. Considered rare. |
| Invasive Species | Considered rare. Town would rely on state to assist individuals and commercial agricultural producers in mitigation and response to invasive outbreak. |
| Dam Failure | There are no dams in town. |
| Rock Cuts | Man-made. None in town. |
| Nuclear Power Plant Failure | Richford is approximately 180 miles northwest from the nearest nuclear power plant, which is the recently decommissioned VT Yankee Nuclear Power Plant. |
| Rockslide/Landslide | Do not occur in Town. No areas where rockslides are an issue. Mentioned in landslide (fluvial erosion). |

The community has identified and chosen to focus mitigation action items on the following hazards: Severe Winter Storm/Ice Storm, Flooding/Fluvial Erosion, and Severe Thunderstorms (High Wind, Lightning, and Hail). These are the hazards that are most likely to occur in Richford Town and are the hazards the town has developed mitigation actions around.

Severe Winter Storm/Ice Storm

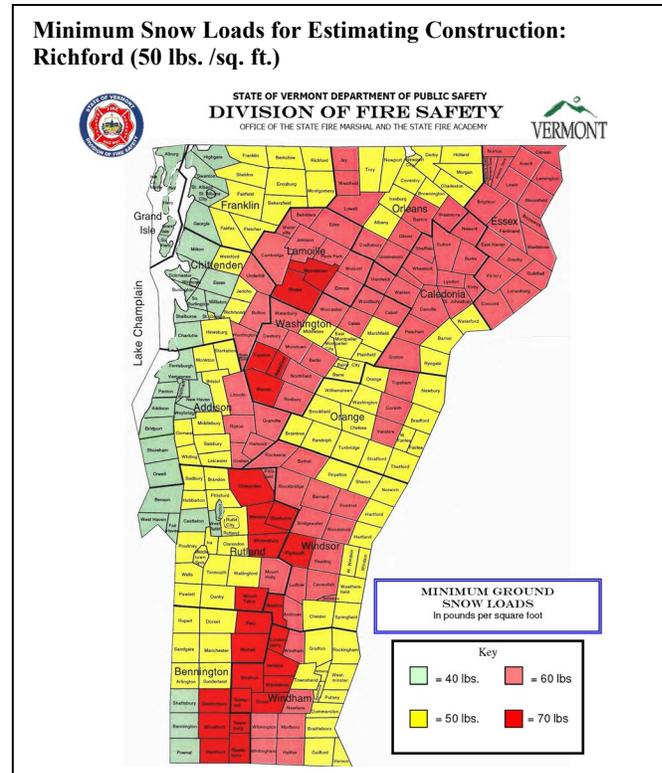
Description

Severe winter storms with snow, ice and freezing temperatures in various combinations are fairly commonplace in Richford. Such storms are accompanied by strong winds creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chill. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Winter storms can cause roofs to collapse and limit access to areas and buildings around Town. Extreme cold often accompanies a severe winter storm or is left in its' wake. Prolonged exposure to the cold can cause frostbite or hypothermia and become life-threatening.

Impact and Geographic Area of the Hazard

The primary impacts of a winter storms / ice storm typically include disruptions to transportation networks due to fallen limbs and trees, school closings and occasionally telecommunications and power outages. Communications and power can be disrupted for days while utility companies work to repair the extensive damage. Even small accumulations of ice may cause extreme hazards along roadways.

Winter storms / ice storms affect the entire Town and generally cause disruptions to public and private services. Construction standards for snow load (see map below) indicate that structures in Richford should be built to withstand loads of 50 pounds per square foot. At that point, design standards would be exceeded and the structure runs the risk of collapse. Given this standard, a snowstorm which dumped 40 inches of snow or 10 inches of ice would likely result in a few collapsed roofs, especially on structures which are not built to these standards.



Burlington, Vermont Top 10 Fall Snowfall Totals Sep-Nov

| Highest | | | Lowest | | |
|---------|----------|---------|--------|----------|--------------------------|
| Rank | Snowfall | Year(s) | Rank | Snowfall | Year(s) |
| 1 | 24.0" | 1900 | 1 | 0 | 2009/1948/1937/1915 |
| 2 | 23.0" | 1921 | 2 | 0.1" | 2004 |
| 3 | 21.9" | 1906 | 3 | 0.4" | 2010/1953/1930 |
| 4 | 20.4" | 2002 | 4 | 0.5" | 2003/1946/1941/1934/1918 |
| 5 | 19.4" | 1910 | 5 | 0.7" | 1999/1960/1894 |
| 6 | 19.2" | 1971 | 6 | 0.8" | 1982 |
| 7 | 18.8" | 1968 | 7 | 0.9" | 1988/1929 |
| 8 | 16.1" | 1997 | 8 | 1.0" | 1931 |
| 9 | 16.0" | 1977 | 9 | 1.3" | 1964 |
| 10 | 15.6" | 1969 | 10 | 1.4" | 1939 |

Source: National Oceanic and Atmospheric Administration

The primary impacts of an ice storm typically include disruption to transportation networks due to fallen limbs and trees, school closings and occasionally telecommunications and power outages. Communications and power can be disrupted for days while utility companies work to repair the extensive damage. Even small accumulations of ice may cause extreme hazards along roadways.

Vulnerable populations, such as the elderly, those dependent on medical equipment and specialized health or physical care, are at risk to all types of

winter storms. Also, at risk are farms and livestock. Barns can collapse due to heavy snow and ice loads. Dairy cattle are susceptible to mastitis² if they are unable to be milked. Many larger dairy farms have stationary or portable PTO driven generators as back-up power for automated milking equipment. Also, at risk are people who use electric heat in their homes when associated power outages occur.

Extent and Probability

The National Weather service defines a blizzard as “a storm which contains large amounts of snow or blowing snow, with winds in excess of 35 mph and visibilities of less than 1/4 mile for an extended period of time (at least 3 hours). Some of the worst historical storms in Franklin County have left snow depths of 38” (March 2017), wind speeds up to 40 mph (January 1998), and ice accumulations of 2-4” (January 1998 and December 2013).

Winter storms/ice storms occur annually in Richford, typically in the form of a Nor’easter. Nor’easters occur most often in the winter and early spring, but also sometimes during the fall. These storms can leave inches of rain or several feet of snow on the region, and sometimes last for several days.

Richford’s recent history has not recorded any loss of life due to the extreme winter weather. These random events are difficult to set a cost to repair or replace any of the structures or utilities affected. Impacts to future populations, residences, new buildings, critical facilities and infrastructure are anticipated to remain the same.

| Burlington, Vermont | | | | | |
|--------------------------------------|----------|---------|--------|----------|---------|
| Top 10 Winter Snowfall Totals | | | | | |
| Dec-Feb | | | | | |
| Highest | | | Lowest | | |
| Rank | Snowfall | Year(s) | Rank | Snowfall | Year(s) |
| 1 | 103.4” | 2007-08 | 1 | 18.4” | 1912-13 |
| 2 | 97.9” | 2010-11 | 2 | 20.4” | 1979-80 |
| 3 | 96.9” | 1970-71 | 3 | 21.9” | 1928-29 |
| 4 | 90.1” | 2009-10 | 4 | 23.6” | 1936-37 |
| 5 | 81.7” | 1965-66 | 5 | 24.0” | 1898-99 |
| 6 | 80.7” | 2003-04 | 6 | 25.0” | 1904-05 |
| 7 | 80.0” | 1957-58 | 7 | 25.6” | 1940-41 |
| 8 | 79.4” | 2008-09 | 8 | 26.3” | 2011-12 |
| 9 | 78.6” | 1946-47 | 9 | 27.0” | 1900-01 |
| 10 | 75.7” | 1969-70 | 10 | 27.4” | 1960-61 |

Source: National Oceanic and Atmospheric Administration

| Burlington, Vermont | | | | | |
|--------------------------------------|----------|-----------|--------|----------|---------|
| Top 10 Spring Snowfall Totals | | | | | |
| Mar-May | | | | | |
| Highest | | | Lowest | | |
| Rank | Snowfall | Year(s) | Rank | Snowfall | Year(s) |
| 1 | 52.7” | 1933 | 1 | 0.1” | 1945 |
| 2 | 47.8” | 2001 | 2 | 1.0” | 1903 |
| 3 | 45.7” | 1971 | 3 | 2.0” | 1910 |
| 4 | 37.7” | 1974 | 4 | 2.7” | 1927 |
| 5 | 36.4” | 1916 | 5 | 3.1” | 1934 |
| 6 | 36.1” | 1997 | 6 | 3.2” | 1991 |
| 7 | 34.4” | 1994 | 7 | 3.9” | 1946 |
| 8 | 33.9” | 1983 | 8 | 4.0” | 1905 |
| 9 | 31.0” | 2007/1972 | 9 | 4.1” | 1915 |
| 10 | 30.1” | 2011 | 10 | 4.2” | 1921 |

Source: National Oceanic and Atmospheric Administration

The Town is equipped to handle most winter emergencies, including maintaining road accessibility through various snow and tree debris removal equipment. The Town has access to private machinery, including bulldozers, plows, ATVs and snowmobiles, should they be needed in the event of an emergency. Heavy wet snows occurring during early fall and late spring and ice storms in the winter months are the cause of most power failures.

Past Occurrences:

According to the National Climate Data Center, there have been 81 winter

storms events affecting eastern Franklin County, Vermont including Richford since January 1, 1997 totaling

² Mastitis is the inflammation of the mammary gland caused by microorganisms, usually bacteria that invade the udder, multiply and produce toxins that are harmful to the mammary gland.

approximately \$1,097,500 in property damages and no deaths in the region. Additionally, there were 3 severe ice storms in the region causing \$2,500,000 in property damages and no deaths.

| Table 4.3 Severe Winter & Ice Storm Events | | |
|---|--|--|
| Date | Location | Severity Remarks/Description of Area Impacted |
| December 9 -14, 2014 | Addison, Chittenden, Franklin, Grand Isle, Orange, and Windsor | (DR-4207) Rain and wet snow moved into Vermont midday December 9 and changed to a heavy, wet snow during the evening. A band of moderate snowfall impacted much of central and northern Vermont during the afternoon and evening hours of the 10 th , then scattered snow showers ending on the 12 th . Total snowfall totals across Vermont ranged from 3-6" in Essex County to 12-20" across the Green Mountains into the Champlain Valley. The heavy, wet nature of the snowfall accounted for snow-loaded trees that resulted in more than 175,000 power outages in the region. This was the 2nd most power outages due to weather in Vermont. Over \$4 million in property damages estimated. |
| December 20-16, 2013 | Addison, Chittenden, Franklin, Grand Isle, Orange, and Windsor | (DR-4163) A wide-spread low-pressure system that brought snow and freezing rain through Ontario, Quebec, and Northern New England. These areas experienced an ice storm that brought wide-spread power outages. Many Towns throughout Franklin County, Vermont were affected by the ice storm. Vermont Electric Cooperative responded to over 60,000 customer outages during the week and estimated costs of restoring power at \$7,400,000. In Montgomery, the highway department was active keeping roads open and removing ice damaged trees and limbs from local roads. Several residents were without power for several days. |
| December 1 -5 ,2010 | Franklin, Lamoille and Chittenden Counties | (DR-1951). Wind and snow spread across much of Vermont. Snowfall amounts in northern Vermont exceeded 2 feet across in some locations. Some of the highest amounts included 27 inches nearby at Jay Peak Ski Resort. Numerous vehicle accidents resulted from the snow-covered roadways and over 35,000 people lost power. Much of the damage was in the form of downed limbs, branches, trees, and some isolated structural damage in the form of blown off roof shingles. The prolonged persistence of strong and gusty winds accounted for the scope of damage across the region. |
| February 25, 2010 | Central and Northern Vermont | Heavy wet snow fell across the State that resulted in snowfall accumulations of 6 to 30 inches. The weight of the heavy snow accounted for widespread power outages across the region that resulted in upwards of 50,000 customers state-wide without power. |
| January 2-3, 2010 | Central and Northern Vermont | Near record snow fell across the county from a powerful Atlantic storm system. Northwest winds of 15 to 25 mph with higher gusts caused considerable blowing and drifting snow with 4 to 5-foot snow drifts reported. A record 33.1 inches of snow fell at Burlington International Airport in South Burlington. |
| February 19 – 21, 2009 | Northern Vermont | A prolonged flow of cool, moist and unstable air created persistent snow showers across the northern Counties during the afternoon of February 20 th and continued until the early morning hours of February 21 st . There were significant snowfall amounts (more than 12 inches) observed 1at various ski resorts. From 3 to 8 inches of snowfall accumulated within Grand Isle County and across the Champlain Valley. |
| January 29, 2009 | Grand Isle County | Snow overspread the State early in the morning and continued into the evening hours. Snowfall accumulations with this storm were generally 8 to 14 inches in the County. There were no reported damages. |
| June 14-17, 2008 | Franklin and Addison Counties | (DR-1778) scattered showers and thunderstorms moved very slowly along a cold front and produced very localized heavy rainfall. Several roads in Richford and Montgomery were washed out as local drainage systems were overwhelmed. There were approximately \$100,000 in damages. |
| February 14, 2007 | New England | Known regionally as the "Valentine's Day Storm. Snow fell heavy at times from late morning through early evening before dissipating during the night. Snowfall rates of 2 to 4 inches per hour and brisk winds of 15 to 25 mph caused near whiteout conditions at times, along with considerable blowing and drifting snow, making roads nearly impassable. Temperatures in the single numbers combined with brisk winds created wind chill values of 10 degrees below zero or colder. |

| | | |
|-------------------|--|--|
| October 20, 2006 | Grand Isle County | A low-pressure system brought cold air to the northern portion of the state. Heavy, wet snow accumulation of 3-6 inches occurred in Georgia damaging many trees and causing power disruptions. |
| February 13, 2000 | Grand Isle County | A storm system over the Ohio Valley tracked across central New England during Monday, February 14th. Heavy snow fell across the area with accumulations generally between 7 and 14 inches. |
| January 6, 1998 | Addison, Chittenden, Franklin, Grand Isle, Orange, and Windsor | DR 1201. This storm is referred to as the Ice Storm of 1998, snow turned to freezing rain. Ice accumulations were generally between 1 and 2 inches with locally greater accumulations over portions of Grand Isle County. The impact on the region was dramatic. Trees and power lines snapped due to the weight of the ice. Power outages lasted for several days. Damage to the utility companies ran in the millions. With no electricity, the agricultural community was unable to milk cows with loss of income and damage to cows. Travel was dramatically impacted and many roads and bridges closed due to ice and fallen trees. The National Guard assisted with cleanup operations after the storm. Falling tree limbs and other debris was a significant hazard during and following the storm. It is not known what the financial losses were to the Town as a result of the storm. Public Assistance funding was \$5,899,183. |
| April 10, 1996 | Statewide | A classic Nor'easter, this system spread snow across the region for nearly two days. The snow tapered off to flurries by late evening on the second day. The heaviest snow fell over and east of the Green Mountains with 7 to 14 inches. In the Champlain Valley 2 to 5 inches fell. The wet snow resulted in some power outages and minor automobile accidents across the state. |
| February 28, 1995 | Grand Isle County | A low-pressure system which developed in the Ohio Valley resulted in a mixture of snow, sleet, and freezing rain across Vermont. Snow accumulations ranged from four to eight inches across much of Grand Isle County. |
| March 13-14, 1993 | State-wide | One of the worst storms of the century. Known as the "Blizzard of 93", it was one of the most powerful storms (Nor'easters) on record. The system moved up the Eastern Seaboard on the 13th and 14th coming close to breaking pressure and snowfall records in many locations. Snowfall amounts ranged from 10 to 28 inches across the state. Due to the weight of the snow that accumulated over March, there were numerous damage reports of barns and building roofs being damaged or at risk of collapsing |
| January 3, 1993 | Northern Vermont | A combination of a cold surface and warm moist air aloft created freezing rain and freezing drizzle across the state. Road surfaces in Grand Isle County were covered in "black ice". |

The Town's Mitigation Committee classified severe winter storms/ice storms to be highly likely each year. Every winter there is a winter event where Town residents will have to address snow and ice build-up on personal property and the Town's public works department will have to ensure the roads remain clear of snow and ice.

Flooding/Fluvial Erosion

Description:

Historically in Vermont, flooding has been the number one natural disaster in loss of life and property. Most flash flooding is caused by heavy rain from thunderstorms. Smaller creeks and streams are particularly vulnerable to flash flooding. Fluvial erosion is the destruction of riverbanks caused by the movement of rivers and streams. This occurs when the stream is unstable and has more energy than is needed to transport its sediment load, due to channel alterations or runoff events that increase water speed in the channel. Historic land uses along rivers and streams, including floodplain encroachments and removal of vegetation have increased the risk of fluvial erosion.

Impact and Geographic Area of the Hazard

The Missisquoi River traverses through most of Franklin County from east to west ultimately draining into Lake Champlain. The Trout River, which runs through the Town of Montgomery, is one of its many tributaries. The watershed is a valuable natural and cultural resource. The Missisquoi River watershed provides many beneficial uses such as providing a place for recreation activities and power generation in Swanton Village. Maintaining the quality of the watershed is of extreme importance. Not only does it affect the Town, but also it has the potential to directly affect the Missisquoi River Delta and consequently, Lake Champlain.

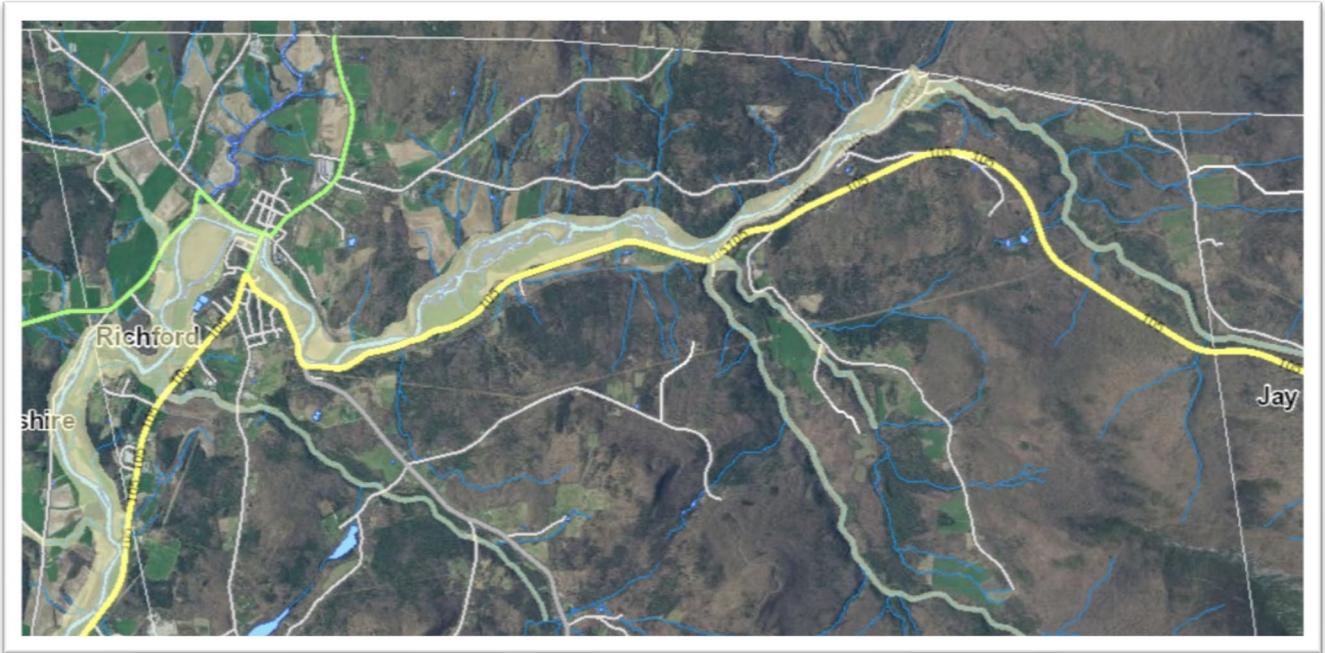
Fluvial erosion hazard mapping was released by the VT Agency of Natural Resources (ANR) in early December 2014. This mapping will assist municipalities in developing bylaws and effective mitigation strategies to regulate development within fluvial erosion hazard zones. Richford is currently developing a river corridor bylaw.

Floodplain/River Corridor Mapping

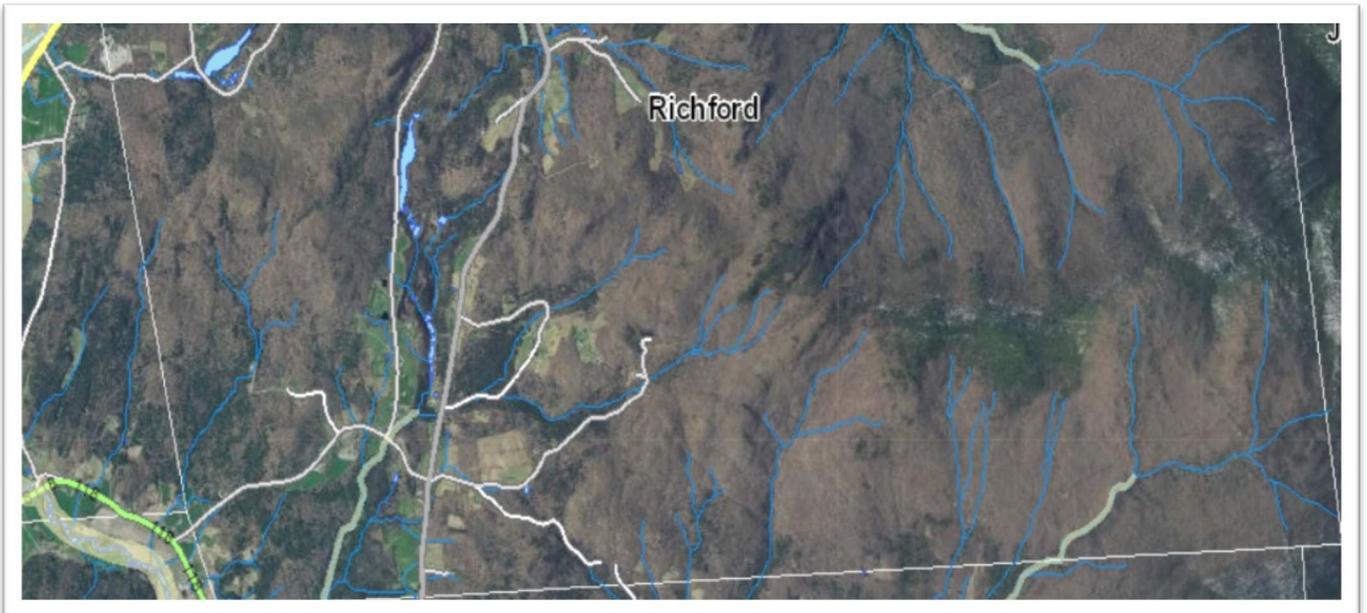
The following maps were created using the Vermont Agency of Natural Resources (ANR) ‘Natural Resources Atlas’ which is an online mapping tool. The maps depict the River Corridors that VT ANR has designated. The yellow shaded area is the ANR River Corridor, created August 27, 2019. River corridors are only mapped for streams with watershed of two or more square miles, but they do also apply to the area within fifty feet of top of bank. Areas within mapped river corridors are included in the restrictions set out in Richford’s floodplain bylaw. It should be noted that the current map effective date (as of this plan writing) for the Flood Insurance Rate Maps (FIRMS) for Richford is June 16, 1978.

| Missisquoi River Flood Categories in Feet | |
|--|----|
| Major Flood Stage | 16 |
| Moderate Flood Stage | 14 |
| Flood Stage | 13 |
| Action Stage | 11 |

The map below shows the northern half of Richford. which follows the Missisquoi River from east to west along VT105 and through The Village area where it turns south. To the east are Stanhope Brook and Mountain Brook which drain south to north into the Missisquoi River. This fairly steep area is prone to flash flooding as the channel is steep and somewhat constricted. The committee did mention that many trees are toppling at the higher elevations of this corridor and a flash flood could send them to a culvert on Route 105 that would get damaged thus closing the state highway. Brook Street which Stanhope Brooks runs along contains several homes that are threatened by flash flooding and stream erosion.

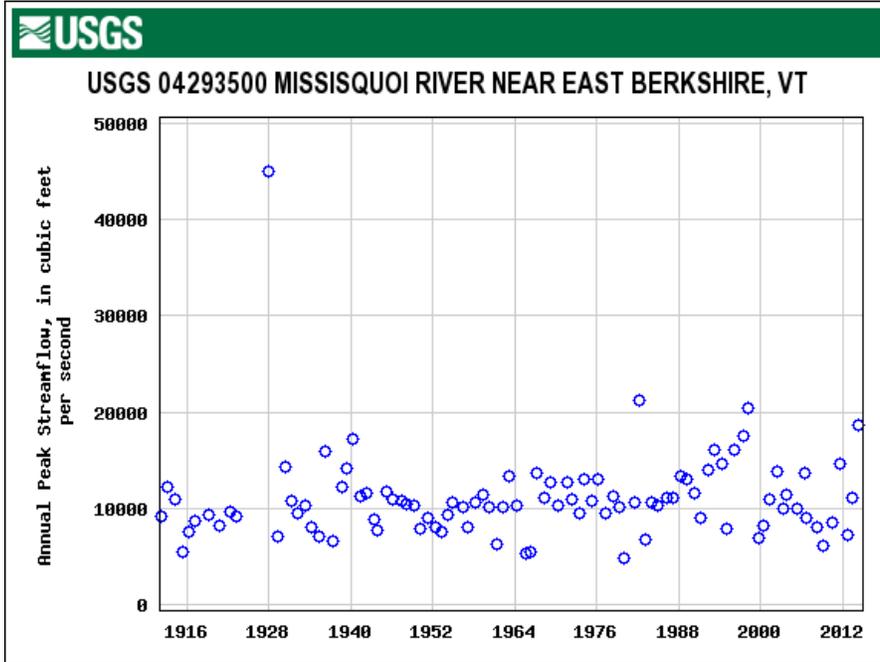


The map below shows the Southern half of Richford. Areas within mapped river corridors are included in the restrictions set out in Richford's floodplain bylaw. This map depicts Loveland Brook, Whittaker Brook and Guilmette' Pond. The drainage area of southwest Richford flows to the Trout River which is a tributary of the Missisquoi River. Much of this area in the south east is forested mountains while to the west is forests and farmland. South Richford Road is the main Town Highway that runs north to south from the village to Montgomery and is an important transportation link in the community. It is vulnerable to flooding from the steep terrain to the east as many tributaries bisect the road.



According to FEMA's National Flood Insurance Program, as of March 31, 2010, the Town of Richford has 7 policies in force with \$1,265,400 in insurance in-force and \$4,834 written premium in force. These residential structures,

built prior to the Town enacting flood hazard ordinances, are located in low density residential areas and in flood hazard areas.



Source: Missisquoi River at East Berkshire Stream Gauge. Annual Peak Stream flow.
 Source: USGS

A GIS based overlay analysis was conducted using FIRM data with the Vermont E-911 data of structure locations. The results found that there are approximately 58 structures within the 100-year flood plain in Richford: 2 are commercial sites, 23 are single family residential, 4 are mobile homes, and 29 are camps. This represents 5% of E-911 surveyed structures within the community.

Estimating flood damage of the 8% of structures with 20% damage is \$74,703. The cost of repairing or replacing the utilities, roads, bridges, culverts, and contents of structures is not included. Impacts to future populations, residences,

new buildings, critical facilities and infrastructure are anticipated to remain the same.

Extent / Probability

Flash floods, rain storms and fluvial erosion occur annually. According to the National Climatic Data Center, there have been 14 recorded flash flood events and 26 flood events causing approximately \$511,184,000 in damages and 1 death in Franklin County between 1987 and 2017.

Parts of Richford, such as those along the Missisquoi River and Stanhope Brook, will continue to be the parts of Richford most at risk for flooding. River Street in the village area is at risk for flooding from the Missisquoi River during high water events. Brook Street along Stanhope Brook is also at risk for flooding.

Agriculture is an important and part of the economy. Flooding disasters pose a major threat to the industry. Severe flooding in October of 2017 (FEMA-4356-DR) had a significant impact across Franklin County, with severe damages in the Upper Missisquoi River Basin. The impacts from flooding substantially threaten the future agricultural viability of this part of the region. The failure of even a small number of farms would have a significant negative economic impact.

Flash floods typically occur during summer when a large thunderstorm or a series of rain storms result in high volumes of rain over a short period of time. Higher-elevation drainage areas and streams are particularly susceptible to flash floods. Flash floods are likely in Richford and have the potential to do damage to major transportation corridors. Areas of concern for flash flooding include Stanhope Brook, Loveland Brook and Whittaker Brook.

There are no river gauges in Richford. The closest gauge is in East Berkshire and the highest recorded measurement was 23.10 feet, which was measured on November 4, 1927. Flood height is 13 feet, a height which has been exceeded 8 times since 2000. According to NOAA, gauge heights at this location will result in the following:

| Table 4.4: USGS Missisquoi River at East Berkshire River Gauge Height and Effects | |
|--|--|
| Gauge Height | Potential Effects |
| 23 | Devastating flooding occurs. This stage equals the Great Flood of 1927. Bridges on Routes 118, 108, and 105 will be covered in water, and may be destroyed. Large sections of Routes 118, 108, and 105 and local roads will be covered in water. Water will inundate homes in East Berkshire and Enosburg Falls. |
| 17 | Severe flooding will occur from Richford downstream to Sheldon along the Missisquoi. Water will enter homes in East Berkshire, and cover portions of Route 118 near East Berkshire and Route 105 between East Berkshire and Enosburg Falls. Missisquoi Street in Enosburg Falls will flood. Flooding of farmland will be widespread along the Missisquoi in Franklin county. This stage is equivalent to the FEMA 1 Percent Annual Chance Flood. |
| 16 | There will be widespread flooding along the Missisquoi from Richford to Sheldon. Water will cover portions of Route 105 between Enosburg Falls and East Berkshire, and will approach Route 236 in Sheldon and Route 118 in East Berkshire. There will be extensive field flooding. |
| 14 | Widespread flooding of low-lying fields and roadways will occur from Richford to Enosburg. Water will approach Route 118 at East Berkshire, and Route 105 between Enosburg Falls and East Berkshire. Yards will be flooded in East Berkshire. |
| 13 | Widespread flooding of low-lying fields and some low-lying roads will occur along the Missisquoi from Richford to Enosburg. Water will enter the yards of riverside homes in East Berkshire. |

Several farmers have observed the intensity of rain events (micro-bursts) has increased over the past 20 years. It is highly probable that flood events will occur annually during any season. Whether it be spring runoff, a summer microburst, flooding from a mid-winter thaw caused by an ice jam or a late fall wind/rain event as evidenced by recent events, the Town of Richford is committed to mitigating losses related to damages from such events.

Extent for fluvial erosion Many areas in Richford have the potential to suffer from fluvial erosion impacts and some have suffered more than others simply because of the topography and soil chemistry. Transportation infrastructure and agricultural property are the most vulnerable types of investment affected by fluvial erosion hazards. Residential, commercial, utility infrastructure and municipal properties are also often vulnerable. The village area was built along the Missisquoi River and is at risk of fluvial erosion within the river corridor.

Two of the problem areas that are causing issues in the Town of Richford are on Brook Street and Richford Slide Road. These roads start in mountainous areas east of Town and travel south to north where they intersect VT105 where it parallels the Missisquoi River. These roads have seen significant erosion over the past several years due to the increased severity of rain events. There are several homes on Brook Street that are threatened from erosion caused by flash flooding. The homeowners have expressed concern that they may lose their homes if a flash flood occurs. The Richford Slide Road has some parts that have been protected through the installation of rips rap and stone along the shoulder, however other several sections need to be protected. Town structures on this section are located within the River Corridor or special flood hazard area (SFHA).

Past Occurrences:

Floods of large magnitude occurred in Richford in 1888, 1895, 1927, 1973, 1976, 1983, 1997 and 2011. Minor flooding occurs nearly every spring, particularly along the Missisquoi River, when melting snow combined with spring rainfall flows from the surrounding mountains. One of the worst natural floods of historic record in Richford probably occurred in the late 1800's according to recollections and historical records. The summer of 1976 brought the worst flooding since November 3-4, 1927 to Richford. Heavy rains from remnants of tropical storms have also created flooding in the north such as from Floyd in 1999 and Irene in 2011

| Table 4.5 Flood and Flash Flood Events | | |
|---|---|---|
| Date | Location | Severity Remarks / Description of Area Impacted |
| October 31 to November 1, 2019 | Franklin, Chittenden, Washington, Addison, Lamoille Counties. | On the night of October 31, a heavy rain fell throughout much of north western Vermont and the Champlain Valley. Richford experienced 4 inches of rain overnight. The Missisquoi River and its tributaries flooded. The floodwaters created major damages to Routes 105, 118 and 108. A culvert on Route 105 just south of Richford Village was destroyed and the State Highway was closed. Many local roads including but not limited to Brook Street, Hardwood Hill Road, South Richford Road and Stevens Mill Road were damaged as well as the water system on Stanhope Brook. Many residents reported flooded basements and damaged driveways. At the time of this writing, damage estimates are still being developed. |
| June 9 -10, 2015 | \$150,000 County wide | Flash flooding from heaving rainfall occurred along the western slopes of the Green Mountain in northwest Vermont. A cold front was stalled across the Adirondacks and central Vermont, and several waves moving along the front produced repeated periods of heavy rain. Early morning rainfall of one to two inches saturate the ground and brought streams and ditches to bankful, and an additional inch or more later in the day on the 9 th added to the on-going high flows. Several roads were damaged in Richford due to overwhelmed culverts |
| April 15, 2014 | Counties of Franklin, Caledonia, Washington, Essex, Orleans, Lamoille | DR4178. Flooding from heavy rain and snowmelt caused damage to roadways across much of Franklin County. Road and culvert damage occurred in Bakersfield, Montgomery, Richford, and Sheldon. Flooding along the Missisquoi River forced the closure of Routes 118 and 105 in Berkshire, and portions of Route 105 were also flooded in Sheldon and Enosburg. The river gage on the Missisquoi River at East Berkshire went above its flood stage of 13 feet at 1 pm EST on April 15, crested at 15.64 feet at 9:15 pm EST April 15, and fell below flood stage at 11:35 pm EST on April 16. |
| August 29, 2011 | State-wide | EM-3338. Heavy rainfall from Tropical Storm Irene caused flooding across Franklin County VT. Along the Missisquoi River and its tributaries, floodwaters inundated and forced the closures of routes 105, 118, and 108. The Missisquoi River at East Berkshire crested at 14.13 feet at 1:00 am EST August 29. Flood stage is 13.0 feet. |
| April 27, 2011 | NW Vermont including Essex and Orleans Counties | DR-1995. Runoff from heavy rain and snowmelt caused flooding of the Missisquoi River and its tributaries. The Missisquoi River flooded portions of Route 105 between Sheldon and Berkshire. The Trout River, a tributary to the Missisquoi, flooded portions of Route 118 between Montgomery Center and East Berkshire, and a slope failure closed a portion of Route 118. The river gage on the Missisquoi River at East Berkshire exceeded its flood stage at 13.66 feet at 04:45 EST. |
| June 14 – 17, 2008 | Franklin and Addison Counties | (DR-1778) Scattered showers and thunderstorms moved very slowly along the cold front and produced heavy rain. Roads were damaged because ditches and culverts in many areas were overwhelmed with the sustained precipitation. Damages county-wide were approx. \$200,000. |
| June 18, 2006 | County-wide | Widespread rainfall of 1.5 to 2.5 inches on the night of the 17th through early afternoon of the 18th increased run-off into area watersheds. Widespread field flooding and ponding of water on area roadways including Richford. Localized ice |

| | | |
|------------------|---|---|
| | | jams along the Missisquoi caused flooding and left large ice chunks along Route 78 in Highgate and Route 105 between Enosburg and Berkshire. |
| August 30, 2004 | Franklin and Lamoille Counties | A cold front accompanied by thunderstorms with very heavy rain passed through northern Vermont. Some roads were washed out in Bakersfield Fletcher, Cambridge, Johnson, Richford and Montgomery as local drainages systems became overwhelmed. The Lamoille and Missisquoi Rivers and their tributaries flooded and several residents reported water in their basements. Damages estimates were less than \$100,000. |
| August 12, 2004 | Franklin County | Thunderstorms with heavy rainfall produced flooding across northern Vermont. Richford and Berkshire were hit particularly hard. Several roads were inundated and culverts were washed out. There was less than \$50,000 in damages locally. |
| June 12-13, 2002 | Caledonia, Franklin, Lamoille, and Orleans Counties | Countywide flooding of small streams and occurred throughout the day into evening on June 12 th . A few minor road washouts were reported. This was followed by continued flooding of the Missisquoi River through late afternoon and evening of June 13 th . County-wide damages in Franklin County were estimated to be \$25,000. |
| April 1, 1998 | Franklin County | Spring flooding continued from March into early April along the Missisquoi River from Richford to Swanton. A number of roads continued closed due to washouts and water on roads. There was an estimated \$10,000 in damages. |
| March 28, 1998 | Franklin County | Unseasonably warm weather resulted in dramatic snowmelt with rapid rises on rivers. In addition, showers and thunderstorms with heavy downpours moved across the area on the 30 th enhancing the runoff into the rivers. Among the streams and rivers flooding were the Missisquoi from Richford to Swanton. A number of roads were closed due to flooding. Damages were estimated to be \$25,000 mainly to road infrastructure. |
| January 8, 1998 | Northern Vermont | Rain totals during the week varied from 3 to 6 inches across the area. The Missisquoi River flooded in Richford and Enosburg Falls damaging roads. |
| July 14-15, 1997 | Franklin County | (DR-1184) More than ten hours of almost continuous rain fell in the area. Many local roads were washed out as drainage systems became overwhelmed from flash flooding of the Missisquoi River and Trout River and their tributaries. Some private bridges were destroyed and many residences reporting water in their basements. |

Severe Thunderstorms (High Winds, Lightning, Hail)

Description

Thunderstorms are caused by an updraft, which occurs when warm, moist air rises vertically into the atmosphere. The updraft creates a cumulus cloud, which will eventually be the thunderstorm cloud. Severe thunderstorm winds are brief in duration and bring gust in excess of 50 mph. Severe thunderstorms are capable of producing high winds, large hail, lightning, flooding, rains, and tornadoes. Microbursts are downdrafts from thunderstorm that may reach speeds in excess of 80 mph. (State of Vermont Hazard Mitigation Plan 2013).

The National Weather Service (NWS) issues a wind advisory when winds are sustained at 31 to 39 mph for at least one hour or any gusts 46 to 57 mph. Winds of 58 mph or higher cause the NWS to issue a High Wind Warning. In Vermont, high winds are most often seen accompanying severe thunderstorms. In fact, straight-line winds are often responsible for most of the wind damage associated with a thunderstorm. These winds are often confused with tornadoes because of similar damage and wind speeds.

Impact and Geographic Area of the Hazard

According to NOAA’s National Severe Storms Laboratory, damage from severe thunderstorm winds account for half of all severe reports in the lower 48 states and is more common than damage from tornadoes. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles. High winds are a hazardous threat to the Town and most commonly accompany other storm events. Violent windstorms are possible in Richford. High winds associated with severe thunderstorms affect forested areas, utility lines and exposed property. People living in mobile homes are especially at risk for injury and death. Even anchored mobile homes can be seriously damaged when winds gust over 80 mph.

The Town has experienced a variety of severe thunderstorm winds from storm systems that develop along ridgelines to the east in the Green Mountain Range. Typically, severe thunderstorms often generate lightning and/or hail. Micro bursts with high wind speeds and high precipitation accumulations over brief periods often down trees and branches and power lines and can overwhelm local drainage networks for brief periods. There are rare instances where lightning has caused structure fires (barns) and grass fires during dry periods. Private properties in Richford have experienced lightning strikes however, no data on lightning strikes in Town if kept. High elevations exposed areas are more susceptible to lightning strikes. The Town’s Highway and Fire Departments have appropriate debris removal equipment to clear trees and limbs from following thunderstorms

Table 4.6: Beaufort Wind Scale

| Beaufort Number | Wind Speed Range (mph) | NOAA Terminology | Description |
|-----------------|------------------------|------------------|--|
| 0 | 0 | Calm | Smoke rises vertically. |
| 1 | 1-3 | Light air | Direction shown by smoke but not by wind vanes |
| 2 | 4-7 | Light breeze | Wind felt on exposed skin; leaves rustle. |
| 3 | 8-12 | Gentle breeze | Leaves and small twigs in constant motion; wind extends light flag. |
| 4 | 13-18 | Moderate breeze | Raises dust and loose paper; small branches are moved. |
| 5 | 19-24 | Fresh breeze | Small trees sway. |
| 6 | 25-31 | Strong breeze | Large branches in motion; umbrellas used with difficulty |
| 7 | 32-38 | Near gale | Whole trees in motion, inconvenience felt when walking against the wind. |
| 8 | 39-46 | Gale | Breaks twigs off trees. Cars veer on road. Generally, impedes progress |
| 9 | 47-54 | Severe Gale | Light structural damage. |
| 10 | 55-63 | Storm | Trees uprooted. Considerable structural damage |
| 11 | 64-73 | Violent Storm | Widespread structural damage. |
| 12 | 74-95 | Hurricane | Considerable and widespread damage to structure |

Source: NOAA

There are no loss estimates for lightning because it is extremely difficult to predict where the event will occur and the type of associated structural damage. Damages could come in the form of destroyed electrical appliances, structure fires, or wildland fires. Death or serious injury could occur to individuals exposed to lightning. Private properties in Richford have experienced lightning strikes. High elevations and areas around bodies of water such as lakes and ponds are more susceptible. Richford’s road crew is equipped with associated debris removal equipment.

Extent / Probability

There have been 141 thunderstorm events in the region in the past 58 years according to the National Climatic Data Center. Of those, 77 are classified as severe thunderstorms with wind speeds of 50 kts. or greater. Severe thunderstorms can cause power outages, property damage, transportation interruptions, affect businesses and

can cause loss of life. Micro bursts with high wind speeds and high precipitation accumulations over brief periods often down trees and branches and power lines and can overwhelm local drainage networks for brief periods. Micro burst have occurred almost annually in the past 10 years according to project participants.

Lightning strikes in western Franklin County average between 4-6 strikes per square mile each year based on data collected by NASA satellites between 1995 and 2002. Within the Town of Richford, these numbers would average between 224 -340 lightning strikes per year. There is very little data on lightning strikes in Town. There are rare instances where lightning has caused barn fires and grass fires during dry periods. Damages from lightning could come in the form of destroyed electrical appliances, structure fires, or wildland fires. Private properties in Richford have experienced lightning strikes. High elevations and areas around bodies of water such as lakes and ponds are more susceptible. The Town’s Highway Department has appropriate debris removal equipment.

Hailstorms usually occur in Vermont during the summer months and generally accompany passing thunderstorms. While local in nature, these storms are especially significant to area farmers, who can lose entire fields of crops in a single hailstorm. Large hail is also capable of property damage. There have been 12 recorded hail events in Franklin County between 1998 and 2016. Hail is considered a relatively infrequent occurrence. Those hail events that do occur tend to be highly localized and limited to a relatively small area and typically occur with thunderstorms.

Loss estimates for lightning are difficult to ascertain because it is extremely difficult to predict where the event will occur and the type of associated structural damage. Damages could come in the form of destroyed electrical appliances, structure fires, or wildland fires. Death or serious injury could occur to individuals exposed to lightning. The estimated damage from a severe thunderstorm event occurring to 10% of all structures in Town with 20% damage is \$4,339,002. The estimated cost does not include building contents or land values. There are no known deaths that have occurred in Town due to severe thunderstorms.

Past Occurrences

| Table 4.7: Severe Thunderstorm Occurrences for Richford | | | | | |
|--|---------------------------|--|-------------------------------------|------------------|-------------------------|
| Dates | Type | Description | Area | Magnitude | Property Damages |
| October 29-30, 2017 | Thunderstorms, High Winds | DR-4356. 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. A peak wind gust of 115 mph was observed at the summit of Mount Mansfield. Numerous downed branches, trees and some snapped and uprooted trees causing widespread power outages, especially in VT where 30% of the power grid or >100,000 customers were without power. Trees fell on residences and vehicles as well. | Northern Vermont and Windham County | 52 kts. | \$200,000 State wide |
| 9/11/2016 | Thunderstorms, High Winds | A strong front moved into the area from the west generating damaging winds and lightning. Trees were blown down and parts of northern Franklin County were without power overnight. | County-wide | 50 kts | \$5,000 |

| | | | | | |
|----------------|---------------------------------------|---|----------------------------------|-------------------------|----------|
| 9/11/2013 | Thunderstorms, High Winds | A weak area of low pressure resulted in a series of thunderstorms that moved across Vermont during the late afternoon and evening. Some of these thunderstorms produced hail and damaging winds that downed trees and utility lines. | Northern Vermont | 1.00 in. | \$5,000 |
| 6/1/2013 | Thunderstorms, High Winds | A weak disturbance, well ahead of a cold front forecast triggered a few scattered thunderstorms. Damaging winds occurred in Montgomery toppling trees in town. There were brief power interruptions. | County-wide | 50 kts. | \$2,000 |
| 10/29/ 2012 | Thunderstorms, High Winds | Superstorm Sandy brought high winds along the western slopes of the Green Mountain. Much of the state experience 50 knot wind speeds. Strong east winds of 25 to 35 mph, enhanced by downslope from the Green Mountains caused frequent wind gusts in excess of 45 mph with isolated wind gusts to 60 mph along western slope communities. Scattered tree limbs, branches and small trees were toppled by these winds, which accounted for scattered power outages as well. | State-wide | 50 kts. | \$10,000 |
| 9/8/2012 | Thunderstorms, High Winds | A squall line of severe thunderstorms developed and pushed east into Vermont. There was isolated minor wind damage in the form of large tree branches knocking out powerlines across town. | County - wide | 50 kts. | \$25,000 |
| 7/6/2011 | Thunderstorms, High Winds | A well-established squall line moved across the state during the afternoon with numerous reports of wind damage as well as lightning strikes. As a result of these storms, more than 15,000 customers in Vermont lost power | State-wide | 50 kts. | \$5,000 |
| 6/18/2011 | Thunderstorms, High Winds | A cold front brought scattered thunderstorm activity across Franklin County. A few of the stronger storms produced large hail greater than an inch diameter, | Northern Vermont | 1.00 in. | \$0.00 |
| 5/26/2011 | Thunderstorms, High Winds | DR4001. Unstable air mass travelled across northern Vermont from the west during the late afternoon producing widespread thunderstorms and damaging winds. Many customers were without power due to downed trees on utility lines. | County wide | 50 kts. | \$20,000 |
| 5/20/2011 | Thunderstorms, High Winds, Hail | DR4043. Several strong thunderstorms passed through northern New York and Vermont during the afternoon and evening of May 26th. There were numerous reports of damaging winds and very large hail. Some 25,000+ customers lost power during these storms. | Franklin and Washington Counties | 0.25-inch hail reported | unknown |

| | | | | | |
|------------------|---------------------------|--|--|---------|------------|
| April 16, 2011 | Thunderstorms, High Winds | There were numerous reports of trees downed by high winds, with wind gusts in excess of 60 mph that resulted in nearly 10,000 customers without power in eastern Franklin county along the Canadian border | Franklin and Lamoille Counties | 50 kts. | . \$25,000 |
| December 1, 2010 | High Winds | Scattered to numerous trees and large branches down, utility poles, partial roofs and shed damage | Franklin, Lamoille, Chittenden, and Addison Counties | 50 kts. | . \$25,000 |
| 7/8/2008 | Thunderstorms, High Winds | (DR1778) Several rounds of thunderstorms moved across northern Vermont during the afternoon of July 18th. A developing squall line across the Champlain Valley of New York moved into northwest Vermont by mid-afternoon and continued across the state. Widespread tree and structural damage occurred with this system in Grand Isle, Franklin, Lamoille and Orleans counties. | Northern Vermont | 55 kts. | \$50,000 |
| 6/10/2008 | Thunderstorms, High Winds | A cold front brought severe thunderstorms to the area. Numerous trees were damaged, downed or uprooted which caused downed power lines and structural damage to numerous buildings and vehicles throughout the state. Tens of thousands of customers lost power due to the storms, with some outages that lasted several days. Numerous trees were down interrupting travel. No one was injured. | Northern Vermont | 50 kts. | \$10,000 |
| 8/16/2007 | Thunderstorms, High Winds | A cold front moved across the region from Canada and was accompanied by high winds. Many trees were uprooted | State-wide | 60 kts. | \$50,000 |
| 6/19/2006 | Thunderstorms, High Winds | Thunderstorms intensified during the day as they moved into the Champlain Valley from Canada. These thunderstorms produced severe weather including downed trees. | County Wide | 50 kts. | \$10,000 |
| 2/27/2006 | High Winds | Sustained winds of 35 to 45 mph with damaging wind gusts in excess of 70 mph moved across the region between late morning and mid-afternoon. There were widespread reports of trees and power lines down across the western slope communities blocking roads and causing structural damage | Central and Northern Vermont | 40 kts | \$10,000 |

| | | | | | |
|-----------|---------------------------------------|---|------------------|----------|-----------|
| 9/29/2005 | Thunderstorms, High Winds | <p>A storm system moved rapidly across the Province of Quebec on the 29th of September. The associated cold front moved across western Vermont during the morning of September 29th. The front was accompanied by showers and thunderstorms. Large scale damaging winds preceded and followed the front. Trees and power lines were blown down countywide across both Franklin and Addison counties, with numerous power outages.</p> <p>Winds were generally sustained at an estimated 35 to 45 mph with gusts to over 50 mph. A few roads were closed throughout Franklin County.</p> | Northern Vermont | 50 kts | \$50,000 |
| 7/5/2005 | Thunderstorms, High Winds | <p>Thunderstorms preceded a cold front that moved into Vermont from Canada. Thunderstorms were severe in Franklin County with dozens of trees blown down damaging cars. Winds were estimated between 58 and 72 mph (between 50 and 63 knots). Power outages were reported in the county.</p> | Franklin County | 55 kts. | \$100,000 |
| 6/9/2004 | Thunderstorms, High Winds Wind | <p>A cold front tracked slowly across northern New York and Vermont. This front was preceded and accompanied by thunderstorms with damaging winds. Trees and power lines were blown down in many towns including Richford.</p> | Franklin County | 50 kts. | \$5,000 |
| 5/30/2002 | Thunderstorms, Hail | <p>A cold front moved southeast from Canada and triggered late afternoon and evening thunderstorms. Dime size hail was reported in neighboring Montgomery.</p> | Northern Vermont | 0.75 in. | \$0.00 |
| 3/10/2002 | High Winds | <p>A cold front moved across the area from Canada and brought strong winds. Trees were blown down around Town.</p> | Franklin County | 54 kts. | \$5,000 |
| 5/28/1998 | Thunderstorms, Hail, High Winds | <p>A cold front produced strong thunderstorms accompanied by strong winds and very heavy rain. In Richford, trees and power lines were blown down.</p> | Franklin County | Unknown | \$5,000 |

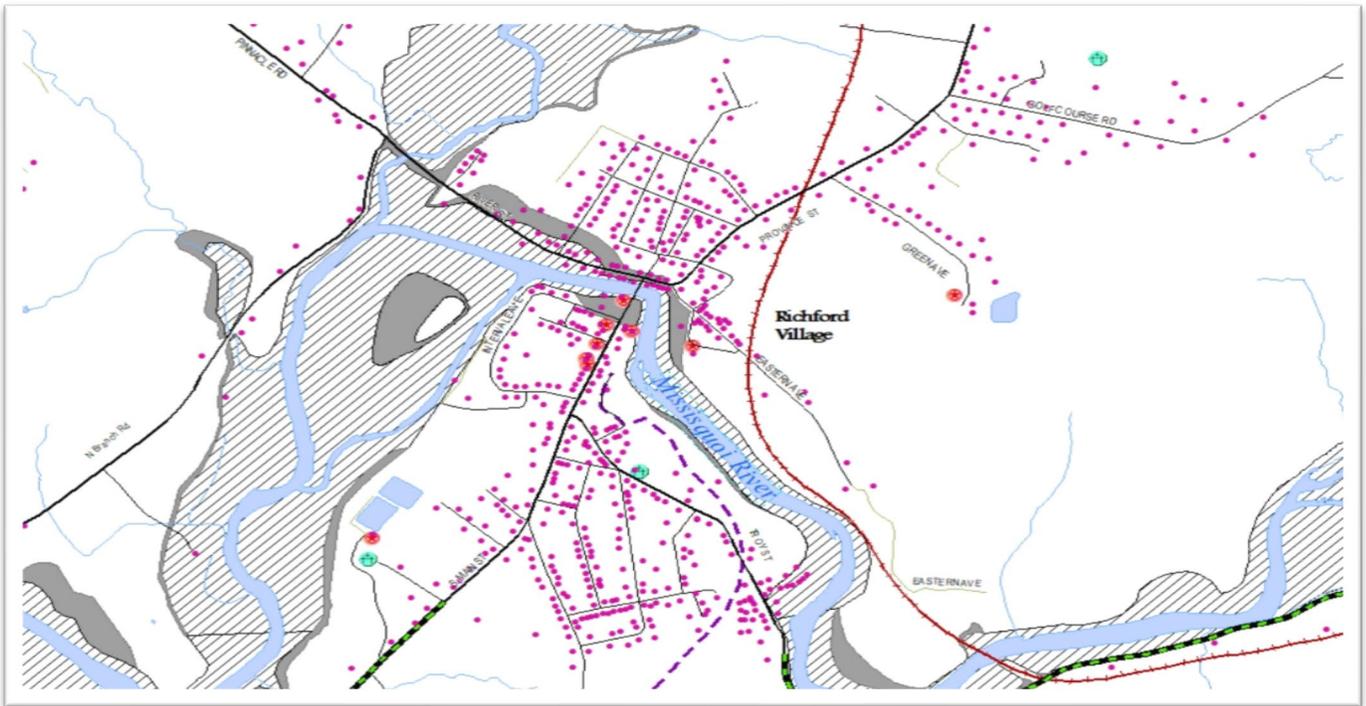
6. ASSESSING VULNERABILITY

Structures in the SFHA

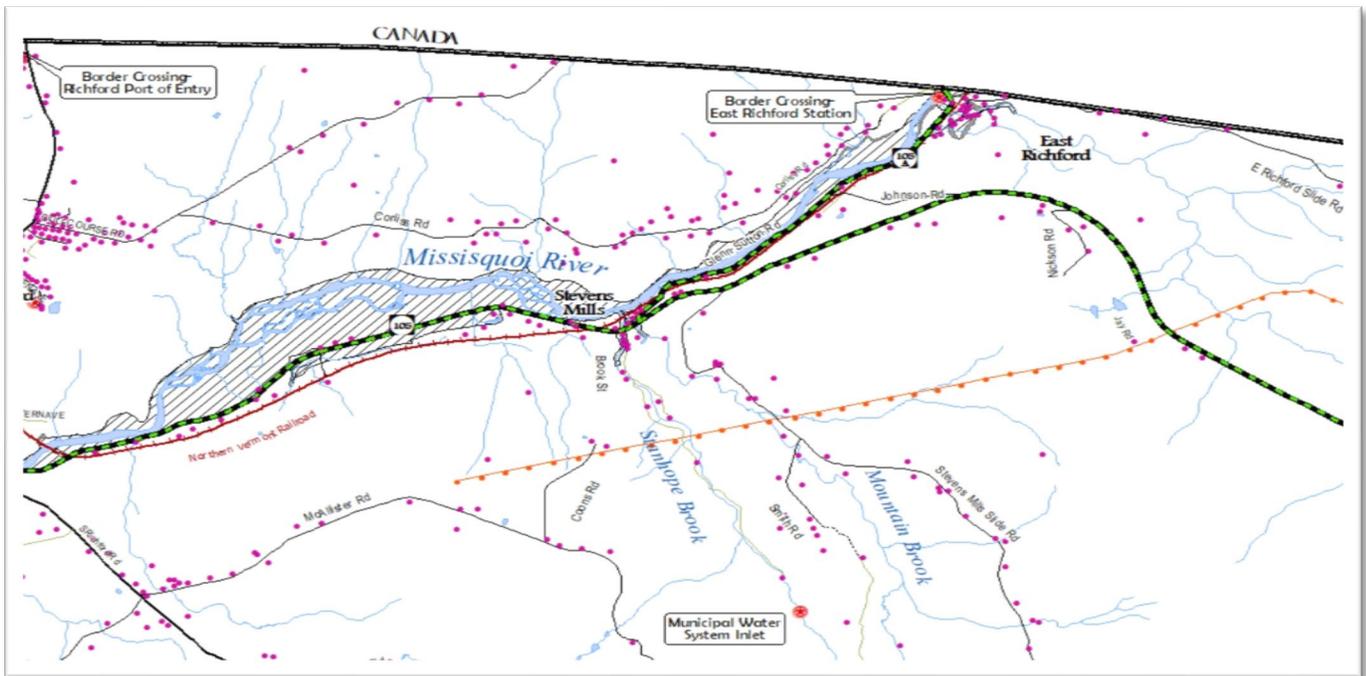
There are approximately 43 buildings within FEMA-designated Special Flood Hazard Areas (SFHAs)³. The below map shows structures (purple circles) that are approximately located in the SFHA in Richford Village. (Note: The FIRMs were digitized from the original dated hard copy FIRMs and depict approximations of SFHA location. At the time of this writing, FEMA is in the process of creating D-FIRMS for the Missisquoi River basin.) Twenty-Seven of the Forty-three structures are in the Village area of which thirteen are single or multi-family dwellings, six are

³ Flood Hazard Summary Report for Richford, available on VT ANR's Floodready website
<<https://anrweb.vt.gov/DEC/FoFReports/>>

commercial, five are commercial with residence, one is a house of worship and one is a mobile home and one is a lodging site (B&B/Hotel/Motel/Inn).



The below map shows structures (purple circles) that are located in the SFHA in Richford Town near the confluences of Stanhope Brook, Mountain Brook and the Missisquoi River. (Note: The FIRMs were digitized from the original dated hard copy FIRMs and depict approximations of SFHA locations. At the time of this writing, FEMA



is in the process of creating D-FIRMS for the Missisquoi River basin.) Fifteen structures are either single or multi-family dwellings and 1 is a mobile home located in the SFHA.

Properties within SFHAs, that have a mortgage, are required to purchase flood insurance. Richford’s participation in the National Flood Insurance Program (NFIP) gives residents and business owners access to discount flood insurance through the National Flood Insurance Program. Flood insurance can still be purchased privately; however, it is more expensive. Development in SFHAs must meet additional construction standards as outlined in Richford’s floodplain regulations. According to the Flood Ready Vermont Community Report, 4% of all buildings in Richford Village are in the SFHA and 17% of have flood insurance in force while 5% of all buildings in Richford Town are in the SFHA and 15% have flood insurance.

Repetitive Loss Properties

According to the State Hazard Mitigation Officer, the Town of Richford has no repetitive loss properties.

The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended, 42 U.S.C. 4102a. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

- (a) That has at least four NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or
- (b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart. ⁴

Critical Facilities

A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the appropriate jurisdictions, or fulfills important public safety, emergency response, and/or disaster recovery functions. The current scope of this plan is to address these facilities and associated infrastructure. Once this plan is accepted, there is the possibility to expand the plan to cover other facilities and structures within the community.

The critical facilities identified in the Town of Richford Hazard Mitigation Plan include shelters; health care facilities; electric, and communication utilities; water and wastewater treatment plants, public safety facilities, government offices, hazardous materials storage sites; churches and educational facilities. They are listed in Attachment B.

Data from Richford Planning Commission, Northwest Regional Planning Commission, Local Emergency Planning Committee and Richford Emergency Services were used to assist in the analysis of areas affected by various hazards. The results of the analysis are listed in Table 4.1. The community hazard mitigation maps are included in Attachment E. The community map depicts hazard areas, critical facilities, and vulnerable sites based on the best available data derived from local, regional, state and federal sources.

Market Value of Structures in Richford⁵

Table 5.1: Richford Grand List Summary

⁴ FEMA <<http://www.fema.gov/severe-repetitive-loss-program>>

⁵ Town of Richford Grand List 2017.

| Type | Number | Value Including Land |
|---|--------------|-----------------------|
| Residential Homes | 770 | \$ 115,153,600 |
| Seasonal Homes | 44 | \$ 6,160,900 |
| Mobile Homes – Unlanded | 38 | \$ 504,500 |
| Mobile Homes - Landed | 53 | \$ 4,227,200 |
| Farms | 11 | \$ 5,071,030 |
| Commercial | 75 | \$ 56,345,500 |
| Commercial Apts | 12 | \$ 3,317,900 |
| Other (Utilities, Woodland and Miscellaneous) | 167 | \$ 18,152,400 |
| Total Listed Value | 1,175 | \$ 216,950,100 |

Participation and Compliance with the National Flood Insurance Program (NFIP)

The National Flood Insurance Program (NFIP) is a voluntary program organized by the Federal Emergency Management Agency (FEMA) that includes participation from 20,000 communities nationwide and 247 Vermont towns and cities. Combined with floodplain mapping and floodplain management at the municipal level, the NFIP participation makes affordable flood insurance available to all homeowners, renters, and businesses, regardless of whether they are located in a floodplain.

FEMA published a flood hazard study for the Town of Richford in 1974. Flood Insurance Rate Maps (FIRMs) were prepared by FEMA in 1980. Flood hazard areas were identified along the Missisquoi River, The North Branch of the Missisquoi River and Loveland Brook. The FIRMs and Study are available for review at the Richford Town Office and on-line at FEMA.gov.

Creation of the Flood Hazard District in the Town’s Subdivision and Zoning bylaws enabled Richford to be eligible for FEMA’s National Flood Insurance Program (NFIP), which permits residents within the Flood Hazard District to purchase flood insurance. The purpose of the district is to prevent increases in flooding caused by development in flood hazard area, to minimize future public and private losses due to floods, and to promote the public health, safety and general welfare. The Town is committed to enforcing floodplain regulations and ordinances to be eligible to participate in the NFIP program and protect the people and property of Richford by restricting development in flood prone areas. Richford is a member in good standing with the NFIP (CID 500218 and 500057⁶). The latest floodplain ordinance was adopted March 3, 2016.

According to FEMA’s National Flood Insurance Program as of June 26, 2018, there are 7 active NFIP policies in Richford (town and village). The policies have a total coverage value of \$1,376,100. There have been 8 NFIP claims filed in Richford (town and village) since 1978 totaling \$8,623. There are no repetitive loss properties. Currently no large- or small-scale developments are planned in the floodplain areas of Richford.

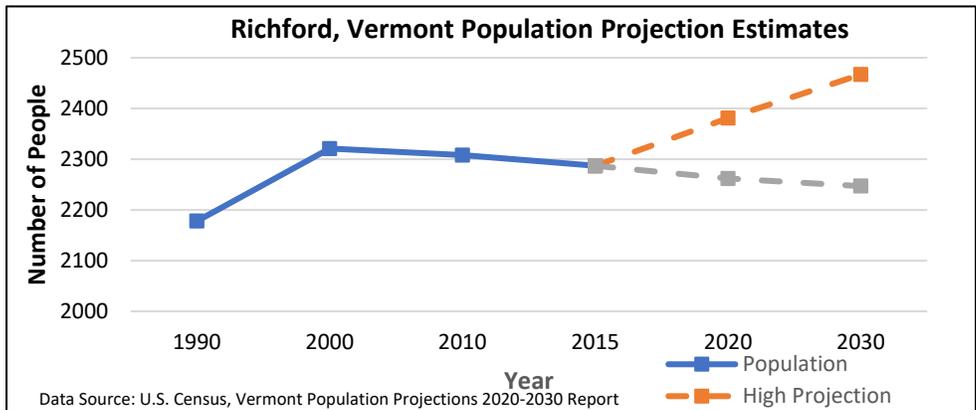
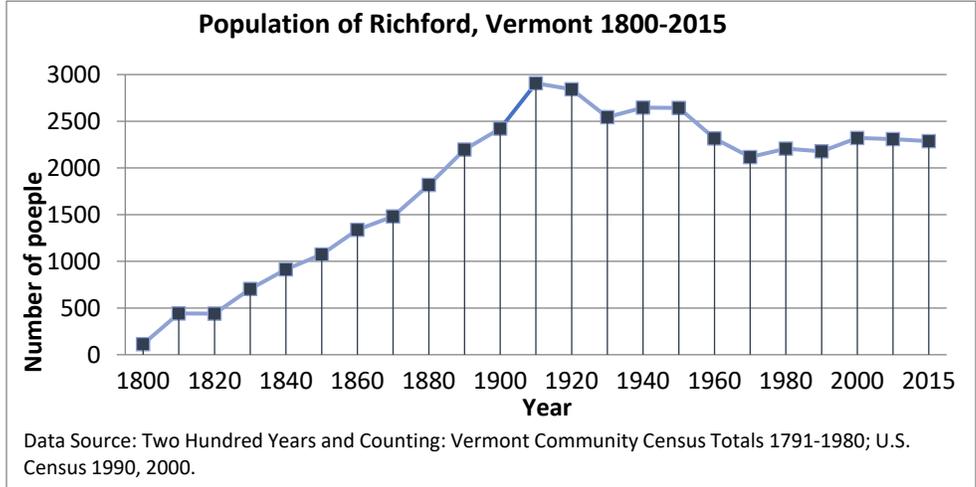
The Town works with the elected officials, the State, the Northwest Regional Commission, and FEMA to correct existing compliance issues and prevent any further NFIP compliance issues through continuous communications, training and education.

⁶ Richford Town and Richford Village merged into one municipality since the CID’s were generated.

Development Trends

Richford’s population gradually increased from 1840 to 2000 where it leveled off for a few years. The population dropped again from 2011 to 2013, rose in 2014, and is now decreasing.

Population projections are based on past trends in birth, deaths and migration which provide reasonable estimates of future conditions. The Vermont Agency of Commerce and Community Development produced a report calculating projections based on past trends from two time periods; the 1990-2000 predict higher growth and 2000-2010 predicts lower growth. Based on these projections, Richford could experience growth of just over 50% by 2030 or a decline of about 10% of the population.



Development is characterized by a concentration of structures and land uses devoted to small-scale commercial, residential, governmental and recreational uses. The character of the Center and the Village is an important social and economic asset to the community. The Town does not have adequate sewer making the potential for additional development in these two areas problematic. This coincides with Richford’s desire to maintain its rural character.

Richford has zoning bylaws in place that protects high risk areas from development. Development on slopes above 15% is discouraged in the town plan. Zoning bylaws also contain floodplain regulations to prevent development in those areas.

Richford has a relatively low full-time population. The town sees population fluxes because the tourist season in the summer and fall. However, the town is spread out and has less concentrated infrastructure to accommodate the influx of summer and fall travelers. Many tourists stay in the neighboring resort towns of Jay and Montgomery which have the Jay Peak Ski Resort in between. Richford is considered to have similar resources as towns of their size in the region. Generally, not a lot of economic growth or industry are occurring in Richford. The Town and Village do benefit from Canadian tourists when the Canadian economy is strong.

7. MITIGATION STRATEGY

The Hazard Mitigation Goals were developed by the Committee for the Richford Local Hazard Mitigation Plan.

General Goals

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

Town Plan (Adopted 2017) Goals & Policies That Support Hazard Mitigation

- Richford shall protect and maintain in healthy condition critical natural areas in Richford including woodlands, wetlands, flood hazard areas, and wildlife habitat.
- Richford shall have sufficient fire protection to ensure the health, safety, and welfare of its residents and visitors.
- Richford shall have sufficient emergency services to ensure the health, safety, and welfare of its residents and visitors.
- Acquisition of natural or fragile areas by local or state conservation agencies whose goal is protection of the area is encouraged.
- Development should not encroach on Vermont Significant Wetlands.
- Encourage establishment of vegetative buffer strips around wetlands and, where appropriate, other critical natural areas.
- The town should regulate development in identified flood hazard areas in accordance with the federal regulations to enable property owners to buy flood insurance and to prevent future public and private losses due to floods.
- Development should be prohibited on land over 1,500 feet in elevation except for agriculture and forestry purposes.
- All land development should be prohibited on slopes greater than 25% and, to the extent possible, vegetative cover should be maintained.
- Development on shallow soils should be discouraged.
- Runoff and erosion should be carefully controlled during all phases of construction and wastes should be treated off the steep slope area.
- Monitor development in the Stanhope Brook watershed and adopt land use regulations to minimize development in this area.
- Work with the Fire Marshall to enforce the Minimum Housing Standards Ordinance.
- Continue fundraising efforts to purchase equipment for fire services.
- Assure proper and adequate training for all emergency service volunteers.

Existing Hazard Mitigation Programs, Projects and Activities

Severe Winter Storm (Ice Storm)

- Town Highway Department has snow removal equipment.
- Richford High School, Richford Elementary School and All-Saints Catholic Church as open emergency shelters
- Road crews have response equipment to deal with downed trees and branches.
- Fire department provides public campaign on wood stove safety and maintenance and generator safety and maintenance.

- Fire department provides welfare checks for elderly and at-risk residents during severe winter weather when many are home bound.
- Fire department marks and clears out hydrant locations during deep snow conditions.

Flooding / Fluvial Erosion

- The Town has Zoning Bylaws which designates a Flood Hazard District whose purpose is to minimize future public and private losses caused by development in flood hazard areas. The town participates in the National Flood Insurance Program (NFIP). Maintaining compliance with NFIP regulations both now and in the long term is a high priority activity.
- The Town enforces flood plain regulations.
- Flood Hazard Areas in Richford are identified on Flood Hazard Boundary Maps (FHBMs) and Flood Insurance Rate Maps (FIRMs) produced by FEMA.
- Ditches located in areas susceptible to flooding are inspected and maintained on an annual basis.
- Culverts are inspected at least once a year. Seasonal maintenance is developed based on an annual inspection.
- The Town has adopted Road and Bridge Standards.
- Completed road erosion inventory to mitigation erosion issues along roads that are hydrologically connected. In conformance with the State’s Municipal Roads General Permit program.
-

Severe Thunderstorm (Lightning, High Winds, Hail)

- Road crews have response equipment to deal with downed trees and branches.
- Road crews monitor roadways for obstructions and flooding.
- Town has installed some lightning protection on equipment operated at municipal facilities.
- Highway department has debris removal equipment.
- On-going regularly scheduled road maintenance programs (cutting vegetation).
-

On Going Community Preparedness Activities

- The Town has named the Emergency Services Building, the Richford Town Hall and the Mobile Command Post as Emergency Operations Centers (OEC’s).
- Town applies for state grants (Local Roads, Grants in Aid, State Structures, MRGP) to address road construction/improvement projects.
- Locally adopted Local Emergency Management Plan. Updated annually.
- Emergency Responders attend professional training sessions as appropriate including ICS training.
- Compliant with State NIMS strategy including having staff and elected officials trained in ICS.
- Richford is member of Franklin County Mutual Aid Agreement (NIMS)
- Continue to equip, as appropriate, emergency shelters.
- Regular maintenance of town fleet and emergency equipment.
- Community participates in the Vermont Enhanced 911 System Program.
- Regularly scheduled maintenance programs ongoing (culvert survey & replacement, ditching along roadways, cutting vegetation to allow visibility at intersections).

Identified Hazard Mitigation Actions, Programs, and Activities

The following list documents the questions (criteria) considered in establishing an order of priority. Each of the following criteria was rated according to a numeric score of “1” (indicating Poor), “2” (indicating Average) and “3” (indicating Good). The highest possible score is 36. The full scoring matrix used is located in Attachment C.

- 1) Does the action reduce damage?

- 2) Does the action contribute to community objectives?
- 3) Does the action meet existing regulations?
- 4) Does the action protect historic structures or structures critical to Town operations?
- 5) Can the action be implemented quickly?
- 6) Is the action socially acceptable?
- 7) Is the action technically feasible?
- 8) Is the action administratively possible?
- 9) Is the action politically acceptable?
- 10) Is the action legal?
- 11) Does the action offer reasonable benefits compared to its cost of implementation?
- 12) Is the action environmentally sound?

Mitigation actions are listed in terms of mitigating threat or risk to public health and safety, reduction of hazard to community assets, adherence to Town plan and local ordinances, cost, and feasibility. Actions are classified as either short - term or long - term activities. Short –term action items are activities which the municipality may be capable of implementing within one to two years. Long-term action items may require new or additional resources, funding or authorities. Ongoing action items occur at least once per year.

Recent disasters that have occurred have not caused a change in priorities. The projects have been prioritized as part of the Town’s on-going comprehensive planning process following state land use law.

The following identified programs, projects and activities are future mitigation strategies for the Town of Richford. These mitigation strategies have been chosen by the town as the most appropriate policies and programs to lessen the impacts of potential hazards.

Cost-Benefit Analysis

Each project will incorporate a full benefit-cost analysis (BCA) following FEMA’s BCA methodology and latest software to ensure cost effectiveness and maximize savings.

There was a rough cost/benefit analysis done for each action listed in the table. The below cost and benefits tables address the priorities for the mitigation strategies that are stated in the Mitigation Actions Table.

Cost Estimates

| | |
|--------|----------------------|
| High | =>\$100,000 |
| Medium | = \$25,000 – 100,000 |
| Low | =< \$25,000 |

Benefit Estimates

| | |
|--------|----------------------------------|
| High | Public Safety |
| Medium | Infrastructure / Functionality |
| Low | Aesthetics / General Maintenance |

Time Frame

| | |
|-------------|----------------------|
| Short term | 6 months to one year |
| Medium term | 1 – 3 years |
| Long term | 4+ years |

Implementation of the mitigation actions is summarized in the below table, as far as who, when and how they will be carried out. Further details about some actions can be found following the mitigation actions table, in text.

| Table 6.1 Prioritized Mitigation Actions | | | | | | |
|---|--|---------------------------------|---|--|---------------------|---|
| Priority/Score | Mitigation Action / Hazard Addressed | Responsibility/Oversight | Funding/Support | Time Frame | Cost/Benefit | Initial Implementation Steps |
| High 34 | TH23 (Stevens Mill Slide Rd) Drainage upgrades. / Flooding, fluvial erosion | Selectboard | Better Roads, Grants in Aid program | Short Term, May 2020 – July 2020 | Low / High | Funding awarded through Better Roads Program. |
| High 35 | TH7 (Golf Course Rd) and TH11 (Corliss Rd) Drainage upgrades. / Flooding, fluvial erosion | Selectboard | Better Roads, Grants in Aid program | Short Term, May 2020 – July 2020 | Low / High | Funding awarded through Grants in Aid Program. |
| High 35 | TH24 (Smith Rd) Culvert Upgrade on Mountain Brook. / Flooding /fluvial erosion | Selectboard | Better Roads, Grants in Aid program | Short Term, May 2020 – July 2020 | Low / High | Funding awarded through Better Roads Program. |
| High 36 | Enhance Public Awareness of the Dangers of Severe Winter Weather. / Severe winter storm (ice storm). | Fire Department | Local funding | On-going | Low / High | Identify home fire safety measures. Develop media campaign for schools and distribute through local and social media. |
| High 35 | TH 2 (South Richford Rd) 0.35 miles north of intersection with TH34 (Coombs Rd) and TH41 (Wrightman Hill Rd) culvert upgrade. / Flooding, fluvial erosion. | Selectboard | State Structures Grant, Better Roads, Grants-in-Aid, HMGP | Medium-term Start July 2021 and finish August 2022 | High / High | Partial funding secured. Site design/engineering study. Obtain necessary permits from state. Request quotes from materials suppliers and contractors. Construction. |
| High 34 | TH 18 – Br. 27 (Guilmette Rd) culvert upgrade. / Flooding, fluvial erosion. | Selectboard | State Structures Grant, Better Roads, Grants-in-Aid, HMGP | Medium – term Start July 2020 and finish August 2021 | Medium / High | Apply for state and federal grants. Engineering. Hydrology study. Stream permits for project. |

| | | | | | | |
|---------|--|-------------|---|--|---------------|--|
| High 35 | Brook Street Property Protection; Stabilize Stanhope Brook stream bank. / Flooding, fluvial erosion. | Selectboard | State Structures Grant, Better Roads, Grants-in-Aid, HMGP | Short – term Start January 2020 and finish August 2020 | High / High | Apply for state and federal grants. Engineering. Hydrology study. Stream permits for project. |
| High 36 | Support utility company efforts to protect utility corridors from ice/wind damage. / Severe winter storm (ice storm); severe thunderstorm (high winds, hail lightning) | Selectboard | State Structures Grant, Better Roads, Grants-in-Aid, HMGP | On-going | High / High | Utilities are privately owned. Town will support as necessary. |
| High 34 | Damaged trees removal along Stanhope Brook. / Flooding, fluvial erosion, severe thunderstorm (High winds, hail, lightning) | Selectboard | Local funding | Short – Term March 2020 – August 2020 | Medium / High | Consult with ANR stream engineer, hire forestry / tree removal contractor. |
| High 36 | Protect Critical Facilities and Infrastructure from Lightning Damage. Severe thunderstorms (high winds, hail, lightning) | Selectboard | Local funding | Short – Term March 2020 – August 2020 | Low / High | Identify protection needs. Spec power protection equipment to meet needs. Procure and install equipment. |

TH23 (Stevens Mill Slide Rd) Drainage Upgrades – The area has a history of road erosion issues. The road has been identified as having a risk of erosion in the VANR road erosion inventory. The Town applied for and received a Vermont Local Roads grant for \$20,000 to stone line ditches along the road to mitigate erosion issues.

TH7 (Golf Course Rd) and TH11 (Corliss Rd) Drainage Upgrades – A tributary of the Missisquoi River bisects each of these roads and is created erosion issues. The VANR road erosion inventory classified these two points of intersection as “high risk” for road erosion. The culverts should be upgraded to meet local roads and ANR’s municipal roads general permit standards. These sites have a history of flooding.

TH24 (Smith Rd) Culvert Upgrade on Mountain Brook – This site has a history of flooding and repetitive damages. The culvert needs to be upgraded to meet stream hydraulics and conform with local road standards and ANR’s municipal roads general permit. It was most recently damaged during the November 1, 2019 flooding event.

Enhance Public Awareness of the Dangers of Severe Winter Weather – The Town Fire Department will educate homeowners of the importance of installing carbon monoxide monitors and alarms. The Town Fire Department will educate citizens that all fuel-burning equipment should be vented to the outside. The Fire Department will add information to social media sites. The town is considering mailing out educational literature to the citizens and making brochures available at the Town Office and Public Library.

TH 2 (South Richford Rd) 0.35 miles north of intersection with TH34 (Coombs Rd) and TH41 (Wrightman Hill Rd) Culvert Upgrade – The site has a history of flooding and is causing erosion issues on private property downstream. The culvert needs to be upgraded to meet stream hydraulics and ditching in the area needs to be improved. This is a high priority for the Town.

TH 18 (Guilmette Rd) Culvert Upgrade – In stream culvert is currently undersized. The site experiences flooding because the culvert does not meet hydraulic standards for the stream. The site has a history of flooding. The culvert needs to be upgraded to meet stream hydraulics and conform with local road standards and ANR's municipal roads general permit.

Brook Street Property Protection; Stabilize Stanhope Brook Stream Bank – Stanhope Brook is a tributary to the Missisquoi River. The brook has a history of flooding during high rain events. Erosion is evident along the stream channel. There are several properties along the road that have been damaged from flood events including flooded basements. The November 1, 2019 flood event has carved out a section of streambank that is threatening one home. The Town has applied for funding through the USDA's Emergency Watershed Protection (EWP) program to address road erosion issues. The Town may consider a home buyout for the site if the EWP is unsuccessful.

Support Power Utility Efforts to Protect Utility Corridors from Ice/ Wind Damage – The utility lines are privately owned; however, the Town will support the power company's utility line and corridor tree pruning program in order to protect power lines. Trees or branches that are a concern to impact utility lines will be reported to the power company. The power company has improved upon their line corridor tree pruning program to reduce the impacts of ice storms in recent years.

Damaged Trees Removal Along Stanhope Brook – There are many damaged and partially uprooted/downed trees in the upper reaches of Stanhope Brook as a result of the wind event on October 31, 2019. The Town is concerned that another high precipitation event could cause these trees to be washed downstream and create a significant log debris jam at the intersection of Stanhope Brook and VT105. The town would like to remove many of the damaged/downed trees upstream to prevent this from occurring.

Protect Critical Facilities and Infrastructure from Lightning Damage – The Town Public Works Department will protect critical facilities and infrastructure from lightning damage. Staff will determine what the appropriate level of protection is for the various equipment. The Department will identify equipment and facilities that are lacking adequate lightning protection devices such as surge protection, lightning rods and grounding on municipal communications infrastructure, and other critical facilities. The Town will install and maintain surge protection on critical electronic equipment such as municipal computer systems.

Existing Planning and Regulatory Capabilities

Richford is a rural town with a low population. The Town staff includes a Full-Time Town Clerk/Treasurer and an Assistant Town Clerk/Treasurer, and three full-time Highway Department staff. The Highway Department staff covers 49.284 miles of town highway. They are constantly treating roadways in winter months, so they are strained to do other things that come up. The full-time staff size is similar to other towns in northern Vermont of similar size. They have a volunteer Planning Commission, Development Review Board and part-time Zoning Administrator.

The Richford Fire Department contains is a Volunteer force with 25 members, 12 of which are firefighters, but is in need of additional volunteers, especially to cover daytime hours. The Town of Richford currently maintains an ambulance squad (Richford Rescue) of 9 members providing emergency medical services to Town residents and

the surrounding area as needed. The Fire Department and Richford Rescue are situated in the same building and need a new facility as there are numerous deficiencies including structural issues, health and safety issues, and that the facilities lack basic functionality. A Department Facilities Review Committee was created to review the current utilization of facilities, identify specific problems, and make a recommendation to the Fire Department Executive Committee on how best to move forward.

One of the strains on the town's emergency personnel is that Richford draws a lot of recreational visitors during the fall for the colorful foliage season. Weekend traffic through Richford increases greatly during the summer season from May to September and in the Fall during September and October. The town's capabilities are limited for such an increase in traffic. During peak summer season, emergency resources could be tied up dealing with motor vehicle accidents, so the fire department and Richford rescue relies on mutual aid at times.

How this Plan will Improve Existing Capabilities

The following policies, programs and activities related to hazard mitigation are currently in place and/or being implemented in the Town of Richford. The Town Emergency Management Coordinator analyzed these programs for their effectiveness and noted improvements needed. Richford uses all of the plans listed below to help plan for current and future activities with the town. For example: The Local Emergency Management Plan has a contact list that is used for response purposes in the case of a hazard event, and is updated every year after Town Meeting. The Town Plan directs visions and goals that include Natural Resources and Land-Use decisions. In the development of this plan, the latest 2017 Town Plan was used. Town Road and Bridge Standards are followed by the town and they do an annual culvert and bridge inventory that is mapped by the NRPC. The town is compliant with the NFIP.

As Richford goes through the update process for the planning mechanisms outlined in the table below, they will look to the Hazard Mitigation Plan's Table of Actions and Risk and Vulnerability Assessments to help guide land use district decisions, and guide goals and policies for those districts. They have agreed to this. After Town Meeting every March, policies and action items in the Town Plan are reviewed and integrated into hazard mitigation as needed. The Local Emergency Operations Plan contact list is updated after Town Meeting each year, including updates to vulnerable geographic locations, as well as locations of vulnerable populations. Updates to each of the planning mechanisms outlined in the table below are handled by the responsible party identified in the table. There is no timeframe for updating the below referenced plans and regulations to better incorporate hazard mitigation, however, as each document is updated the hazard mitigation plan will be reviewed for incorporation. The goals of this hazard mitigation plan will be incorporated in the upcoming town plan update to ensure that emergency preparedness and mitigation planning efforts are included in the Town Plan, with particular attention to including the projects in the Mitigation Actions Table. This will assist with ensuring that this plan is utilized and project follow-through occurs.

The last time the zoning bylaws were updated, the town included Flood Hazard Area Overlay to mitigate damages from flooding and fluvial erosion hazards. The LEMP is updated yearly and was updated last in 2019.

The following authorities, policies, programs, and resources related to hazard mitigation are currently in place and/or being implemented in the Town of Richford in addition to the NFIP. These programs reduce the effects of hazards to existing, new, and future buildings, infrastructure, and critical facilities by preventing their location in identified hazard areas and ensuring that infrastructure and buildings are designed to minimize damage from hazard events. The Committee analyzed these programs for their effectiveness and noted any improvements that may be needed. Other mitigation/emergency planning related documents and their status are outlined in the below table:

| Table 6.2 Town Policies and Plans | | | |
|--|--|--|---|
| Existing Protection | Description | Effectiveness/Enforcement/Hazard that is addressed | Gaps in Existing Protection/Improvements Needed |
| Municipal Plan | Policies and vision for future land use. Adopted in 2017. | Policies and vision for future land use. Includes flood resiliency element. Adopted in 2017. Addresses: Flooding, fluvial erosion, structure fire, and overview of public safety. | None found. |
| Zoning Bylaws and Flood Hazard Area Regulations. | Land Use Regulation. Adopted March 2, 2010. Last amended October 7, 2019. | Land Use Regulation. Adopted March 2, 2010. Last amended October 7, 2019. Addresses: Flooding, fluvial erosion/landslide, structure fire, HazMat, telecommunications, utility related | Need to incorporate River Corridor Overlay District. |
| Local Emergency Management Plan | Municipal emergency procedures for emergency response. Last adopted August 2019. | Annually updated. Addresses: All-hazards. | Missing evacuation annex. |
| Franklin County Mutual Aid | Assistance from county fire, rescue, municipal and public works departments. | Franklin County Mutual Aid Agreement, 2007. Updated in 2015. Addresses: All-hazards. | No gaps identified. |
| School Emergency Response | Responses by various types of emergency incidents at school. | Vermont School Crisis Guide 2018. Addresses: All hazards. | School staff should be trained every year in emergency response procedures. |
| Road and Bridge Standards | Design and construction standards for roads and drainage systems. | Adopted VTRANS Standards in 2013. Addresses: Flooding, fluvial erosion. | Update to current standards. |
| Richford Stormwater Master Plan | Examines stormwater problems at a larger scale (e.g., throughout the village center) to determine their relative contributions and aid in setting priorities for addressing challenges related to stormwater runoff. | Finalized 2018. | No gaps identified. |
| Maintenance Programs | Municipal Bridge and Culvert Inventory | Updated in 2014. Addresses: flooding and fluvial erosion. | Needs to be updated. |

There are currently no large or small developments planned in Richford that would be considered in the floodplain or flood prone areas.

Through current plans, policies and mitigation actions, Richford is working to decrease damages from severe winter storms (ice storms), floods/fluvial erosion and severe thunderstorms (high winds, hail and lightning). Other less hazardous risks are also being addressed.

Flooding and Development Regulations

The Town of Richford has adopted floodplain regulations in order to protect the health, safety, and welfare of its residents and to allow the community to participate in the National Flood Insurance Program (NFIP). In 1987 the Town established an ordinance for special flood hazard areas. The purpose of this bylaw is:

- Minimize and prevent the loss of life and property, the disruption of commerce, the impairment of the tax base, and the extraordinary public expenditures and demands on public services that result from flooding and other flood related hazards; and
- Ensure that the design and construction of development in flood and other hazard areas are accomplished in a manner that minimizes or eliminates the potential for flood and loss or damage to life and property; and
- Manage all flood hazard areas designated pursuant to 10 V.S.A. § 753; and
- Make the state, municipalities, and individuals eligible for federal flood insurance and other federal disaster recovery and hazard mitigation funds as may be available.

The Town Zoning Administrator is responsible for monitoring compliance with the NFIP.

River Corridor Regulations

The Town of Richford does not have River Corridor regulations. The community is presently working on a river corridor bylaw as referenced in the municipal plan.

8. PLAN IMPLEMENTATION, MONITORING & EVALUATION

Monitoring and Updating the Plan – Yearly Review

Once the plan is approved and adopted, the Emergency Management Director in Richford, along with interested and appointed volunteers and stakeholders, will continue to work with the Northwest Regional Commission to monitor, evaluate, and update the plan throughout the next 5-year cycle. The plan will be reviewed annually at the May Selectboard meeting along with the review of the town’s Local Emergency Management Plan (LEMP). This meeting will allow town officials and the public to discuss the town’s progress in implementing mitigation actions and determine if the town is interested in applying for grant funding for projects that can help mitigate future hazardous events; e.g., bridge and culvert replacements, road replacements/upgrades, as well as buying out any repetitive loss structures that may be in the Special Flood Hazard Area, and revise the plan as needed. Northwest Regional Commission’s emergency planner will assist the Richford Emergency Management Director with this review, as requested by the Town. Progress on actions will be kept track using a table the NRPC will provide to the Town EMD to update. There will be no changes to the plan, unless deemed necessary by the Town. If so, the post disaster review procedure will be followed.

Plan Maintenance (5 Year Update and Evaluation Process)

The Hazard Mitigation Plan is dynamic and should not be static. To ensure that the plan remains current and relevant, it is important that it be updated periodically. The plan should be updated every five years in accordance with the following procedure:

1. The Richford Selectboard Chair will appoint a team to convene a meeting of the hazard mitigation planning committee. The team will include a Richford Emergency Management Director who will chair the meeting.

Others members should include local officials such as Selectboard members, Emergency Management Coordinator, Fire Chief, Zoning Administrator, Public Works Director, Road Commissioner, Health Officer and interested stakeholders. The Emergency Management Director will work with the Northwest Regional Planning Commission Emergency Planner as needed and be the point person for the Town.

2. The NRPC Emergency Planner will guide the Committee through the update process if requested otherwise the EMD will be the guide. This update process will include several publicly warned meetings. At these meeting the Committee will use the existing pan and update as appropriately guided by the NRPC Emergency Planner to address:
 - Update of hazard events and data gathered since the last plan update.
 - Changes in community and government processes, which are hazard-related and have occurred since the last review
 - Changes in community growth and development trends and their effect on vulnerability.
 - Progress in implementation of plan initiatives and projects
 - Incorporation of new mitigation initiatives and projects.
 - Effectiveness of previously implemented initiatives and projects.
 - Evaluation of the plan for its effectiveness at achieving its state purpose and goals.
 - Evaluation of unanticipated challenges or opportunities that may have occurred between the date of adoption and the date of the report, and their effect on capabilities of the town.
 - Evaluation of hazard-related public policies, initiatives and projects.
 - How mitigation strategy has been incorporated into other planning mechanisms.
 - Review and discussion of the effectiveness of public and private sector coordination and cooperation.
3. From the information gathered at these meetings, along with data collected independently during research for the update, the NRPC Emergency Planner will prepare and updated draft in conformance with the FEMA Local Hazard Mitigation Plan Review Tool document.
4. The Selectboard will review the draft report. Consensus will be reached on changes to the draft. Emphasis will be on a critical review of how the plan can become more effective at achieving its stated purpose and goals.
5. The changes will be incorporated into the Plan by the NRPC Emergency Planner.
6. The Selectboard will notify the public that the draft is available for public comment and review. The Town will advertise and make available the draft plan for comments both electronically and in hard copy. The draft plan will be distributed electronically to the neighboring municipalities of Berkshire, Enosburgh, Jay, Montgomery and Westfield.
7. Public comments will be incorporated by the NRPC Emergency Planner. The final draft will be provided to the plan development participants and town staff for final review and comment with review comments provided to the Emergency Management Director and incorporated into the plan.
8. The NRPC Emergency Planner will finalize the plan, with any remaining comments from the plan participants and town staff incorporated. The draft will be submitted electronically to Vermont Emergency Management's State Hazard Mitigation Officer (SHMO) for review.

9. The Plan will be reviewed by the VEM's SHMO.
10. SHMO comments, if any, will be addressed in the Plan by the NRPC Emergency Planner.
11. The Plan will be resubmitted as needed until the plan is Approved-Pending-Adoption (APA) by VEM's SHMO. Once the plan achieves APA, it will be ready for adoption by the Selectboard.
12. The Selectboard will adopt the plan and distribute to interested parties.
13. The final adopted plan will be submitted by the NRPC Emergency Planner to VEM and FEMA.
14. FEMA will issue final approval of the adopted plan.

Continued Public Involvement

The Richford Selectboard is dedicated to involving the public directly in the continual review and updates of the Hazard Mitigation Plan. Copies of the plan will be kept at the Town Office. The existence and location of these copies will be publicized in the media (newspaper, web sites, Town Annual Report, etc.). The plan will also include the Selectboard Chair's contact information to facilitate and track public comments. In addition, any proposed changes will be publicized in the media.

Programs, Initiatives and Projects Review

Although the plan should be reviewed in its entirety every five years as described above, the Town may review and update its programs, initiatives and projects more often directly with the SHMO based on changing local needs and priorities.

The Town of Richford should incorporate elements of this plan, such as identified projects, into capital planning initiatives and annual budget reviews during Town Meeting.

Post-Disaster Review/Update Procedure

Should a declared disaster occur, a special review will occur amongst the Selectboard, the Emergency Management Coordinator, the NRPC Emergency Planner, and those involved in the five-year update process described above. This review will occur in accordance with the following procedures:

1. Within six months of a declared emergency event, the town will initiate a post disaster review and assessment. Members of the State Hazard Mitigation Committee will be notified that the assessment process has commenced.
2. This post disaster review and assessment will document the facts of the event and assess whether existing Hazard Mitigation projects effectively lowered community vulnerability/damages. New mitigation projects will be discussed, as needed.
3. A draft After Action Report of the review and assessment will be distributed to the hazard mitigation committee.
4. A meeting of the committee will be convened by the Selectboard to make a determination of whether the plan needs to be amended. If the committee determines that NO modification of the plan is needed, then the report is distributed to local communities.

5. If the committee determines that modification of the plan IS needed, then the committee drafts an amended plan based on the recommendations and forwards to the Selectboard for public input.
6. The Selectboard adopts the amended plan after receiving Approved-Pending-Adoption notification from FEMA.

Attachment A

Table A Hazard Identification and Risk Assessment

| Hazard | Impacted Area (% Community Affected) | Frequency Of Occurrence | Consequence of Occurrence | | | | Total |
|---|--------------------------------------|-------------------------|---------------------------|----------|-------------|----------|------------|
| | | | Health & Safety | Property | Environment | Economic | |
| Flooding/Fluvial Erosion | 3 | 5 | 1 | 2 | 1 | 2 | 45 |
| Severe Winter Storm/Ice Storm | 3 | 5 | 1 | 2 | 1 | 2 | 45 |
| Severe Thunderstorms (High Winds, Lightning/Hail) | 3 | 5 | 0 | 1 | 1 | 1 | 30 |
| Loss of Electrical Service | 1 | 4 | 1 | 1 | 0 | 2 | 20 |
| Structure Fire | 0 | 4 | 1 | 1 | 1 | 1 | 16 |
| Hazardous Materials | 0 | 4 | 1 | 1 | 1 | 1 | 16 |
| Drought | 3 | 1 | 1 | 1 | 2 | 2 | 8 |
| Telecommunication Systems Failure | 3 | 1 | 0 | 0 | 0 | 1 | 4 |
| Tornado | 1 | 1 | 1 | 1 | 1 | 2 | 6 |
| Earthquake | 1 | 1 | 1 | 1 | 1 | 2 | 6 |
| Major Fire – Wildland | 1 | 1 | 1 | 1 | 1 | 1 | 5 |
| Civil Disturbance | 1 | 1 | 1 | 0 | 0 | 2 | 4 |
| Terrorism/WMD | 1 | 1 | 1 | 0 | 0 | 2 | 4 |
| Total Risk Rating | | | | | | | 209 |

Attachment B

Critical Facilities, Hazmat Storage Facilities, and Vulnerable Sites

| Facility Name or Designation | Facility Owner | Function | Street or Location |
|--|---|---|-------------------------|
| All Saint's Church | Roman Catholic Diocese of Burlington | Religious facility | 152 Main St. |
| Ava Maria Nursing Home | The Doe Family | Assisted living/rehab center | 19 School St. |
| Blue Seal Feeds, Inc. | Blue Seal Feeds, Inc. | Hazardous Materials / Employer | 1 Webster St. |
| Consolidated Communications | Consolidated Communication | Telecommunications | 20 Intervale Ave. |
| Electric Substation | CVPS | Energy Facility | |
| Emergency Services Building | Town of Richford | Emergency Service | 48 Main St. |
| First Baptist Church | Pastor Lyle Willey | Religious facility | 33 School St. |
| Kaytec, Inc. | Kaytec, Inc | Hazardous Materials / Employer | 1 Memorial Dr. |
| Kent Nutritionals | Kent Nutritionals | Hazardous Materials / Employer | Memorial Dr. |
| Missisquoi Manor Elderly Housing | Richard Carr | Assisted living/rehab center | Liberty St. |
| NOTCH | Non-profit | Federally Qualified Health Center | 44 Main St. |
| Our Lady of the Meadows Nursing Home | Shawna Hanley, Property Manager | Assisted living/rehab center | 1 Pinnacle Meadows |
| Pinnacle Peddler | S.B. Collins, Inc | Hazardous Materials | 309 South Main St. |
| Port of Entry – East Richford Station | USCBP | US Port-of-Entry | VT 105A |
| Port of Entry – Pinnacle Border Station | USCBP | US Port-of-Entry | Pinnacle Rd. |
| Port of Entry – Richford Station | USCBP | US Port-of-Entry | Province St. |
| R. L. Vallee, Inc. | R. L. Vallee, Inc. | Hazardous Materials | Troy St. |
| R.T.W. People's Plaza | Wendy Mercer | Child Care | 328 South Main St. |
| Railroad | Canadian National Rail | Transportation / Hazardous Materials | |
| Richford Country Club | Richford CC | Hazardous Materials | 249 Golf Course Rd. |
| Richford Elementary School | Town of Richford | Educational Facility | 1 Elementary School Rd. |
| Richford First Baptist Church | Timothy Stetson | Religious Facility | 30 School St. |
| Richford Health Center | Town of Richford | Medical / Health Care Office | 53 Main St. |
| Richford Jr. – Sr. High School | Town of Richford | Educational Facility | 1 Corliss Heights |
| Richford Public Library | Town of Richford | Library | Main St. |
| Richford Sewer Plant and Wastewater Pump Stations | Town of Richford | Wastewater control facility | Sewer Plant Rd. |
| Richford Sunoco | J.W. Sandri, Inc. | Hazardous Materials | 75 Main St. |
| Richford Town Hall | Town of Richford | Government | 94 Main St. |
| Richford US Port of Entry | US Homeland Security | Government | Province St. |
| Richford Village Mobile Home Parks (parks 1 and 2) | Mark Lafayette | Vulnerable Site | Troy St. |
| Richford Water Treatment Plant | Town of Richford | Government | Green Ave. |

| | | | |
|-----------------------------------|-------------------|---------------------|--------------|
| South Main Quick Stop Gulf | J. W. Holding Co. | Hazardous Materials | 301 Main St. |
| United Methodist Church | | Religious Facility | 86 River St. |
| US Post Office (Richford) | USPS | Government | Main St. |
| Wetherby's Quick Stop Sunoco #262 | W. A. Sandri Inc. | Hazardous materials | 75 Main St. |

Attachment C

Town of Richford Priority Matrix

Each of the following criteria was rated according to a numeric score of “1” (indicating Poor), “2” (indicating Average) and “3” (indicating Good).

- 1) Does the action reduce damage?
- 2) Does the action contribute to community objectives?
- 3) Does the action meet existing regulations?
- 4) Does the action protect historic structures or structures critical to Town operations?
- 5) Can the action be implemented quickly?
- 6) Is the action socially acceptable?
- 7) Is the action technically feasible?
- 8) Is the action administratively possible?
- 9) Is the action politically acceptable?
- 10) Is the action legal?
- 11) Does the action offer reasonable benefits compared to its cost of implementation?
- 12) Is the action environmentally sound?

| | Criteria | | | | | | | | | | | | Total Score | |
|--------------------------|---|---|---|---|---|---|---|---|---|----|----|----|-------------|-----------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | |
| Mitigation Action | TH23 (Stevens Mill Slide Rd) Drainage upgrades. | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 34 |
| | TH7 (Golf Course Rd) and TH11 (Corliss Rd) Drainage upgrades. | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 35 |
| | TH24 (Smith Rd) Culvert Upgrade on Mountain Brook. | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 35 |
| | Enhance Public Awareness of the Dangers of Severe Winter Weather. | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 36 |
| | TH 2 (South Richford Rd) 0.35 miles north of intersection with TH34 (Coombs Rd) and TH41 (Wrightman Hill Rd) culvert upgrade. | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 35 |
| | TH 18 – Br. 27 (Guilmette Rd) culvert upgrade. | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 34 |
| | Brook Street Property Protection; Stabilize Stanhope Brook stream bank. | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 35 |
| | Support utility company efforts to protect utility corridors from ice/wind damage. | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 36 |
| | Damaged trees removal along Stanhope Brook. | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 34 |
| | Protect Critical Facilities and Infrastructure from Lightning Damage. | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 36 |

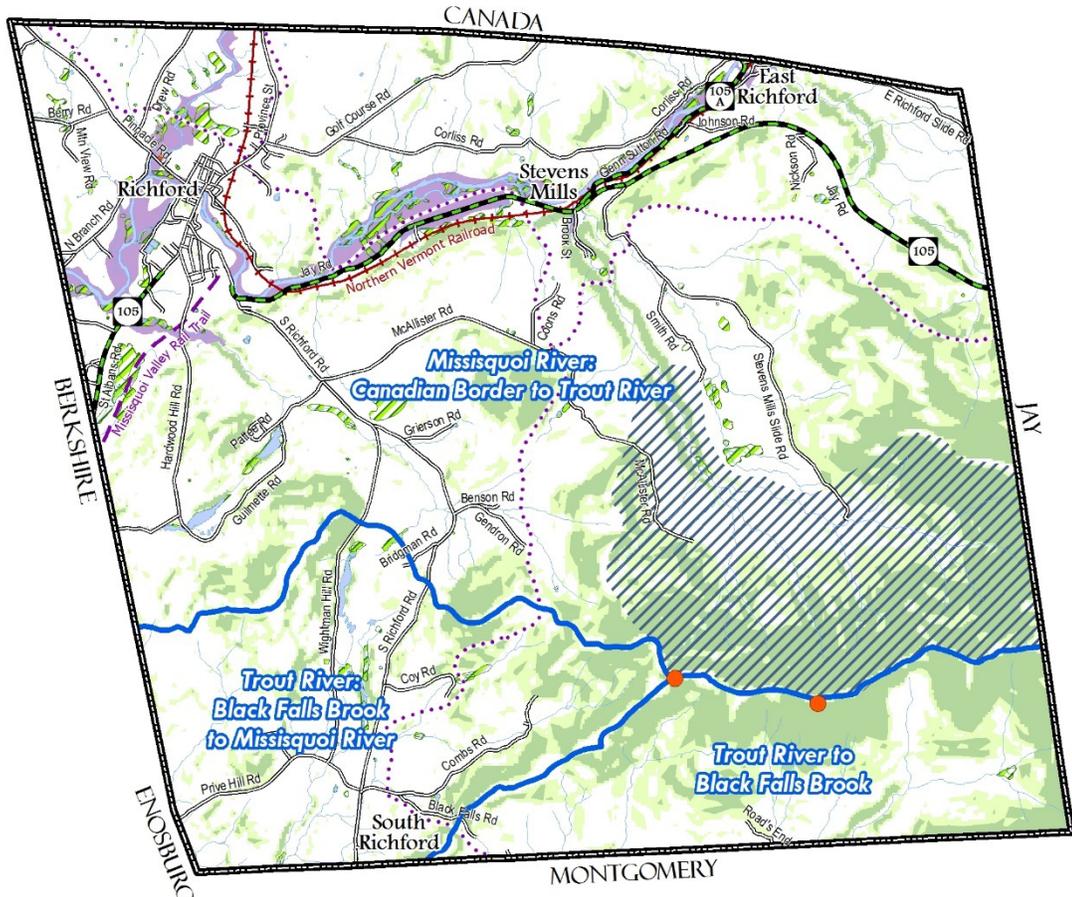
Attachment D

Public Government Participation

Information in the Hazard Mitigation Plan is based on research from a variety of sources. It encompassed research using a historical perspective and future projections for the vulnerability assessment. The research methods and various contributions to the plan included but were not limited to:

- Town of Richford Select Board
- Town of Richford Emergency Management
- Northwest Regional Planning Commission
- Town of Richford Highway Department
- Local Emergency Planning Committee #4 (Franklin County)
- Richford Fire Department
- Richford Ambulance Service
- Vermont Department of Transportation District 8
- Vermont Emergency Management
- Vermont Agency of Natural Resources
- Vermont Fire Academy
- Northeast States Emergency Consortium
- Federal Emergency Management Agency
- National Weather Service
- National Oceanic Atmospheric Administration
- Vermont Geological Survey

Attachment E
Town of Richford Map – Areas of Concern



LEGEND

Critical Area Features

- Slopes > 20%
- Slopes > 25%
- 100 Year Flood Zone
- Threatened or Endangered Species
- Wetland
- Surface Water Protection Area
- Watershed Boundary
- Boundary Feature**
- Town Boundary

Transportation Features

- State Highway
- Road
- Railroad
- Missisquoi Valley Rail Trail
- VAST Trail

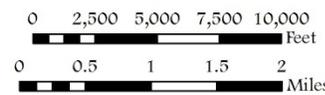
Surface Water Features

- River, Stream or Brook
- Pond or River

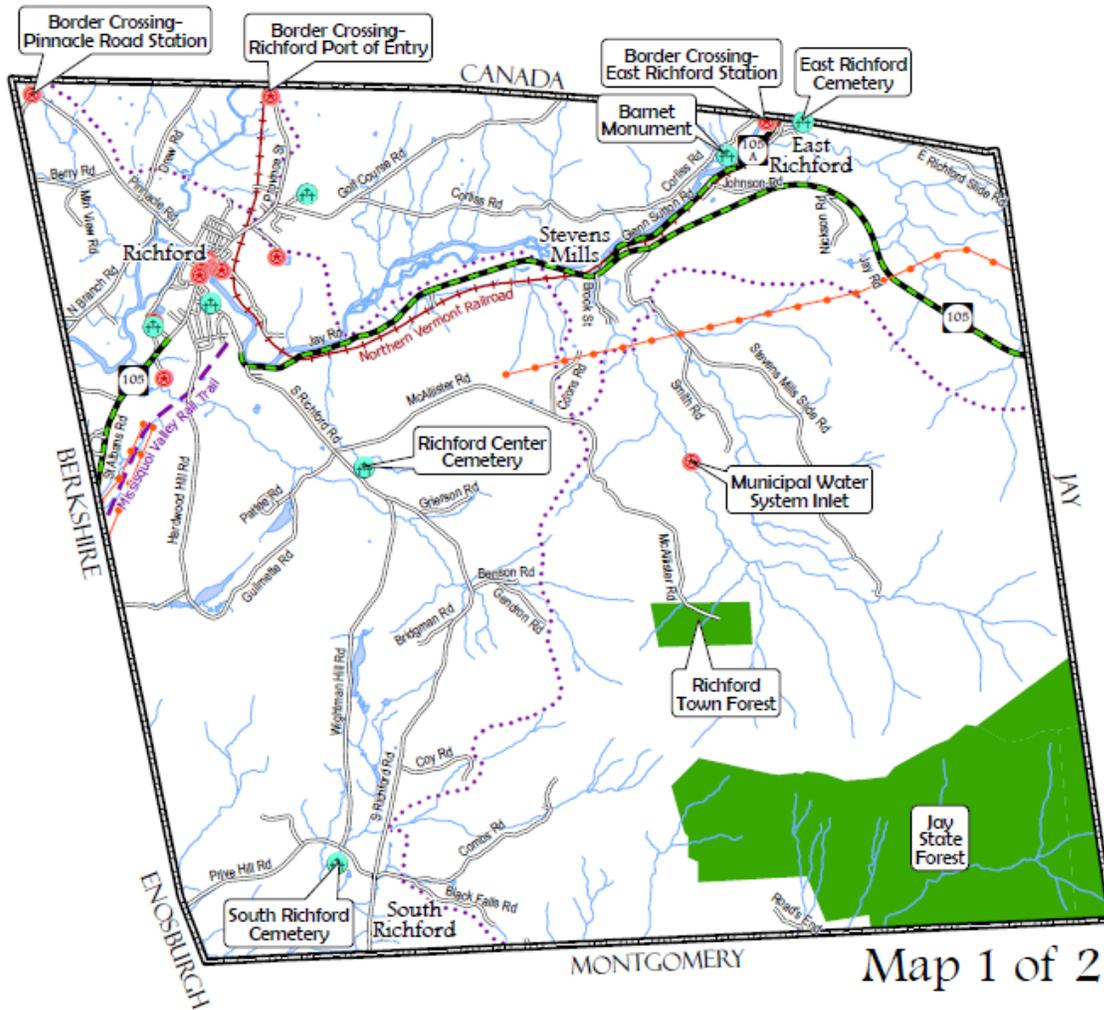


Vermont Coordinate System
 Transverse Mercator, NAD 83.
 For planning purposes only.

Prepared by:
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 www.nwrpcvt.com
 May, 2015.
 z:/gis/projects/county/franklin/
 richford/townplan2015



Attachment E
Town of Richford Map – Facilities & Services



LEGEND

Facility or Service Features

- Facility
- Cemetery
- Electric Transmission Line
- Public Land
- Surface Water Features**
- River, Stream or Brook
- Pond or River

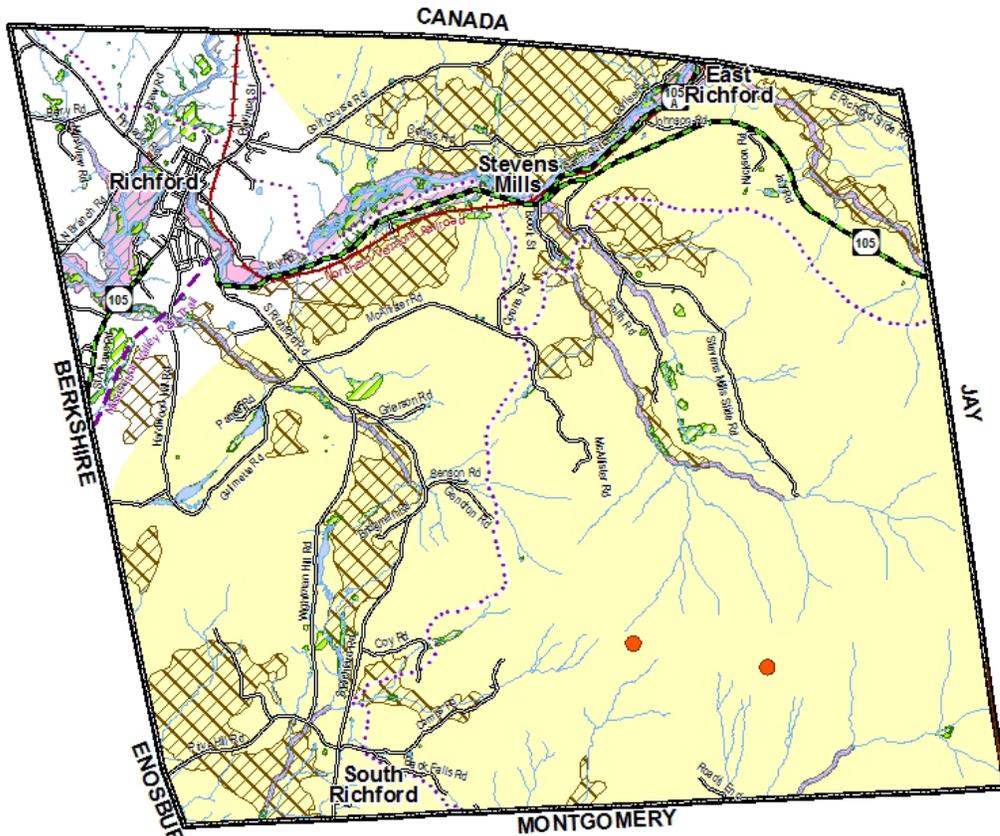
Transportation Features

- State Highway
- Road
- Railroad
- Missisquoi Valley Rail Trail
- VAST Trail
- Boundary Feature**
- Town Boundary

Vermont Coordinate System
 Transverse Mercator, NAD 83.
 For planning purposes only.
 Prepared by:
 Northwest RPC
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 802.924.9958
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 November, 2012.
 //gis/projects/county/franklin/
 richford/townplan2012

0 2,500 5,000 7,500 10,000 Feet
 0 0.5 1 1.5 2 Miles

Attachment E
Town of Richford - River Corridors and Flood Zones Map



LEGEND

Natural Resource Features

- 100 Year Flood Zone
- Threatened or Endangered Species
- Wetland
- Deer Wintering Area
- Bear Habitat
- River Corridor

Surface Water Features

- River, Stream or Brook
- Pond or River

Transportation Features

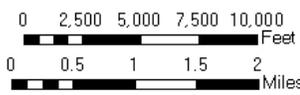
- State Highway
- Road
- Railroad
- Missisquoi Valley Rail Trail
- VAST Trail

Boundary Feature

- Town Boundary



Vermont Coordinate System
 Transverse Mercator, NAD 83
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Attachment F

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