Town of West Fairlee, Vermont

2019 Local Hazard Mitigation Plan

Prepared by the Two Rivers-Ottauquechee Regional Commission and the Town of West Fairlee

12/2/2019
Date of Town Adoption

12/18/2019
Date of Final Approval by FEMA

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

DEC 18 2019

Stephanie A. Smith, Hazard Mitigation Planner
Vermont Emergency Management
45 State Drive
Waterbury, Vermont 05671-1300

Dear Ms. Smith:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region I Mitigation Division has approved the Town of West Fairlee, Vermont 2019 Local Hazard Mitigation Plan effective **December 4, 2019** through **December 3, 2024** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

With this approval, the jurisdiction is eligible to apply to the Vermont Emergency Management Agency for mitigation grants administered by FEMA. Requests for funding will be evaluated according to the eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in this community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region I Mitigation Division for approval every five years to remain eligible for FEMA mitigation grant funding.

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

Captain W. Russ Webster, USCG (Ret.), CEM
Regional Administrator
FEMA Region I

WRW:ms

cc: Ben Rose, Recovery and Mitigation Section Chief, VEM

Contents

I. Introduction

Natural and human-caused hazards may affect a community at any time. They are not usually avoidable; however, their impact on human life and property can be reduced through community planning. Accordingly, this Local Hazard Mitigation Plan (hereafter referred to simply as the Plan) seeks to provide an all-hazards mitigation strategy that will make the community of West Fairlee more disaster resistant.

"Mitigation" is defined as any sustained action that reduces or eliminates long-term risk to people and property from natural and human-caused hazards and their effects. Previous Federal Emergency Management Agency (FEMA), State and Regional Project Impact efforts have demonstrated that it is less expensive to anticipate disasters than to repeatedly ignore a threat until the damage has already been done. While hazards cannot be eliminated entirely, it is possible to identify prospective hazards, anticipate which might be the most severe, and recognize local actions that can be taken ahead-of-time to reduce the damage. These actions, also known as 'hazard mitigation strategies' can (1) avert the hazards through redirecting impacts by means of a structure or land treatment, (2) adapt to the hazard by modifying structures or standards or, (3) avoid the hazard through improved public education, relocation/removal of buildings in the flood zone, or ensuring development is disaster resistant.

II. Purpose of the Plan

The purpose of this Plan is to assist the Town of West Fairlee in identifying hazards facing the town, ranking them according to local vulnerabilities, and identifying strategies to reduce risks from hazards of highest concern. Implementation of this plan will make our community more resistant to harm and damages in the future, and will reduce public costs.

The Town of West Fairlee seeks to be in accordance with the strategies, goals, and objectives of the State Hazard Mitigation Plan.

The 2019 West Fairlee Local Hazard Mitigation Plan is the first stand-alone mitigation plan drafted for the Town. Previously, the Town had a town-specific 2009 Annex in the Regional Pre-Disaster Mitigation Plan. This new Plan has been reorganized and new sections have been added:

- Program eligibility subsequent to plan approval
- Authority for plan development
- Existing information and Community Profile
- Funding for plan development

Old assumptions have been challenged throughout, and new information has been added to make the plan stronger and more useful for the West Fairlee town officials and residents who will implement the hazard mitigation strategies in the future.

III. Community Profile

The Town of West Fairlee is located along the Ompompanoosuc River in the eastern portion of Orange County. It is bordered by the Towns of Fairlee, Bradford, Vershire, Thetford, Corinth, and Strafford. Vermont Route 113 serves as the main highway artery passing through the southwest corner of town. VT Route 244 follows the southeast edge of town along the Lake Fairlee. Most of West Fairlee's 13,429 acres are characterized by rolling hills with dense forest cover (estimated at 89 percent). Open land is present along the wetlands along Middlebrook Road and around the village. Lake Fairlee is located at the southeast corner. West Fairlee is rural residential in nature with most of the resident population having settled along existing town roads.

According to the 2010 U.S. Census, the population of West Fairlee is 652 people. This represents a 10.2% population decrease from 2000. This population was the first population decrease West Fairlee experienced since 1960. West Fairlee's population increased by 14.69% From 1990 to 2000. The population growth increased dramatically in the period 1980-1990. During that period, population grew by 48%, one of the fastest growth rates in the State of Vermont, according to the U.S. Census Bureau. Because of its proximity to Interstate 91, the town is likely to experience consistent growth into the future

Using the 2017 Census American Community Survey data, there were 332 households with 441 housing units (i.e., residences) in West Fairlee. The median age is 44.1 with between 8% and 23% people living below the poverty line. The number of housing units in West Fairlee increased greatly from 1980 to 1900, as the housing stock grew by 42.6%. 106 new housing units were constructed in the Town during this period. 168 housing units were built before 1970. However, 81 housing units were built from 1970 to 1980. With the increased number of housing units constructed from 1970 through 1990, West Fairlee's housing stock is young.

Green Mountain Power (GMP) supplies almost all of West Fairlee's electricity. There is one small portion of coverage in the northwest corner of the Town that is serviced by Washington Electric Coop. Internet service is available through Consolidated Communications and Comcast as well as ECFiber and Topsham Communications. Recently ECFiber added a line along 113 to connect its member towns of Vershire and Thetford. West Fairlee is not currently a member of ECFiber. Several roads including West Fairlee Road, Stevens and Back Street as well as the Town Office/Community Building have EC Fiber service. Topsham Communications has a fiber line along Wild Hill, Middlebrook, up a portion of Blood Brook, and east on Route 244. Cellular service is spotty at best in West Fairlee. There are 4 microcell repeaters on the Route 113 corridor all were shut down in fall 2018 with failure of the operator. VT Department of Public Service is exploring cost-sharing with Towns.

The town does not have a standing highway department. Instead West Fairlee contracts for maintenance (plowing, grading paving, and ditch and culvert cleaning) as well as larger culvert and ditch upgrades and replacements. The town has a significant portion of paved roads for a town of its size and population in Vermont and has been working aggressively to maintain their surface. These include Beanville Road, West Fairlee Road and Middlebrook Road. The town has 4 town bridges longer than 20' listed in Appendix that VTrans inspects and should continue to keep up with VTrans recommended maintenance.

Fire protection is accomplished by the West Fairlee Volunteer Fire Department, whose station is located on Route 113 in the Village. Personnel include a Fire Chief, Deputy Fire Chief, Secretary/Treasurer and approximately twenty volunteer firemen. The need of the Department at this point is for volunteer manpower in addition to special firefighting equipment, trucks, or storage facilities. The Town has received grants for new equipment. Most of the

Fire/Rescue Squad members have HAZMAT awareness or operations level, more than half are at least FF Level One or higher and the town has a paramedic, an EMT-I and soon a couple EMT-Bs. There are 4 "dry hydrants" located strategically around Town install through grants from Vermont Rural Fire Protection Program

Police coverage is provided by the Orange County sheriff's office, and the Vermont State Police, Troop “B”, located in Bradford and the Town recently contracted with the Town of Thetford Police Department for traffic enforcement services. At the present time, this protection is adequate. A Town Constable is elected each year, but has no formal in law enforcement training so the position is largely honorary.

Ambulance coverage is provided by the private, non-profit Upper Valley Ambulance Service, Inc. located in Fairlee. West Fairlee Volunteer Fire Department’s Rescue Squad is often the first responders at a medical emergency; and work closely with Upper Valley Ambulance to provide prompt delivery of basic life support. They are assisted by the mutual aid towns (Thetford, Bradford, and Vershire) Fire Departments. The closest hospital is Dartmouth Hitchcock Clinic located in Lebanon, NH. Medivac services are available by the DHART helicopter.

West Fairlee is part of the Rivendell Interstate School District which unites three towns in Vermont (Fairlee, Vershire, and West Fairlee) and one in New Hampshire (Orford). Right in West Fairlee village, the K-4 Westshire Elementary School serves approximately 85 students from the towns of West Fairlee and Vershire, and houses an additional 19 preschoolers from the entire district. Westshire serves the western portion of the Rivendell Interstate School District. Located on Route 113 in the village of West Fairlee, the school sits on 17 beautiful acres that include athletic fields, a playground, and a flowing stream. Once inside the seven-year-old facility, it is difficult to imagine a more attractive schoolhouse. (Riverdell 2019).

The Aloha Hive Camp is a Girl’s camp located in West Fairlee off VT 244 on Lake Fairlee and during the summer has the largest concentrated population of people in town. The Town of Thetford also owns a parcel which includes a public beach and other facilities just north of the Aloha Hive Camp.

Finally, the town has a food shelf located in the bottom of the Community Building.

IV. The Planning Process

A. Plan Developers

Pete Fellows and Jessica Richter are Planners at the Two Rivers-Ottauquechee Regional Commission (TRORC), assisted the Town of West Fairlee with updating its Local Hazard Mitigation Plan, and worked on the plan with Local Hazard Mitigation Plan Committee. Committee members who assisted with the revisions include:

This section of the Plan satisfies 44 CFR 201.6(b)(1) and 201.6(c)(1) (or, A3.a and A3.b of FEMA's Local Mitigation Plan Review Guide, 2011).

Name	Role/Organization	How Participation Was Solicited
Steve Malinoski	Member, West Fairlee Selectboard	On 11/8/2018, 3/22/2019 and 4/1/2019, TRORC staff members (Pete Fellows and Jessica Richter) reached out to the West Fairlee Selectboard Chair, Delsie Hoyt, offering assistance in updating and developing their new Local Hazard Mitigation Plan. TRORC staff coordinated with West Fairlee town officials to set up an introductory meeting. The first meeting was scheduled for 04/22/2019. A committee was established to update and develop this Local Hazard Mitigation Plan. See below for meeting-specific details.
Beverly Jo Ash	Member, West Fairlee Selectboard	
Delsie Hoyt	Chair, West Fairlee Selectboard	
Bruce Durkee	Member, West Fairlee Selectboard	
Peggy-Burden	Member, West Fairlee Planning Commission	
Al Pfeiffer	Member, West Fairlee Planning Commission	
Cat Spaulding	Library Trustee	

B. Plan Development Process

The 2011 West Fairlee Annex was originally part of the 2008 multi-jurisdictional Regional Hazard Mitigation Plan, drafted by Two Rivers-Ottauquechee Regional Commission, and approved by FEMA on September 30, 2008 with its first local annex. The West Fairlee Annex received subsequent FEMA approval, but, since it was part of a larger plan, FEMA treats its start date as September 30, 2008, meaning the West Fairlee Annex expired on September 30, 2013.

This section of the Plan satisfies the Element A: Planning Process requirements set out in 44 CFR 201.6.

This Plan has been reconstructed now as a single jurisdiction, stand-alone West Fairlee Local Hazard Mitigation Plan that will be submitted for individual approval to FEMA. As such, several sections have been added or updated to include all necessary information.

The changes to this Plan include:

- **General**
  - New sections: Plan Development Process, 2011 Mitigation Strategies Status Update chart, Existing Hazard Mitigation Programs, Projects & Activities, Plan Maintenance;
  - Data updates: New hazard incidents, emergency declarations, census data;
  - Hazards have been reevaluated with the hazard ranking system used by the Vermont Emergency Management.
- **Hazards Analysis**
  - Flash Flood/Flood/Fluvial Erosion remains on the list of "top hazards," which reflect the local officials' belief that the Town is still vulnerable to these hazards;
  - Severe Summer Weather, Hurricanes/Tropical Storms and Extreme Cold/Snow/Ice Storms have been added to the list of "top hazards," which reflects the intention/priorities of local officials to expand their analysis of hazards that the Town is or may be vulnerable to in the next five years;
  - Structure Fires HAS been removed from the list of "top hazards;"
  - For each hazard, a location/vulnerability/extent/impact/likelihood table has been added to summarize the hazard description.
- **Maps**
  - A map of the Town of West Fairlee depicting critical facilities, town infrastructure, the State of Vermont River Corridor Area, the NFIP designated floodway and 100-year floodplain has been added.

The following represent the avenues taken to draft the West Fairlee Local Hazard Mitigation Plan:

- **Activities**
  - 4/22/2019: TRORC staff met with West Fairlee LHMP committee members to introduce the update/plan development process, to review West Fairlee's existing Hazard Mitigation Plan (adopted in March 2011) and to consider the status of various mitigation actions, potential hazards, and the data collection/research process. During this meeting, the West Fairlee committee also discussed and ranked hazards to determine the "Top Hazards" in the Town. TRORC staff then explained to the committee the next steps in the process. This meeting was open to the public.

- 5/21/2019 TRORC staff meet with the West Fairlee LHMP committee members. The committee review the draft plan.
- 9/16/2019 The Selectboard met to review the final draft and adopt the plan.

- **Public participation and involvement** (*44 CFR 201.6(b)(1)*)
  - Posted a notice in four local papers alerting the public to the hazard mitigation planning process that was taking place. Contact information was provided in the notice to allow those interested in West Fairlee's efforts to receive more information and how to find out about upcoming meetings. No comments were received.
    - Journal Opinion— ran 4/3/2019
    - Journal Opinion— ran 5/15/2019
    - Journal Opinion— ran 9/12/2019
  - Posted Notices in Fairlee-West Fairlee Front Porch Forum and West Fairlee Community email listserv alerting the public to the hazard mitigation planning process that was taking place. Contact information was provided in the notice to allow those interested in West Fairlee's efforts to receive more information and how to find out about upcoming meetings. No comments were received.
- **Governmental participation and involvement** *(44 CFR 201.6(b)(2)*)
  - Sent revised draft to the review committee plus Planning Commission and Selectboard members who were not on the committee and provided contact information for receiving comments via email— 7/9/2019
    - Delsie Hoyt got comments from Fire Department and provided comments on 7/18/19
    - Al Pfeiffer provided comments on 7/22/19
  - Sent revised draft to Vermont Emergency Management—7/12/2019
  - Note: Town officials were given the opportunity to review, provide feedback and approve the changes that were made through the Plan revision and FEMA review process.
- **Neighboring community participation and involvement** *(44 CFR 201.6(b)(2)*)
  - April 10th 2019: A notice was placed in the Two Rivers-Ottauquechee Regional Planning Commission website alerting recipients West Fairlee Vershire was engaging in hazard mitigation planning and updating their Local Hazard Mitigation Plan. Contact information was provided in the notice to allow those interested in West Fairlee's efforts to receive more information and how to find out about upcoming meetings. No comments were received.
  - Posted a notice in the local papers alerting the public to the hazard mitigation planning process that was taking place. Contact information was provided in the notice to allow those interested in West Fairlee's efforts to receive more information and how to find out about upcoming meetings. No comments were received.
    - Journal Opinion— ran 4/3/2019
    - Journal Opinion— ran 5/15/2019
    - Journal Opinion— ran 9/12/2019
  - 9/6/2019: Sent revised draft to neighboring towns' Selectboards for comment and provided contact information for receiving comments via hard copy—
    - Towns of: Vershire, Fairlee, Corinth, Bradford, Strafford, and Thetford received copies via US Mail.

        - On 9/16/19, received call from the Town of Corinth asking about the mailing. TRORC staff explained the Plan and the Plan development process.

- **Review of existing plans, studies, reports, and technical information** (*44 CFR 201.6(b)(3)*)

This section of the Plan satisfies 44 CFR 201.6(b)(3) (or, A4.a and A4.b of FEMA's Local Mitigation Plan Review Guide, 2011).

    - Vermont State Hazard Mitigation Plan, 2018
        - This Plan was referenced for knowledge of the state's hazard mitigation planning processes and description of top hazards for the State of Vermont.
    - West Fairlee Hazard Mitigation Plan (Adopted 03/21/2011)
        - This Plan was referenced extensively during the plan development process, especially in regard to the worst threats and mitigation action strategies identified in 2009.
    - West Fairlee Town Plan (Adopted 03/07/2017)
        - The Town Plan provided TRORC's staff with background information on the community, as well as more detail on their emergency services.
    - Flood Insurance Study: Town of West Fairlee, Vermont, Orange County (December 2, 1992)
        - The Flood Insurance Study was referenced for general knowledge of the West Branch of the Ompompanoosuc River and for peak discharge information.
        - This information has been integrated into the Flash Flood/Flood/Fluvial Erosion, and Hurricane/Tropical Storm/Severe Summer Weather hazard profiles.

C. Status Update on Mitigation Actions Identified in 2011

This section of the Plan satisfies the requirements of 44 CFR 201.6(d)(3).

The following table outlines the mitigation actions that were proposed in the 2009 All-Hazard Pre-Disaster Mitigation Plan for the Town of West Fairlee (adopted on March 21, 2011 as an appendix to the Two Rivers-Ottauquechee Regional Commission's multi-jurisdictional Pre-Disaster Mitigation Plan).

Participants in the new Plan update process reviewed these actions and reported on the status of each (in order of 2011 priority). Actions related to long-term mitigation of natural hazards are so noted:

Mitigation Action	Who (Leadership)	When (Timeframe)	How (Funding/ Support)	2019 – Status of Mitigation Actions
ALL HAZARDS 1. Ensure that the BEOP is current.	Selectboard	Yearly	With TRORC assistance	The newest iteration of the BEOP is the Local Emergency Operations Plan (LEMP). The West Fairlee LEMP undergoes an annual update of this document and it was last updated and approved on April 22, 2019
2. Encourage utilities to continue regular schedule of tree trimming along power lines.	Emergency Management Coordinator	Yearly	Local Resources	Ongoing
3. Use PDM plan for Hazard Identification and Mapping.	Emergency Management Coordinator	Ongoing	With TRORC assistance	This 2019 West Fairlee Hazard Mitigation Plan features current hazard identification and mapping.
FLOOD 4. Continue the planned road maintenance program and update existing culvert inventory. Upgrade culverts and ditching.	Highway Department	Ongoing	Local resources	The culvert inventory update was completed in the spring of 2019.
5. Revise and update hazard regulations.	Selectboard	2010	Local resources	Considering
FIRE 6. Develop additional dry hydrant sites in rural locations.	Fire Department	2010	Local resources, George Aiken RC&D	The town has at least 4 or 5 sites but could add more in the central part of town.

D. Town Capabilities for Implementing Mitigation Strategy

The Town of West Fairlee is currently engaged in the following hazard mitigation programs, projects and activities:

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3).

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability to Expand/Improve On
Community Preparedness Activities	Program—Annual update of West Fairlee's Local Emergency Management Plan (LEMP). Last updated and approved on	Volunteer time from the Selectboard//Emergency Management Director; assistance from TRORC. Funding from Vermont DEMHS.	This document is reviewed and updated each year to ensure that the contact information of emergency response personnel is up-to-date. This information is then sent to Vermont Emergency Management for their records. There is no need to expand on this program at this time.
	Program—attendance/participation at Local Emergency Planning Commission (LEPC) #12 meetings	Volunteer time from the West Fairlee Emergency Management Director. Funding from Vermont DEMHS.	No need to expand or improve on attendance, as attendance is satisfactory.
	Program -E911 Updates	E911 Coordinator	NA
	Rescue Squad	Volunteers	Training
	Fire Department	Volunteers	Outreach to residents
	Ongoing Action—The Town of West Fairlee has a website and listserv.	Time from the Town Office. Funding from local budgets.	There is no need to expand or improve on this action.
	Program – Highway Budget	Funding from budget	Continued upgrades
Insurance Programs	Authority/ Program—participation in National Flood Insurance Program (NFIP) The Town of West Fairlee participates in and is compliant with the NFIP by enforcing its The Town enforces the Flood Hazard Area Regulations based on the 12/02/1992 FIRM. [Note: This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3)(ii).]	Assistance from TRORC and Vermont ANR. Funding from local resources—annual budget.	The Town's initial Flood Insurance Rate Map (FIRM) was dated 02/28/1975. The Town of West Fairlee, Vermont Flood Insurance Study (FIS) is dated 12/02/1992. The Town's current Flood Insurance Rate Map (FIRM) has not been updated since 12/2/1992.

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability to Expand/Improve On
Land Use Planning	Policy/Program—West Fairlee Town Plan (Adopted 03/07/2017).	Volunteer time from Planning Commission, and assistance from TRORC and other state agencies on specific subject matter. Funding from Municipal Planning Grants.	The Town Plan is updated every eight years, as required by statute. The Planning Commission may expand or improve on any section it deems necessary, or that is required by changes in state statue.
	Authority—West Fairlee Flood Hazard Area Zoning Ordinance Adopted 3/6/1990	Volunteer time from the Planning Commission, and assistance from TRORC and Vermont ANR. Funding from Municipal Planning Grants.	The Town of West Fairlee's Flood Hazard Area Zoning Ordinance is outdated and would benefit from an update. This action has been carried over into the 2019 Plan.
	Action— Culvert inventory with TRORC assistance.	Staff time from the Road Contractor; with assistance from TRORC. Funding from VTrans.	The Town applied for and received funding to complete a culvert survey and road erosion inventory, which it finished work on in the spring of 2019. The Town will use the information collected in this inventory to inform its culvert improvement program and to prioritize culvert upgrades and infrastructure investments. The inventory will analyze undersized structures in need of improvement, including georeferenced locations, as well as town road locations that have experienced erosion.
Hazard Control & Protection of Critical Infrastructure & Facilities	Authority— Town Road and Bridge Standards (Adopted 03/18/2013) New template adopted 07/01/2019	Adopted by the Selectboard, implemented by the Road Foreman, assistance from TRORC. Funding from VTrans and the local budget to implement.	Specifies minimum construction standards for roadway, ditches, culverts and bridges and guardrails. VTrans updates the Town Road and Bridge Standards on a fairly regular basis. The Town has the authority to require above-and-beyond what is written in the policy.
	Policy/Program—West Fairlee Hazard Mitigation Plan (Adopted on 03/21/2011)	Volunteer time from Town officials; assistance from TRORC and Vermont DEMHS. Funding from FEMA; Vermont DEMHS; TRORC.	The 2019 West Fairlee Local Hazard Mitigation Plan will replace the 2011 Annex. The 2019 LHMP has evolved from the 2011 Annex and has greatly expanded and improved upon it. Future iterations of the Town's LHMP will be updated by the Town at least every five years.
	Ongoing Action—Education/Communication to community regarding structure fire prevention.	Time from the Volunteer Fire Department and funding from Fire Department budget.	This is an ongoing action, and there is no need to expand or improve on this action.

E. Plan Maintenance

This section of the Plan satisfies 44 CFR and 201.6(c)(4)(i), 201.6(c)(4)(ii), and 201.6(c)(4)(iii).

This Plan (the West Fairlee Local Hazard Mitigation Plan) will be updated and evaluated by discussing its effectiveness and making note to incorporate any necessary revisions in the update process. This update and evaluation will occur annually at an April Selectboard meeting along with the annual review of the Local Emergency Management Plan (LEMP). At this meeting, the Selectboard will monitor the implementation of the hazard mitigation and preparedness strategies outlined in this Plan by noting those that have been completed, and identifying the next steps required to implement the Plan's remaining strategies. Comments from local officials and the public will be incorporated when relevant. This meeting will constitute an opportunity for the public and other town officials to hear about the town's progress in implementing mitigation strategies and to give input on future activities and Plan revisions. The public will be given the opportunity to comment at this meeting. Evaluation of the Local Hazard Mitigation Plan will consist of a thorough analysis of the status of mitigation and preparedness strategies and whether they are being implemented according to the time frames included in tables in this Plan. The Town of West Fairlee will evaluate the status of mitigation strategies to assess that goals of the Local Hazard Mitigation Plan are being met. Adherence to the mitigation, preparedness, and ongoing strategy implementation tables included in this Plan will constitute the degree of effectiveness of the Plan. The Town will also evaluate the status of vulnerabilities detailed in this Plan to evaluate their validity. The update of the Plan will bring up to date materials that have become outdated due to the passage of time. West Fairlee's Emergency Management Director will be the principal point of contact and will take primary responsibility for the monitoring, evaluation, and update process described here. He or she will bring the Plan's maintenance activities to the Selectboard's agenda and discussions.

Updates and evaluation of this Plan by the Selectboard and the local Emergency Director will also occur within three months after every federal disaster declaration directly impacting the Town of West Fairlee. The Town will monitor, evaluate and update this Local Hazard Mitigation Plan at every April Selectboard meeting and after every federally declared disaster according to the graphic in Appendix C. The Town shall reference the Local Hazard Mitigation Plan when working on Town Plan amendments or changes to the Town's bylaws.

At least one year before the Plan expires, the update process will begin (though annual updates, monitoring of progress and evaluation will occur at the annual April Selectboard meeting). For this next Plan update, the Two Rivers-Ottauquechee Regional Commission (TRORC) will help with Plan updates if assistance is requested by the Town of West Fairlee and if funding is available. If TRORC is unable to assist the Town, then West Fairlee's Selectboard will update the Plan, or the Selectboard may appoint a committee of interested citizens (including the current local Emergency Director) to draft changes. Ultimately, it will be the Town's responsibility to update their Local Hazard Mitigation Plan.

The process of evaluating and updating the Plan will include continued public participation through public notices posted on the municipal website, notice within the municipal building, notice in The Valley News, the Herald of Randolph, the Vermont Standard, the Journal Opinion and the TRORC newsletter, inviting the public to the scheduled Selectboard (or specially scheduled) meeting. The public will be given the opportunity to comment during these public meetings. Additional stakeholders should be invited to the meeting, including: local business and civic/non-profit organizations, Upper Valley Ambulance, Inc., and the Vermont Agency of

Natural Resources (VT ANR). VT ANR will be invited because they can provide assistance with NFIP outreach activities in the community, models for stricter floodplain zoning regulations, delineation of fluvial erosion hazard areas, and other applicable initiatives.

Updates will address changes in community mitigation strategies; new town bylaws, zoning and planning strategies if appropriate; progress on the implementation of initiatives and projects; effectiveness of implemented projects or initiatives; and evaluation of challenges and opportunities effectiveness in reducing town's vulnerabilities and meeting plan goal. If new actions are identified in the interim period, the plan can be amended without formal re-adoption during regularly scheduled Selectboard meetings.

West Fairlee shall also incorporate mitigation planning into their long-term land use and development planning documents. The 2011 West Fairlee Annex, the previous version of this Local Hazard Mitigation Plan for the Town of West Fairlee, provided guidance in the development of the West Fairlee Municipal Plan, including directing goals, policies, and recommendations towards mitigating the effects of future hazards on health and property in the Town. The 2013 Vermont Legislature passed a law requiring all towns to incorporate flood resiliency elements into their town plans as of July 2014. West Fairlee incorporated Flood Resiliency information into the 2017 Town Plan, including flood hazard and fluvial erosion hazard identification, and strategies and recommendations to mitigate risks to public safety, critical infrastructure, historic structures and public investments. This Local Hazard Mitigation Plan will help the town to comply with the new community flood resiliency requirement for town plans adopted after July 2014.

It is also recommended that the process work both ways and the Town review and incorporate elements of the Local Hazard Mitigation Plan into updates for the municipal plan and flood hazard/ River Corridor bylaws. The Town shall also consider reviewing any future TRORC planning documents for ideas on future mitigation projects and hazard areas. The West Fairlee Planning Commission will incorporate hazard mitigation strategies developed and identified in this Local Hazard Mitigation Plan directly into goals, policies, and recommendations in future updates to the West Fairlee Town Plan. Mitigation strategies will directly influence goals, policies, and recommendations in future updates to the West Fairlee Town Plan. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, and flood hazard/River Corridor bylaws will also be considered after declared or local disasters.

V. Community Vulnerability by Hazard

A. Hazard Identification

Mitigation efforts must be grounded in the rational evaluation of hazards to the area and the risks these hazards pose. This is done through a process, which in essence asks and answers three basic questions:

- What bad things can happen, given the Town's vulnerabilities?
- How likely are they to occur?
- How bad could they be?

This process, which is laid out in the table below, is an attempt to inventory the known hazards, establish the likelihood of them occurring in the future, and then assess the community's potential vulnerability to each. In performing this analysis, we are then able to prioritize actions that are designed to mitigate the effects of each of these disaster types and ultimately make West Fairlee a safer place.

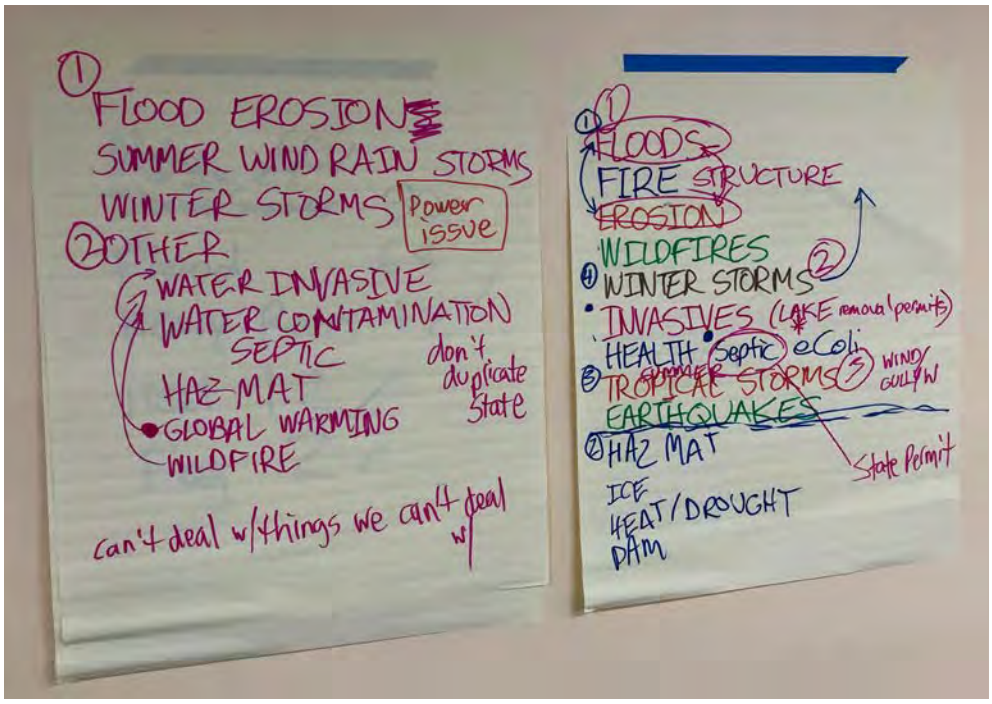
It is important that we learn from the past in order to avoid the same disasters and their outcomes. Disasters that have occurred within the Town of West Fairlee, the larger region, and the State of Vermont can give us good information about what types of disasters we can expect in the future and what kinds of damage they might cause. However, while this historical data can inform our perspective of what might happen in the future, it is by no means a prophecy. While the Town of West Fairlee might not have been impacted by a specific hazard in the past, this does not necessarily mean it will never be affected in the future. Indeed, the advance of climate change means that old weather patterns may not remain consistent. For instance, in recent years, Vermonters have seen an increase in the number and severity of storms, especially high intensity rainfall events. Armed with historical data and a healthy respect for climate change and the unknown, we have tried our best to identify hazards and prepare for the future.

The following table reflects the hazards that we believe can be expected, or are at least possible, in the central Vermont area. We have considered factors such as frequency of occurrence, warning time and potential community impact to rank each and determine which hazards pose the greatest threats to life and property in West Fairlee.[1] The worst threats (bolded in the table, below) are then followed-up with discussion and mitigation strategies throughout the rest of this Plan.[2] It should be noted that hazards assigned with the same "Hazard Score" are not in order and their placement in the table should not be assumed to reflect their potential to create hazards for the town.

[11] The ranking methodology used in this Plan was agree to by the committee and consisted of two parts. First, the hazards were grouped into 3 groups based on their overall hazard profile. Then they were ranked within the first two groups for their risk and vulnerability to West Fairlee.

[2] It's important to note that those hazards which were not found to pose the greatest threats may still occur in West Fairlee's future; however, they are not the focus of this Plan.

Hazard	Frequency	Warning Time	Potential Impact
PRIMARY HAZARDS			
Flash Flood/Flood/Fluvial Erosion	**Highly Likely**	**3-6 Hours**	**Major**
Severe Weather (Thunderstorm, Lightning, High Wind, Hail, and Hurricane/Tropical Storm) 'Severe Weather' includes two or more of the hazards.	**Likely**	**3-6 hours**	**Major**
Extreme Cold/Snow/Ice Storm/Winter Storms	**Highly Likely**	**6-12 hours**	**Moderate**
SECONDARY HAZARDS			
Water Supply Contamination	**Unlikely**	**12+ Hours**	**Minor**
Climate Change	**Highly Likely**	**NA**	**Moderate**
Invasive Species (Aquatic)	**Highly Likely**	**NA**	**Minor**
Wildfire	**Unlikely**	**None-minimal**	**Minor**
Hazardous Material Spill	**Likely**	**None-minimal**	**Moderate**
OTHER HAZARDS			
Structural Fire	Likely	None-minimal	Minor
Ice Jams	Occasionally	6-12 hours	Moderate
Landslides/Mudslides/Rockslides	Occasionally	6-12 hours	Moderate
Invasive Species/Infestation	Highly Likely	12+ hours	Minor
Hail Storms	Occasionally	None-minimal	Negligible
Drought	Likely	12+ hours	Minor
Earthquake	Highly Unlikely	None-minimal	Negligible
Tornado	Highly Unlikely	12+ Hours	Negligible
Extreme Heat	Highly Unlikely	12+ hours	Negligible
Dam Failure (There are no high hazard dams in the Town of West Fairlee or upstream, and the committee decided to remove this from the ranking activity.)	Unlikely	None	Negligible/Minor



The West Fairlee LHMP committee discussed the results of the hazard ranking activity and decided to focus on hazards that had the potential to impact the Town on a town-wide scale, and/or hazards that are ***Likely*** or ***Highly Likely*** to occur, and would have a moderate, minor, or major impact on the health and/or property of West Fairlee. For the purposes of this Plan, Severe Weather and Hurricanes/Tropical Storms will be combined into one hazard profile area for analysis due to their overlapping events and potential impacts to the Town. Similarly, ice jams have been detailed and analyzed in concert with flash flood/flooding/fluvial erosion due to the overlapping events, extents, impacts, and observed history of occurrence. Due to low probability of impact, small potential impact, and scarce community resources (time and money), the mitigation committee chose not to detail the following hazards in this LHMP: extreme heat, drought, water supply contamination, earthquakes, dam failure, tornadoes, wildfires/brushfires, landslides/mudslides/rockslides, ice jams, and invasive species infestation. Refer to Appendix A for definitions of the hazard ranking terms used in the above chart.

After engaging in discussions using their best available knowledge, the Town of West Fairlee identified the following "top hazards" (based on frequency of occurrence and potential impact) that they believe their community is most vulnerable to:

- Flash Flood/Flood/Fluvial Erosion
- Severe Summer Weather & Hurricanes/Tropical Storms
- Extreme Cold/Snow/Ice Storms

The impact of a loss of services is a common element of the hazards discussed in this Plan. These include not only large-scale services such as the loss of transportation and communication ability, but also the loss of services more directly associated with basic needs such as water, food preparation, and heat. Loss of power for an extended period of time has the potential to greatly impact households who are entirely reliant on a functional power supply in order to prepare food, heat the household, and ensure that the water supply is available. While many residences in West Fairlee utilize a variety of methods to ensure these basic needs, it is important to be aware that a number of households rely on electricity alone for all of these functions. In addition to the plans described in the West Fairlee LEMP, it is important to reinforce the need for adequate generators in this Plan, so that the town is prepared to ameliorate the effects of a sustained power loss in West Fairlee. Included in this would be an adequate supply of fuel for these generators.

A further focus that is important to address in this Plan includes the awareness of the population demographics of West Fairlee. This includes a comprehensive idea regarding the number of individuals in the town who may require assistance in the event of a severe weather incident. Age and ability should be factors taken into account, and as discussed in the LEMP, there should be individuals responsible for creating and updating such a list, including members of the ambulance service, town offices, the health officer, and service officer.

Each of these "top hazards" will be discussed in the following sections. Within each section, previous occurrences of each hazard will be listed, including the County-wide FEMA Disaster Declarations (DR-#), where applicable. Hazards information was gathered from local sources (ex., town history book), the National Climatic Data Center's (NCDC's) Storm Events Database (1950-2015), the Spatial Hazard Events and Losses Database for the United States (SHELDUS) 1960-2015, and Special Reports produced by the National Weather Service in Burlington, Vermont. This section also includes a description of each "top hazard" and a hazard matrix that will also include the following information (please see each hazard profile for a hazard-specific matrix):

HAZARD	PERCENT
Dense Fog	**0.2%**
Heat	**1.2%**
Heat	1.2%
Heavy Rain	**1.2%**
Heavy Rain	1.2%
Flood	**6.9%**
Flash Flood	4.2%
Flood	2.7%
Storms and Wind	**30.2%**
Hail	5.6%
Lightning	1.5%
Strong Wind	4.9%
High Wind	1.7%
Thunderstorm Wind	15.6%
Tornado	0.7%
Funnel Cloud	0.2%
Winter and Cold	**60.1%**
Frost/Freeze	0.5%
Ice Storm	0.2%
Cold/Wind Chill	2.9%
Extreme Cold	1.2%
Heavy Snow	1.2%
Winter Storm	27.4%
Winter Weather	26.7%

NWS Storm Events Database

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Type of hazard.	General areas in community that may be vulnerable to the hazard.	Community structures, systems, populations, or other assets as defined by the community that are susceptible to damage and loss from hazard events.	Strength or magnitude, and details of a notable event(s).	Financial impact from an event and/or the number of structures that are impacted	Occasionally: 1–10% probability of occurrence per year, or at least one chance in next 100 years Likely: >10% but <100% probability per year, at least 1 chance in next 10 years Highly Likely: 100% probable in a year

Finally, Climate Change was listed as a stand-alone secondary hazard. The committee wanted to recognize its importance both as a hazard and as a major driver in other hazards. According to the 2018 state plan "Over the past several decades, there has been a marked increase in the frequency and severity of weather-related disasters, both globally and nationally. Most notably, the Earth has experienced a 1°F rise in temperature, which

has far-reaching impacts on weather patterns and ecosystems." The state plan notes that the natural hazards influenced by precipitation, temperature and snow cover are most likely to exacerbated by climate change.

The hazards below in West Fairlee are most likely to be exacerbated by climate change:

Hazard	Frequency	Warning Time	Potential Impact
Flash Flood/Flood/Fluvial Erosion	**Highly Likely**	**3-6 Hours**	**Major**
Severe Weather (Thunderstorm, Lightning, High Wind, Hail, and Hurricane/Tropical Storm)	**Likely**	**3-6 hours**	**Major**
Extreme Cold/Snow/Ice Storm/Winter Storms	**Highly Likely**	**6-12 hours**	**Moderate**
Invasive Species (Aquatic)	**Highly Likely**	**NA**	**Minor**
Wildfire	**Unlikely**	**None-minimal**	**Minor**

Plan Committee at work 2019, TRORC photo

B. Hazard Profiles for "Hazards Posing Highest Vulnerabilities"

1. Flash Flood/Flood/Fluvial Erosion

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Flash Flood/Flood/Fluvial Erosion**.

The most frequent form of flooding in the State of Vermont and the Town of West Fairlee is riverine flooding, or overbank flooding, which occurs to rivers when they receive more rain or snowmelt from their watershed than they typically experience. Flooding causes the inundation of land that is normally dry. Overbank flooding is experienced more frequently in mountainous and hilly areas where water moves with higher velocities. Flash floods occur when severe storms drop high amounts of rainfall in short periods of time. Flash floods occur more frequently in areas with steep slopes and narrow stream valleys. Riverine erosion is the gradual loss of land by rivers and streams. River channels are constantly changing. As rivers flow and water moves downstream, water exerts energy upon riverbanks and causes erosion.

Flooding is one of the worst threats to West Fairlee's residents and infrastructure. Past instances of flooding in West Fairlee have included rain and/or snowmelt events that cause flooding in the major rivers' floodplains and intense rainstorms over a small area that cause localized flash-flooding. Both kinds of events can be worsened by the build-up of ice or debris, which can contribute to the failure of important infrastructure (such as culverts, bridges, and dams).

The worst flood disaster to hit the Town of West Fairlee, as well as the overarching region and the State of Vermont, occurred on November 3, 1927. This event was caused by up to 10 inches of heavy rain from the remnants of a tropical storm that fell on frozen ground. Eighty-four Vermonters, including the Lieutenant Governor, were killed. The flooding in the White River valley was particularly violent, with an estimated 120,000 to 140,000 cubic feet/second (cfs) flowing out of the White River at West Hartford, Vermont. Like many towns in the region, the Town of West Fairlee received heavy precipitation, seeing roughly 6-7 inches of rainfall over the storm period.

A more recent flooding event that devastated the region and the state was the result of Tropical Storm Irene, which occurred on August 28, 2011. Record flooding was reported across the state and was responsible for several deaths, as well as hundreds of millions of dollars of home, road and infrastructure damage. Due to strong winds, 50,000 Vermont residents were initially without power, and many did not have electricity restored to their homes and businesses for over a week. Despite the damage wrought, the flooding caused by Tropical Storm Irene is considered to be the second greatest natural disaster in 20th and 21st century Vermont, second only to the Flood of 1927.

The Town of West Fairlee suffered significant damage to property and infrastructure during Tropical Storm Irene, although no lives were lost. It is estimated that Tropical Storm Irene dropped 6-7 inches of rain over the Town of West Fairlee in a very short span of time, some of the highest precipitation totals in Orange County (which averaged 5-7+ inches over its land area). It is thought that the flooding that occurred as a result of the storm was close to being or was a full-fledged 500-year flood.

A few of West Fairlee's roads were damaged by the storm, including parts of Roberts Road, Back Street, and Beanville Road. The county-wide damage for Orange County totaled $5 million. According to FEMA's PA

database, the storm damage for West Fairlee alone totaled $139,137.95, which is a figure that captures at least 70% of total damage for the Town. The Town of West Fairlee was spared any losses that warranted consideration as part of the FEMA buy-outs.

Unfortunately, flooding is very common across the region, with many events impacting the Town of West Fairlee. West Fairlee has been severely affected by other flooding events that pre-date Tropical Storm Irene. As such, flooding is one of the worst threats to West Fairlee's residents and infrastructure. The following list indicates the history of occurrence with regard to this hazard in Orange County (given the small population of West Fairlee, town-specific data is limited); an asterisk "*" denotes the instances in which town-specific data is available, and federal disaster numbers are listed where appropriate. No detailed data was available for physical size of mostly eroded area for fluvial erosion damage in West Fairlee in terms of numbers of acres lost or amount of fill that was used to compensate for fluvial erosion during each event.

History of Occurrences:

Date	Event	Location	Extent and Impacts
6/29/2017-7/1/2017 (DR-4330 VT)	Flooding, Fluvial erosion, and Severe Storm	West Fairlee; County-wide	Severe storms featured intense rainfall that fell within short periods and led to flooding and erosion. Heavy precipitation fell in Orange county on already saturated soils. On July 1 a severe thunderstorm and associated rain showers moved across central Vermont causing flash flooding. West Fairlee experienced 4.77 inches over the disaster period, including 2.38 inches in 24 hours. West Fairlee experienced damage on Beanville Road and Roberts Road. Orange county experienced $839,514. Minimal power outages occurred during this event. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
6/11/2014	Flood, and Fluvial erosion	County-wide	Period of heavy rain resulted in flash flooding in West Fairlee. The neighboring town of Corinth received 1.26 inches of rain on 5/23 and experienced another 1.64 inches of rain 4 days earlier, resulting in 2.9 inches of rain in less than a week. No Green Mountain Power (GMP) customers lost power during this event. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
06/25/2013 — 07/11/2013 (DR-4140)*	Severe Storms, fluvial erosion, and Flooding	County-wide	Severe storms caused flooding throughout the region, causing damage to some infrastructure and facilities. $504,855 in damages occurred in Orange County. The neighboring Town of Corinth experienced 7.4 inches during the disaster period. On 6/24 52 GMP customers lost power for over 2 hours. On 7/9 550 GMP customers lost power for 1 hour and 14 minutes. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.

Date	Event	Location	Extent and Impacts
08/28/2011 (DR-4022, TS Irene) *	Tropical Storm, flooding, and fluvial erosion	West Fairlee, County-wide	Widespread rainfall amounts of 3-5 inches occurred across Vermont with 5 to 7+ inches across much of southern, central Vermont. Devastating flash flooding occurred across much of central and southern Vermont mountain valleys with substantial and some record-breaking flood stages on larger rivers. This flood event will likely rank second to the November 1927 flood in the scope of meteorological and hydrological conditions/impacts as well as loss of life (84 in 1927), but likely first in monetary damage [approx. $500 million statewide vs $350 million (1927 in 2010 dollars)]. There were nearly 2,400 roads, 800 homes/businesses, 300 bridges and a half dozen railroad tracks destroyed or damaged from the flooding caused by Irene. According to spotter's reports, West Fairlee received nearly 7" of rain. Roberts Road, Back Street, Beanville Road, and Route 113 were damaged in West Fairlee during Irene. $139,137 in damage occurred for West Fairlee according to FEMA's Public Assistance database (captures at least 70% of total damage). Minimal GMP outages occurred in West Fairlee. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
05/25/2011-05/27/2011 (DR-4001)	Severe Storms, fluvial erosion, and Flooding	County-wide	Severe storms and flooding struck the region and the state. Orange County was eligible for federal public assistance funding in the wake of the storms. West Fairlee received about .63 inches of rain in 24 hours. No significant power outages occurred in West Fairlee. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
07/21/2010	Flash Flooding	West Fairlee; County-wide	Several storms strengthened into super cells that produced widespread wind damage to trees, power poles and structures as well as large hail in excess of golf ball size in diameter. Very heavy localized rains caused some temporary problems in many communities. West Fairlee received about 2.43 inches of precipitation in 24 hours. Power outage data was unavailable for this event.
08/21/2009	Flash Flooding	West Fairlee; County-wide	Thunderstorms produced torrential downpours in nearby Chelsea, who experienced significant damage on several roads due to flash flooding. Damage was not as severe in West Fairlee, which received 1.26 inches in precipitation. Outage information was not available for this event.
08/07/2008* (Part of DR-1790 VT)	Flash Flooding	West Fairlee; County-wide	Thunderstorms with heavy rainfall in a moist atmosphere moved through central and southern Vermont during the afternoon and evening hours. West Fairlee received 2.6 inches of rain in 24 hours with an additional 1.22 inches of rain in the previous 24 hours. Outage information was not available for this event.
07/11/2007 (DR-1715 VT)	Flash Flood	County-wide	Tropical-like showers and thunderstorms struck east-central Vermont, with localized rainfall amounts exceeding 3 inches in a 2-hour period. Power outage data for this event was unavailable.
06/27/1998 (Part of DR-1228 VT)	Flash Flooding and fluvial erosion	County-wide	Heavy rains brought 4-8 inches or rainfall to the county, with many homes and businesses flooded and/or losing power. National Guard members were sent in to aid with relief. Power outage time data for this event are not known. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.

Date	Event	Location	Extent and Impacts
01/1998 (DR-1201 VT)	Flooding and fluvial erosion	County-wide	An average of 3.5 inches of rainfall throughout the region early in the month was exacerbated by ensuing bad weather, causing flood damage throughout the region. Power outage time data for this event are not known.
01/19/1996-01/20/1996	Flood, severe storm, and fluvial erosion	County-wide	A deadly storm caused strong winds and flooding throughout the state. Many roads washed out, numerous power outages were reported, and $250K in damage were reported for Orange County. More detailed rainfall data was unavailable for West Fairlee. Power outage time data for this event are not known. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
03/1992 (DR-938 VT)	Flooding	County-wide	Heavy rain and ice jams during the winter season prompted flooding throughout the state, including Orange County. More detailed rainfall data was unavailable for West Fairlee. Power outage time data for this event are not known.
06/28/1973 — 06/30/1973 (DR-397)	Flooding	County-wide	Rainfall as much as 6 inches in 24 hours in some locations. State declared disaster area. 3 deaths occurred and resulted in $64 million in damage. Power outage time data for this event are not known.
11/02/1927 — 11/04/1927 ("Flood of 1927")	Flooding	County-wide	Considered to one of VT's most devastating events, the flood took out 1285 bridges, miles of roads and railways, and countless homes and buildings. 84 people were killed, including Lt. Gov. S. Hollister Jackson. Rainfall totaled 4-9" statewide, following a month with 150% the normal amount of rain. Power outage time data for this event are not known.

The Town of West Fairlee has a standalone Flood Hazard Area Zoning Ordinance that was adopted in 1990. Mapped special flood hazard areas in West Fairlee include the following rivers and brooks: the Ompompanoosuc River, Middle Brook, and Blood Brook.

In West Fairlee there are 16 structures located in the Special Flood Hazard Areas or 100-year floodplain. These areas have a 1% chance of flooding annually. The 15 structures are characterized as 14 residential structures (8 mobile homes and 6 single family residences) and 1 public gathering area (the Camp Billings). If all of these structures were to be damaged or destroyed in a severe flooding or erosion event, the resulting damage would equal approximately $2,265,000. There are no public water supply wells or waste treatment facilities located in West Fairlee that could be adversely impacted by a flood event; however, private wells and septic could be impacted by flood waters. Disruption of the critical services in the 500-year floodplain could drastically hamper future response and relief efforts in the Town, and could cause major disruption to business continuity of operations. Putting such an event into context, the flooding that occurred as a result of Tropical Storm Irene is considered to be greater than a 100-year flood event, and likely closer to a 500-year flood.

Additionally, there are 36 structures that reside within the River Corridor area, which was mapped by the Vermont Agency of Natural Resources. These structures are characterized as 35 residential (24 single-family structures, 8 mobile homes, 2 camps, and 1 other residential) and 1 commercial. The River Corridors accurately represent the area where rivers and streams will move over time, and depict areas that are at risk of erosion due to the river or stream's lateral movement. Mapped river corridor areas in West Fairlee are similar to the mapped

special flood hazard areas within the Town. Mapped River Corridor areas include the Ompompanoosuc River, Middle Brook, Blood Brook, and Bear Notch Brook. If all 36 structures located in the River Corridor were damaged or destroyed from fluvial erosion, the resulting damage would be approximately $5,436,000. The locations of these brooks and streams, river corridor areas, special flood hazard areas, and vulnerable structures located within these frequently flooded areas are illustrated in Attachment A: Map of West Fairlee.

Across Vermont, most child and elder care facilities are not registered with the State. Most child day care is private in-home care in West Fairlee, but there are two licensed childcare facility in the Town. These childcare facilities are located at 744 Route 113 and 894 Vermont 113 and are not vulnerable to flooding or fluvial erosion. There are no elder care facilities in the Town of West Fairlee. Finally, low income housing is not registered with the State, but there is currently one mobile home park located in West Fairlee that is registered with the State. The Cold Springs Trailer Park, located at George's Way, is not vulnerable to flooding or fluvial erosion.

Recent studies have shown that the majority of flooding in Vermont occurs along upland streams, as well as along road drainage systems that fail to convey the amount of water they are receiving. These areas are often not recognized as being flood prone, and property owners in these areas are not typically required to have flood insurance. It should be noted that, while small, mountainous streams may not be mapped by FEMA in NFIP FIRMs (Flood Insurance Rate Maps), flooding along these streams is possible, and should be expected and planned for. Flash flooding in these reaches can be extremely erosive, causing damage to road infrastructure and to topographic features including stream beds and the sides of hills and mountains. The presence of undersized or blocked culverts can lead to further erosion and stream bank/mountainside undercutting. Furthermore, precipitation trend analysis suggests that intense, local storms are occurring more frequently, which indicates that West Fairlee will experience high intensity rainfall and flooding events in the future.

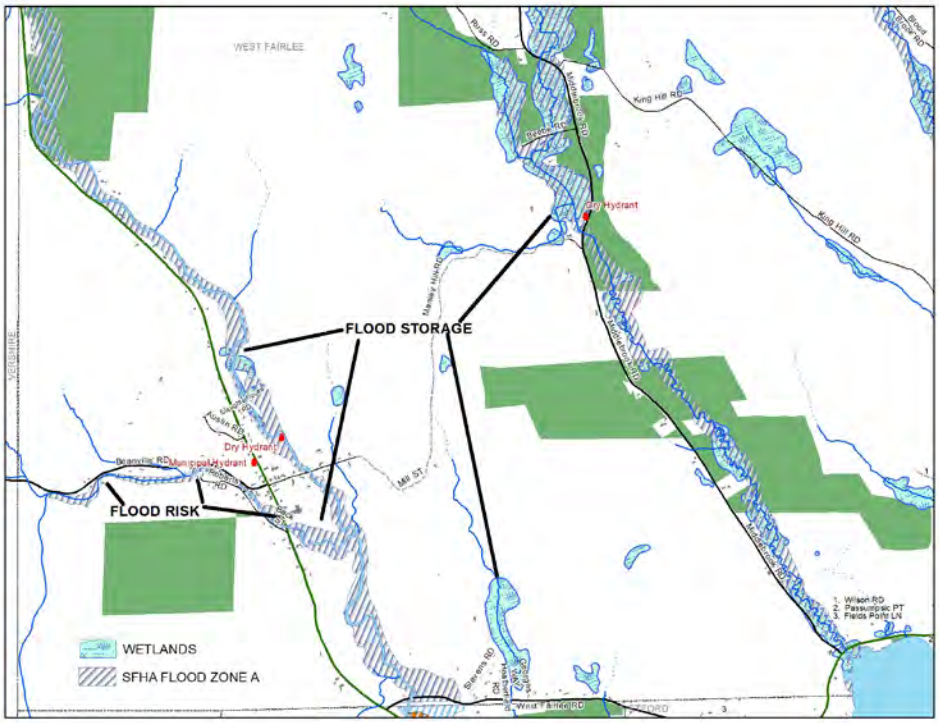
West Fairlee maintains an up-to-date list of culverts and culvert condition and has engaged in culvert upgrading since the 2011 West Fairlee Annex was drafted. The Town's most recent comprehensive, town-wide culvert inventory was completed with Two Rivers-Ottauquechee Regional Commission assistance in 2005, and the process of upgrading culverts is ongoing (and funding permitting). The Town of West Fairlee with the assistance of TRORC conducted an updated culvert inventory and Road Erosion Inventory in 2018. No development projects are planned in West Fairlee in areas that would be vulnerable to flooding. There are no repetitive loss properties in the Town of West Fairlee.

Finally, in an effort to help reduce the Town's vulnerabilities to flooding and protect structures and road infrastructure, it is important to restore floodplain and increase the number of areas for retention wherever possible. Equally important to reducing flood vulnerabilities is the process of stabilizing river banks in areas that are vulnerable to slides and/or have the potential to damage critical or important infrastructure.

Overall, there is very little development activity in the Town of West Fairlee. Due to the terrain and in the Town of West Fairlee, new development may be vulnerable to either flood hazards or fluvial erosion hazards. The vulnerability of any new growth would be dependent on its location near a Special Flood Hazard Area (SFHA), near a small stream, or on a steep hill. The Town's Flood Hazard Area Zoning Ordinance regulates development within the SFHA, where development is vulnerable to inundation from flood waters. Structures located outside

the SFHA are also vulnerable to flood hazards if they are located near a steep, upland stream. Structures in these areas are vulnerable to fluvial erosion as opposed to inundation hazard. Since the 2011 West Fairlee Local Hazard Mitigation Plan there has been minimal development in the Town.

There is a series of wetlands along the Middlebrook corridor leading to Lake Fairlee that act as flood storage. Additionally, the Ompompanoosuc River flows just east and behind West Fairlee village with the Beanville Road tributary confluence just south of the village. This confluence area should remain undeveloped behind the school. There is flood risk along the Beanville Road tributary especially in the area between Back Street, Roberts Road, Beanville Road and VT 113.



Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/ Probability
Flood/ Flash Flood/ Fluvial Erosion	Many of West Fairlee's roads are vulnerable to erosional flooding due to steep terrain. Some of the most vulnerable for fluvial erosion or flooding include: West Fairlee Road, Roberts Road, Back Street, and Beanville Road.	Culverts, bridges, road infrastructure that are located close to streams, brooks, and rivers are vulnerable to flooding and fluvial erosion. Specific vulnerable roads include Roberts Road, Back Street, and Beanville Road. There are 15 residential (6 single family homes and mobile homes) and 1 public gathering located in the special flood hazard area. These structures are valued at $2,265,000. Specific vulnerable structures include Camp Billings, which is located on the shore of Lake Fairlee. There are 36 structures (35 residential and 1 commercial) located within the mapped Vermont River Corridor. These structures are valued at $5,436,000.	Tropical Storm Irene- 5-7" across county (6-7" in West Fairlee). No detailed data was available for fluvial erosion damage in West Fairlee in terms of numbers of acres lost during each event.	From TS Irene: $139,137.95 for West Fairlee, per FEMA's Public Assistance database (captures at least 70% of total damage).	Highly Likely

2. Severe Summer Weather & Hurricanes/Tropical Storms

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Severe Weather**.

Severe weather consists of thunderstorms, lightning, hail, and intense winds. Often it consists of multiple events that combine to create hazardous conditions that pose a threat to communities in the State of Vermont and the Town of West Fairlee. Severe weather can be incredibly unpredictable. More common than hurricanes or tropical storms are severe thunderstorms (usually in the summer), which can cause flooding as noted above, and are associated with lightning, high winds, hail and tornadoes. Hailstorms have occurred in Vermont, usually during the summer months. 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. 382 hail events were recorded between 1950 and 2008 in the state, making hail an annual occurrence in some part of the state. Most of these events had hail measuring .75 inches, but many had hail at least 1.5 inches in size. The largest hail during the period was 3-inch hail that fell in Chittenden County in 1968. Tennis ball-sized hail was reported in the town of Chittenden during a storm in the summer of 2001. Thunderstorms can generate high winds, such as hit the region on July 6, 1999, downing hundreds of large trees in a few minutes.

In West Fairlee, severe weather is quite common, typically in the late spring and summer months when the region experiences high temperatures. Severe thunderstorms tend to bring other hazards such as high winds, hail, lightning, and flooding, and these hazards are often experienced in combinations which create many unique weather and emergency management situations. Over the years, West Fairlee has been hit with high winds that have downed and uprooted numerous trees, and knocked out electricity to residents in the Town. Town-specific wind data is sometimes difficult to find, nevertheless, the “Remarks” section of NCDC Database helps to illuminate the impact strong winds can have on West Fairlee. Sizeable hail has also accompanied storms moving through the Town and region.

While hurricanes (storms with sustained winds greater than 74 mph) and tropical storms rarely reach as far inland as Vermont, they can be as or more destructive than a more commonly occurring severe weather event. Typically, they will manifest themselves in Vermont as tropical storms. In either case, the high winds, heavy rains, and large affected areas from hurricane or tropical storms can make these rare events major disasters. The most infamous example of this was the disastrous hurricane of 1938. On September 21, 1938 a very fast-moving hurricane hit Vermont in the early evening, but was moving so fast that wind damage was more severe than damage from rain in places. However, there was severe flooding, as over 4 inches of rain accompanied the storm and followed upon the heels of preceding storms that had saturated the ground and raised river levels. Buildings were lost, power lines were downed, and many trees were felled. Tropical Storm Floyd in September 1999 caused flooding and wind damage in parts of Vermont, as well as one fatality, and resulted in a federal disaster declaration.

The following list indicates the history of occurrence with regard to this hazard in Orange County (given that small population of West Fairlee, town-specific data is limited); an asterisk "*" denotes the instances in which town-specific data is available, and federal disaster numbers are listed when appropriate. In an attempt to capture the individual hazards that may arise, and the different circumstances caused by the hazards in concert, the separate hazards are documented in the table below.

The impact experienced in West Fairlee from Hurricane/Tropical Storms has mostly been from rainfall and only in the form of a Tropical Storm, not a hurricane. Therefore, wind speed extent for Hurricane/Tropical Storm is not available. Where wind extent data is available, it is given in the form of the Beaufort Wind Chart.

Beaufort Wind Chart – Estimating Winds Speeds

Beaufort Number	MPH Range	MPH Average	Terminology	Description
0	0	0	Calm	Calm. Smoke rises vertically.
1	1-3	2	Light air	Wind motion visible in smoke.
2	4-7	6	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	11	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	15	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19-24	22	Fresh breeze	Smaller trees sway.
6	25-31	27	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	32-38	35	Near gale	Whole trees in motion. Some difficulty when walking into the wind.
8	39-46	42	Gale	Twigs broken from trees. Cars veer on road.
9	47-54	50	**Severe gale**	**Light structure damage.**
10	55-63	60	**Storm**	**Trees uprooted. Considerable structural damage.**
11	64-73	70	**Violent storm**	**Widespread structural damage.**
12	74-95	90	**Hurricane**	**Considerable and widespread damage to structures.**

Webpage: http://www.weather.gov/iwx
Twitter: @nwsiwx
Facebook: NWSNorthernIndiana

History of Occurrences:

Date	Event					Location	Extent and Impact
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
10/29/2017-10/30/2017 (DR-4356 VT)	✓	✓		✓		West Fairlee; County-wide	A cold front, supported by an associated upper level system moved into the eastern United States causing intense wind. Sustained winds were observed of 25-35 mph, with wind gusts of 50-75 mph. Wind experienced in this event was ranked as 6 and 7 on the Beaufort Wind Scale which classify as Strong Breeze to near gale. The event exhibited wind gusts that ranged in the 9, 10, and 11 ranking that classified it as a severe gale, storm, and violent storm on the Beaufort Wind Chart. There were numerous downed branches and power outages that occurred. Specific West Fairlee power outage information was unavailable. West Fairlee experienced 1.78 inches on 10/30, and experienced 2.9 inches on 10/35 and 1.19 inches on 10/27. Orange county damage totaled $191,823.
6/29/2017-7/1/2017 (DR-4330 VT)	✓	✓		✓		West Fairlee; County-wide	Severe storms featured intense rainfall that fell within short periods and led to flooding and erosion. Heavy precipitation fell in Orange county on already saturated soils. On July 1 a severe thunderstorm and associated rain showers moved across central Vermont causing flash flooding. West Fairlee experienced 4.77 inches over the disaster period, including 2.38 inches in 24 hours. Specific wind speed data was unavailable for this event. West Fairlee experienced damage on Roberts Road and Beanville Road. Orange county experienced $839,514. Minimal power outages occurred during this event.

Date	Event					Location	Extent and Impact
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
07/23/2014	✓			✓		County-wide	Severe summer storms rocked the Central Vermont region, including West Fairlee. More detailed rainfall data was unavailable for West Fairlee. No GMP customers lost power in West Fairlee for during this event. Specific wind speed data was unavailable for this event.
10/07/2013	✓			✓		County-wide	Scattered wind gusts of 50 mph or greater across portions of Vermont produced numerous downed trees or tree limbs on utility lines resulting in more than 25,000 GMP customers without power at the peak, however minimal outages occurred in West Fairlee. Wind gusts in this event registered as a 9 on the Beaufort wind chart, which classifies as a severe gale. West Fairlee experienced about 1 inch of rain in 48 hours.
09/11/2013	✓			✓		County-wide	A series of thunderstorms moved across Vermont during the late afternoon and evening. Some of these thunderstorms produced damaging winds that downed trees and utility lines. West Fairlee received 1.85 inches of rain in 72 hours. Minimal power outages occurred in West Fairlee during this event. Specific wind speed data was unavailable for this event.

Date	Event					Location	Extent and Impact
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
6/25/2013—07/11/2013 (DR-4140 VT)	✓	✓	✓	✓	✓	County-wide	Showers and thunderstorms developed on a near daily basis in the summertime heat, and rainfall rates as high as two to three inches in an hour were observed at times. Flash flooding occurred in several areas where storms remained stationary or repeatedly moved across the same area. High water from flash flooding closed some of the region's roads or washed them out completely. Extensive outages occurred during this event. On 6/24 26 GMP customers lost power for over 2 hours. On 7/9 550 GMP customers lost power for just over an hour. Specific wind speed data was unavailable for this event.
05/29/2012	✓		✓	✓		County-wide	A warm front moved across Vermont during the morning hours of May 29th, which lead to numerous thunderstorms with heavy rain, damaging lightning and some isolated large hail and strong winds. Some of these thunderstorms deposited up to 2 inches of rainfall in portions of north-central and northeast Vermont. 24 GMP customers lost power for 1 hour and 20 minutes. Specific wind speed data was unavailable for this event.

Date	Event					Location	Extent and Impact
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
08/28/2011 (DR-4022, TS Irene) *	✓	✓		✓		West Fairlee/ County-wide	Widespread rainfall amounts of 3-5 inches occurred across Vermont with 5 to 7+ inches across much of southern, central Vermont. Wind speeds during the Tropical Storm ranged from 50-65 mph and ranked as 9 and 10 on the Beaufort Wind Scale, which classifies as severe gale and storm. Devastating flash flooding occurred across much of central and southern Vermont mountain valleys with substantial and some record-breaking flood stages on larger rivers. There were nearly 2,400 roads, 800 homes/businesses, 300 bridges and a half dozen railroad tracks destroyed or damaged from the flooding caused by Irene. According to spotter's reports, West Fairlee received nearly 7" of rain. Beanville Road, Back St., Roberts Road, were damaged in West Fairlee during Irene. FEMA Public Assistance totaled $139,138. Housing assistance totaled $41,983.
08/21/2011	✓		✓	✓		County-wide	Numerous showers and thunderstorms developed during the afternoon with some containing large hail and damaging winds. This storm also produced a microburst with straight line winds estimated, by an NWS Storm Damage team, between 70 and 90 mph. Wind speed during this event classified as 11 and 12 on the Beaufort Wind Chart, which classifies as a violent storm or low-level hurricane. West Fairlee received 1.12 inches of rain in 24 hours. Specific power outage time data in West Fairlee for this event were unavailable

Date	Event					Location	Extent and Impact
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
07/06/2011*	✓			✓	✓	West Fairlee/ County-wide	Wind damage as well as lightning strikes resulted in more than 15,000 customers in Vermont losing power. West Fairlee had 8 residents lose power for 7.6 hours. There were numerous reports of trees down in West Fairlee. Approximately $10,000 in damages occurred. Specific wind speed data was unavailable for this event.
10/01/2010	✓	✓		✓		County-wide	Heavy rain, including moisture associated with the dissipated remnants of Tropical Storm Nicole, spread into Vermont and produced four to five inches of rain. Severe storms and flooding in Addison, Caledonia, Essex, Lamoille, Orange, Washington, and Windsor Counties. FEMA disaster declaration with 1.9 million dollars of public assistance. No significant power outages occurred in West Fairlee. Specific wind speed data was unavailable for this event.
07/21/2010*	✓		✓	✓		West Fairlee/County-wide	Supercell thunderstorms spread across the region, causing widespread damage to trees, power poles, structures, and infrastructure. Numerous trees were down between West Fairlee and Vershire along Route 113 and numerous backroads, totaling $25,000 in damage. 2 inches of rain fell in West Fairlee on 7/20 and another 1.9 inches fell on 7/22. Specific power outage time data in West Fairlee for this event were unavailable
5/31/2009	✓		✓	✓		County-wide	40-55mph wind gusts and hail caused fallen trees and power outages in the region. Wind sped for this event registered as 9, which classified as severe gale. Specific power outage time data in West Fairlee for this event were unavailable.

Date	Event					Location	Extent and Impact
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
7/21/2008—8/12/2008 (DR 1790 VT)	✓			✓		County-wide	Severe storms and flooding impacted Orange and surrounding counties. 10.29 inches of rain fell in West Fairlee during the disaster period. On 7/24, 55 people in West Fairlee lost power for 3.2 hours. Specific wind speed data was unavailable for this event.
06/10/2008	✓			✓		County-wide	Severe storms caused damage to hundreds to thousands of trees, downing power lines and causing structural damage to numerous buildings and vehicles. Tens of thousands of Vermonters lost power due to the storms, with some outages that lasted several days. Specific power outage time data in West Fairlee for this event were unavailable. Specific wind speed data was unavailable for this event.
08/25/2007*	✓			✓		West Fairlee, County-wide	Numerous reports of tree and power line damage across the region. In West Fairlee, there was extensive tree damage, and winds were reported at approximately 60mph. Damage was estimated at $10,000. Specific power outage time data in West Fairlee for this event were unavailable. Specific wind speed data was unavailable for this event.
07/11/2007 (DR 1715 VT)	✓	✓				County-wide	Localized heavy rainfall exceeded 3 inches within a two-hour time frame with some localized storm totals approaching 6 inches across a very hilly or mountainous terrain, which resulted in flash flooding of several communities. Storm damage overall totaled over $3 million in affected counties. Specific wind speed data was unavailable for this event.

Date	Event					Location	Extent and Impact
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
06/10/2005*	✓				✓	West Fairlee, County-wide	Severe thunderstorms settled over the region. Lightning strikes killed 17 cows in West Fairlee, and caused a total of $50,000 in damage. More detailed rainfall data was unavailable for West Fairlee. Specific power outage time data in West Fairlee for this event were unavailable. Specific wind speed data was unavailable for this event.
9/16/1999—9/21/1999 (DR 1306 VT)	✓	✓		✓		County-wide	Tropical Storm Floyd brought high winds and heavy rainfall of 3-6 inches to Southern Vermont. The rain produced significant flooding across the region, which proved destructive. The combination of the wind and very saturated ground produced widespread downing of trees and power lines across much of Southern Vermont, and as many as 2,000 people lost power in the State. Detailed power outage information for West Fairlee is unknown. Specific wind speed data was unavailable for this event.
06/22/1997*	✓			✓		West Fairlee, County-wide	Severe thunderstorms and high winds were reported in West Fairlee. Detailed rainfall, wind speed, and power outage data for this event are unknown.
08/09/1976	✓	✓		✓		County-wide	Hurricane Belle brought intense rains to much of State. Detailed rainfall and power outage data for this event are unknown. Specific wind speed data was unavailable for this event.
7/6/1973 (DR 397 VT) *		✓		✓		County-wide	One of the largest flood events of the 20th century in VT. Landslides reported in the region. Detailed rainfall, wind, and power outage data for this event are unknown.
09/21/1938 ("The Great New England Hurricane")	✓			✓		County-wide	Hit Vermont as a Category 1 storm. High winds severely damaged trees, buildings, power lines. Detailed rainfall and power outage data for this event are unknown.
11/3/1927	✓	✓				County-wide	"Great Flood of 1927." Worst recorded flood in VT. White River crested at a record of 29.30 feet.

The Town of West Fairlee is very prone to strong winds, particularly microburst events that sweep through the region. Power outages are the most common occurrence in the wake of such wind events, usually occurring as a result of tree limbs falling on local power lines.

The other main hazard caused by severe weather throughout the Town is flooding. The most recent major flooding event to occur in the region was in the summer of 2017. Severe storms brought heavy rain and strong winds to the Town. The flooding was widespread and severe enough for a federal Disaster Declaration, DR-4330 VT, to be issued for Orange and other counties in Vermont. The Town of West Fairlee was impacted by this event, and experienced heavy rainfall

In the summer of 2018, The Town of West Fairlee began work on a town-wide geo- referenced culvert inventory and road erosion assessment with assistance from Two Rivers-Ottauquechee Regional Commission. The Town plans to maintain the new culvert inventory in-house, and use it as a way to plan and prioritize culvert and road upgrade projects. The Town of West Fairlee's work to upgrade culverts remains in process. A considerable number of culverts have been upgraded in the Town of West Fairlee as part of the Town's recovery from Tropical Storm Irene.

Location	Vulnerability	Extent	Observed Impact	Likelihood
Town wide for wind, hail, high winds, lightning and thunderstorm impacts. Generally speaking, the entire Town is vulnerable to flooding, but "hot spots" include the following roads/areas: Roberts Road< Back Street, Banville Road, and West Fairlee Road.	Culverts, bridges, road infrastructure that are located close to streams, brooks, and rivers are vulnerable to flooding and fluvial erosion. Specific vulnerable roads include Roberts Road, Back Street, and Beanville Road. There are 15 residential (6 single family homes and mobile homes) and 1 public gathering located in the special flood hazard area. These structures are valued at $2,265,000. Specific vulnerable structures include Camp Billings, which is located on the shore of Lake Fairlee. There are 36 structures (35 residential and 1 commercial) located within the mapped Vermont River Corridor. These structures are valued at $5,436,000.	Tropical Storm Irene- 5-7" across county (6-7" in West Fairlee). Damage can be wide-ranging depending on the type of storm, varying from $5,000 or less (6/22/1997) to over $2 million (TS Irene).	For TS Irene in West Fairlee: $139,138 from the FEMA Public Assistance database. Housing assistance totaled $41,983. In addition, severe weather on 07/11/2007 caused approximately $50,000 in damage in West Fairlee.	Highly likely/ Likely

***Note*: The main hazard caused by severe weather is typically flooding (though not always). In addition, flooding is often the most expensive hazard caused by severe weather. Therefore, the Extent and Impact

categories for Severe Summer Weather will reflect the data reported in the Flash Flood/Flood/Fluvial Erosion, as it represents the higher limits of damage caused by severe weather.

3. Extreme Cold/Snow/Ice Storm

Winter storms are a regular occurrence in Vermont. However, severe winter storms can cause serious damage, including collapse of buildings due to overloading with snow or ice, brutal wind chills, downed trees and power lines, and stranded vehicles. People can be at risk of freezing in extended power outages if they lack wood heat or backup power, and individuals shoveling large accumulations of snow can also be at risk from frostbite, hypothermia, and heart attacks caused by cold and overexertion. While snow removal from the transportation system is standard fare in Vermont winters, extreme snow or ice can close rail and road systems, further jeopardizing any stranded persons that are in danger of freezing or needing medical assistance.

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Figure 1 Sperry-Piltz Ice Accumulation Index

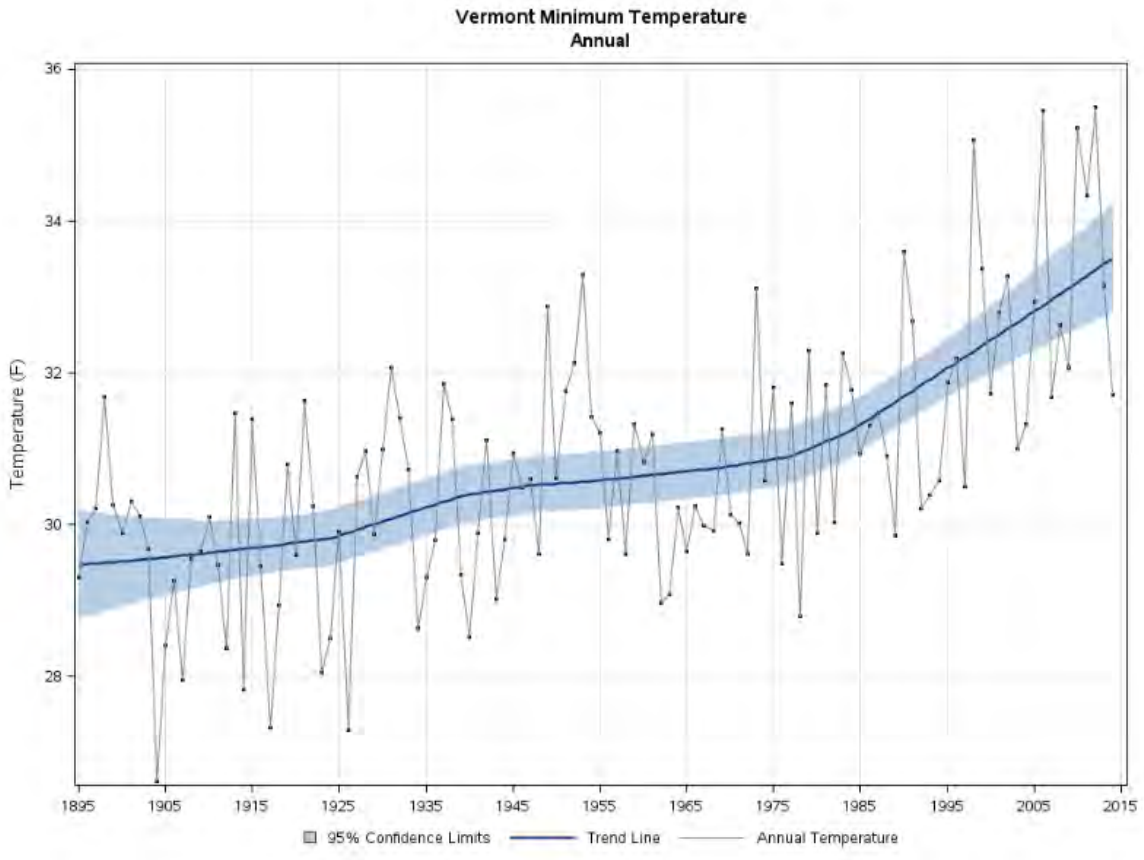
Severe winter storms include a blizzard on February 15-17 in 1958, which dumped over 30 inches and resulted in 26 deaths in New England. On December 26-27 in 1969, another blizzard left 18-36 inches of snow in northwestern Vermont, and a whopping 45 inches in nearby Waitsfield. A string of storms in March 2001 hit the state, beginning with 15-30 inches on March 5-6th (later declared a federal disaster), 10-30 inches on the 22nd, and 10-20 inches on the 30th. Recent years have seen wet snow storms that have toppled trees and caused widespread power outages.

The worst winter storm in terms of damage to hit the state recently was not a snow storm, but an ice storm. In January of 1998, just the right combination of precipitation and temperature led to more than three inches of ice in spots, closing roads, downing power lines, and snapping thousands of trees. This storm was estimated as a 200-500 year event, meaning tey have a .5%-.2% chance of occuring annually. Power was out up to 10 days in some areas, and 700,000 acres in of forest were damaged in Vermont. Amazingly, there were no fatalities in Vermont, unlike Quebec where 3 million people lost power and 28 were killed. The Town of West Fairlee was impacted by this ice storm.

The late 2014 through early 2015 winter season saw a long series of winter storm events from late November 2014 through late March 2015, ranging from a dusting at times to over a foot, sometimes with ice. The heaviest recorded winter precipitation event to hit Vermont recently was between December 9th and December 11th, 2014. During this period of time, much of the state of Vermont was hit with heavy, wet snow that ranged from accumulation totals anywhere from a few inches to almost two feet along parts of the Green Mountains. The heavy, wet snow stuck to tree limbs and power lines which led to widespread power outages and significant damage to the state's power infrastructure. Over 100,000 customers were without power statewide, some for multiple days, and the damage to power infrastructure caused by the storm surpassed that which was incurred as a result of the 1998 ice storm or Tropical Storm Irene. In addition to damage to power infrastructure, towns hit by the storm had significant amounts of debris clean up and removal to contend with in the spring of 2015.

Over the past few winters, West Fairlee has received numerous snow storms that have dropped significant amounts of snow over a day or two day period. However, the details of these events and the damage they

caused are overshadowed by winter weather events of the past. This is not to say such extreme events will not repeat themselves. It should be assumed that extreme winter weather events will occur at some point in the future. The following table documents the occurrence of extreme cold/snow/ice storms in the Town of West Fairlee and in Orange County:



History of Occurrences:

Date	Event	Location	Extent and Impacts
1/7/2015 - 1/8/2015	Extreme Cold	County-wide; state-wide	An arctic cold front pushed across Vermont with plummeting temperatures and brisk strong winds of 15-30 mph caused dangerously cold wind chills of 25-40 degrees Fahrenheit below zero during the evening of January 7 and morning of January 8. Temperatures in the morning of January 8 were 15-25 degrees below zero. West Fairlee registered 25 degrees below zero. Significant outages did not occur.
02/01/2015-02/28/2015	Cold/ wind chill	County-; region-wide	Vermont communities experienced the coldest month on record for over 20 years. Many communities recorded 15 to 20+ days below zero and on several days, dangerously cold wind chills of 30 below zero or colder occurred. West Fairlee experienced minimal power outages during this event.
12/09/2014—12/12/2014 (DR-4207 VT)	Snow/ Winter Storm	County-; region-wide	A powerful prolonged heavy, wet snow event from December 9th through December 11th. Snowfall totals ranged from a few inches to almost 2' near Warren, VT. The snow to liquid ratios ranged from 5-7" of snow to 1" of rain, which lead to the snow sticking to trees and power lines. A widespread 10 to 15 inches of snow fell across Orange County. West Fairlee experienced minimal power outages during this event.
03/12/2014—03/13/2014	Snow Storm	County-; region-wide	A major snowstorm with near blizzard conditions at times impacted Vermont towns. Numerous motor vehicle accidents, school and business closures resulted due to the storm on both March 12th and 13th. Snowfall totals across Orange county were generally 15 to 20+ inches. On 3/29 9 GMP customers lost power for 4 hours. On 3/13 784 GMP customers lost power for 3 hours.
02/13/2014—02/14/2014	Winter Storm	County-; region-wide	A winter storm, responsible for record ice and snow across the southeast United States on February 12th, moved and redeveloped off the southeast United states coastline on February 13th. Snowfall across Orange county was 12 to 18 inches. On 2/14 16 GMP customers lost power for durations ranging from 1.5 to 2 hours.
02/05/2014	Snow Storm	County-; region-wide	Snowfall was at its peak during both the morning and afternoon/evening commutes causing hazardous travel. Eight to twelve inches of snow fell across Orange county. Minimal power outages occurred in West Fairlee during this event.
02/02/2012	Winter Storm	County-; region-wide	An intense winter storm brought snowfall at rates of up to 2 inches per hour and dropped 10-15 inches across Orange County. Specific power outage information for West Fairlee was unavailable for this event.
2/19/2011	Cold Front; Strong Winds	County; region-wide	A strong cold front associated with a powerful storm across Canada moved across West Fairlee the night of February 18th into the early morning of February 19th. Strong west to northwest winds of 20 to 30 mph and gusts of 40-50 mph caused numerous power outages. Significant power outages did not occur in West Fairlee.
11/23/2011*	Winter Storm	West Fairlee, County-wide	Heavy snowfall accounted for numerous vehicle accidents and scattered power outages from tree limbs falling on power lines. West Fairlee recorded 7 inches of snow accumulation. Specific power outage information for West Fairlee was unavailable for this event.
12/26/2010-12/27/2010*	Winter Storm	West Fairlee, County-wide	Heavy snowfall combined with strong winds (15-25mph with gusts up to 40mph) caused blowing and drifting snow that led to accidents and power outages. West Fairlee recorded 9 inches of snow accumulation. Specific power outage information for West Fairlee was unavailable for this event.

Date	Event	Location	Extent and Impacts
02/23/2010-02/25/2010	Winter Storm	County-; region-wide	Heavy wet snow led to accumulations of 6-30 inches across central and southern Vermont, leading to power outages of 50,000 or more residents across the state of Vermont. Specific power outage information for West Fairlee was unavailable for this event.
Period from 02/22/2009-02/23/2009	Winter Storm	County-; region-wide	Heavy snow and high winds with gusts as high as 30mph it the region, impacting travel. Around a foot of snow or more fell in towns neighboring West Fairlee. Specific power outage information for West Fairlee was unavailable for this event.
12/19/2008-12/21/2008	Winter Storms	County-; region-wide	Two heavy storms moved through the region over a 2-3-day period, leading to combined snowfall totals in excess of 2 feet. High snowfall totals led to blocked ventilation pipes and some carbon monoxide injuries as well as a few collapsed small farm structures due to the weight of the snow in Orange County. Specific power outage information for West Fairlee was unavailable for this event.
02/06/2008—02/07/2008	Winter Storm	County-wide; statewide	Heavy snowfall of 10 to 16 inches fell across Orange County, prompting many school closures and vehicle accidents. Specific power outage information for West Fairlee was unavailable for this event.
02/01/2008	"Mixed" Winter Storm	County-wide; statewide	Snowfall reports were generally 2 to 5 inches with localized amounts up to 7 inches. In addition, one quarter to one half of ice accumulation (accretion) occurred as well. Finally, strong south to southeast winds around 3000 feet and above transferred to a few hilltops along the western slopes and produced wind gusts in excess of 50 mph. Specific power outage information for West Fairlee was unavailable for this event.
02/14/2007*	Snow Storm	West Fairlee; County-wide; statewide	Snow fell at 2-4 inches per hour at times amidst brisk 15-25mph winds and wind chills of -10F, making many roads virtually impassable. A total of 19 inches was reported in West Fairlee. Specific power outage information for West Fairlee was unavailable for this event.
12/06/2003-12/07/2003	Winter Storm	County-; region-wide	Steady snow fell throughout a two-day period, producing snow totals around 12-20 inches in Orange County. Specific power outage information for West Fairlee was unavailable for this event.
01/06/1998-01/16/1998 (DR-1201 VT)	Ice Storm	County-; state-wide	Ice accumulations of around 3/4 of an inch or less hit the region, causing damage to tens of thousands of trees, downed power lines, road closures due to ice coatings, vehicle accidents, and temporary cessation of milking operations at farms. Indirect injury impacts included carbon monoxide poisoning from improper generator use and hazards from tree limb/other debris. Specific power outage information for West Fairlee was unavailable for this event.

The Town of West Fairlee is no stranger to winter weather and the hazards that it brings. Depending on the event, though especially with heavy, wet snow or ice, and sometimes in combination with high winds, electricity may be knocked out from a few hours to several days. The utility company currently serving the Town of West Fairlee, Green Mountain Power, has followed a regular tree-trimming schedule. West Fairlee town officials believe this is satisfactory to mitigate damage and the power outages caused by downed trees and tree limbs

during a heavy, wet snow or ice event. In the event of an extended power outage, the Town would open its emergency shelter. More often, those without power would seek accommodations with friends or relatives.

Another complication of falling utility poles is the potential loss of the telephone line. If the landlines are impacted, the possibility presents itself that there is no reliable means of communication in the affected parts of Town, as cellular reception can be spotty. If the power is out, an internet connection is unlikely to be available.

Heavy, wet snow or large quantities of snow may also leave structures vulnerable to roof collapse. Roof collapse occurs when the structural components of a roof can no longer hold the weight of snow. Flat roofs are most vulnerable to collapse because they do not drain well, and the snow on the roof soaks up water like a sponge, increasing the weight that the roof must bear. More common, it seems, is the collapse of barns commonly used for livestock sheltering and other agricultural purposes. Unfortunately, livestock in the barn are often killed, and equipment stored in the barn may be damaged or ruined. It is difficult to determine whether a residential structure or a barn would be rebuilt after a roof collapse because the decision to rebuild would likely depend on the extent of damage. The collapse of a barn roof is likely to be a total loss, and the collapse of a house roof may be a 50% loss.

In general, winter weather is most hazardous to travelers. Icy and snow-covered roads present multiple examples of dangerous driving conditions and situations. In West Fairlee, the mountainous terrain, steep slopes, and remoteness of some roads further complicate travel. The Town relies on Travel Advisories issued by the State of Vermont Emergency Management and the National Weather Service to alert residents of dangerous travel weather. Despite this, it is difficult to prohibit people from driving during winter weather events. As a result, emergency services personnel must always be prepared to provide assistance to stranded drivers or to those who have been in an accident.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/ Probability
Extreme Cold/ Snow/Ice Storm	Town-wide	The entire Town is vulnerable, including road infrastructure, town and privately-owned buildings, utility infrastructure.	Snowfall has varied, from a few inches to over a foot or more. Heavy snow and wind may down trees and power lines. Snow/ice contributes to hazardous driving conditions.	Collapse of barn roof is often a total loss. This does not include the loss of livestock. Collapse of a house roof may be a 50% loss. For car crashes due to poor driving conditions: minimal damage to vehicle to totaled vehicle and operator injury. Health impacts could vary significantly. Loss of energy or communication capabilities may occur and impede recovery.	Highly likely

4. Water Supply Contamination/Septic

The majority of town and individuals in Vermont use groundwater as their primary source of water. While groundwater is more protected from contamination than surface water and is generally of a high quality, groundwater is still at risk of contamination from a number of point and non-point sources. Sources of surface contamination

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Water Supply Contamination**.

located directly above the aquifer may leach through the soil and into the groundwater, or groundwater contamination from another distant source may migrate, and consequently, contaminate a town or individual's water supply.

The migration of contaminates is made more complex because the patterns of groundwater movement, and their relationship to surface water movement, are not completely understood. This creates the potential for groundwater supplies to become contaminated from discrete and unknown sources. It is important to protect groundwater supplies from contamination to the greatest extent possible, because, once contaminated, it is difficult and expensive to clean them to the point where they are again suitable for drinking water. In West Fairlee, the Community Building is considered a public water supply. It is important to note that groundwater supplies can also become contaminated by bacteria from a number of sources. These sources may include: a poorly designed leach field, a ruptured septic tank, or over-application or improper storage of manure or fertilizer.

The following data was retrieved from the Vermont Department of Environmental Conservation's Spill List. It includes data copied from the Hazard Materials Spill section of this Plan that has a direct link to water supply contamination. The remaining data mentioned in the Hazard Materials Spill section below is also relevant because the spilling of any hazardous materials has the potential to contaminate the Town of West Fairlee's water supply.

History of Occurrences:

Date	Event	Location	Extent
1/8/2004	Contaminated water supply	RT-113	Unoccupied home had a water supply that was contaminated with Methyl tert-butyl ether (MTBE).
6/21/2006	Leaking AST	RT-113	West Fairlee Congregational Church had groundwater contamination above the Groundwater Enforcement Standards (GWES) due to a leaking aboveground storage tank (AST).

Hazard	Location	Vulnerability	Extent	Anticipated/Potential Impact	Likelihood/ Probability
Water Supply Contamination	West Fairlee, private homes and businesses located throughout the Town.	Private wells in West Fairlee	Depends on the amount of and location of the source of contamination—may impact one individual's well or the public water supply.	For individual homeowners who experience a heating oil spill, and the groundwater becomes contaminated: $90,000 (according to the Massachusetts Dept. Environmental Protection). For the public water supply, it would depend on the type and extent of contamination. (To clean a very small water system of MTBE (a gasoline additive) over a 10-year period are estimated at $500,000-$1,000,000.) A new supply may also be sought ($3/1000 gallons in small system and community wants a 65,000-gallon capacity) = $195,000. The costs of medical treatment are not factored in here, but could be substantial.	Occasionally

5. Climate Change

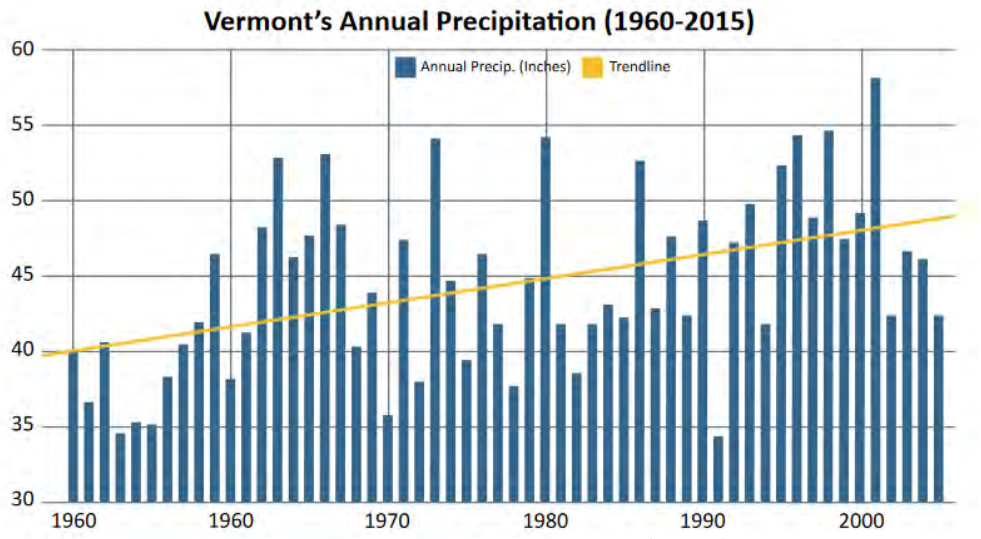


Figure 2 climatechange.vermont.gov

While Climate change is not typical hazard or a hazard in and of itself, it does have the potential to make the natural hazards West Fairlee is facing much worse. Climate change denotes a significant variation in the measures of climate lasting for an extended period of time. These measures include but are not limited to precipitation, wind patterns and temperature, and changes to these measures occur over several decades or more. This results in challenges such as more intense storms, heat, precipitation events and unusual weather events like rain and ice storms in the winter.

In Vermont two main trends driven by climate change impact natural hazards. Both related to precipitation. First, Vermont's annual precipitation is rising. This trend impacts summer storms as well as flooding and erosion. Second, extreme precipitation events are increasing as well. These events can result summer gully-washers that wash out roads and culverts, late winter melt off events that result in flooding or fall tropical events. Vermont's climate change office lists these as well as several other climate trends that include: Rising High and Low Temperatures, Less Snow Cover, Rising Average Temperatures, Shorter Winters.

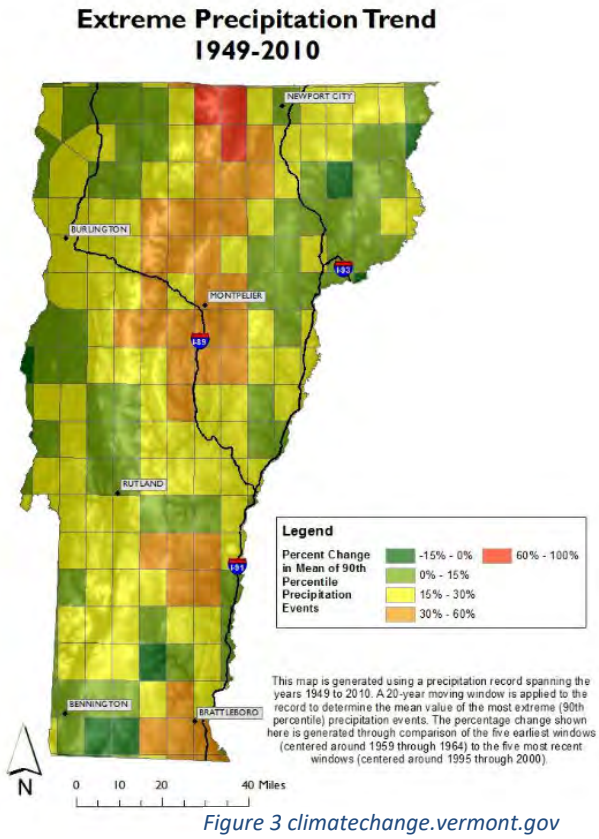


Figure 3 climatechange.vermont.gov

6. Aquatic Invasive Species

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Aquatic Invasive Species/Infestation**.

Aquatic invasive species are aquatic biota that are non-native to a given area and may cause widespread ecosystem or economic harm to a Town. They may be an organism, plant, insect, or animal that encroaches upon, displaces, diseases, or even kills native species. Planning for and mitigating the effects of existing aquatic invasive species and anticipated encroachment, whether from new forms of plant disease, plant species, insects, or animals, is critical to the future health of our landscapes, our wildlife communities, and our local economies. Managing the impacts of aquatic invasive plant species, insects, or other forms of disease would necessitate funding that is larger than is currently available to tackle invasive species and infestation issues.

Currently, an Aquatic Nuisance Control Permit is required to control nuisance aquatic species in the waterbodies of Vermont (10 V.S.A. § 1455). Control methods such as bottom barrier materials, powered mechanical devices, and chemical herbicides are likely to require a wetland permit as well. Vermont State Law also forbids the transport of aquatic plants and aquatic nuisance species to or from the waterbodies of Vermont (10 V.S.A. § 1454), unless a permit has been issued from the Agency of Natural Resources to prove that the transfer is for scientific or educational purposes.

Invasive species do not, by their nature, have boundaries. This concept was clearly demonstrated during Tropical Storm Irene, when floodwaters uprooted Japanese knotweed plants along Vermont's waterways. Years later, the fight to eradicate the knotweed has become even more protracted as it spreads along streambanks and areas beyond, choking out native plant communities and destabilizing banks.

What is known is that aquatic invasive species are already present in West Fairlee, specifically in Lake Fairlee. Below is a table of species that currently do— or are anticipated to—adversely impact the community's natural environment, and, by extension, public health, economy, infrastructure, and private property:

Species	Extent of Impact	Removal/Prevention Method
Eurasian watermilfoil (*Myriophyllum spicatum*) PRESENT	Eurasian water-milfoil competes aggressively to displace and reduce the diversity of native aquatic plants. It elongates from shoots initiated in the fall, beginning spring growth earlier than other aquatic plants. Tolerant of low water temperatures, it quickly grows to the surface, forming dense canopies that overtop and shade the surrounding vegetation (Madsen et al. 1991). Canopy formation and light reduction, are significant factors in the decline of native plant abundance and diversity observed when Eurasian water-milfoil invades healthy plant communities (Smith and Barko 1990; Madsen 1994). (Pfingsten, I.A., L. Berent, C.C. Jacono, and M.M. Richerson., 2019, *Myriophyllum spicatum* L.: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=237, Revision Date: 1/25/2018, Access Date: 6/6/2019)	There is no way to completely eradicate the species once introduced but management efforts, such as benthic barriers, mechanical harvesting, biological control, chemical treatment, and suction harvesting, can help control infestations. The best way to prevent infestation is to ensure all fragments of the plant are removed from water vessels before putting in and removing from a water access area. (VT Fish & Wildlife Dept.)
Common reed (*Phragmites australis*) NOT YET PRESENT	Common reed is a perennial grass that can grow up to 15 feet in height in a variety of waterbodies, including lakes, ponds and river edges. Underground, it has a thick system of roots and rhizomes that make it difficult to remove. It can very quickly overtake wetland communities and can crowd out native plants, change hydrology, alter habitat and increase the fire hazard potential. This aquatic invasive species was found decades ago in the neighboring Lake Morey in Fairlee but has not yet made its way to any waterbodies in West Fairlee.	There are both physical and chemical control methods for this species. Physical removal via pulling, cutting, etc. are known to be somewhat effective, but only if all cut shoots are removed in order to prevent future proliferation. Repeated treatment of herbicides approved for aquatic use are known to be effective as well. The best way to prevent infestation is to ensure all fragments of the plant are removed from water vessels before putting in and removing from a water access area.

While this Plan does not provide a complete listing of all aquatic invasive species—plant, animal, insect or otherwise—those presented are the most prolific and destructive or are areas of major concern to West Fairlee residents, municipal officials, and Vermont Agency of Natural Resources staff. Inactivity in addressing current aquatic invasive species threats will drastically compound the cost and physical effort put toward eradication efforts in the future. With proliferation trends of invasive species being extensive, West Fairlee residents can expect to see widespread growth of known species and range expansion of insect species that are not yet in the Town but are anticipated.

Aquatic invasive species control requires a three-pronged approach of vigilance, preventing further spread of a target species, and eradication. Towns, like West Fairlee, need to be appraised on the invasive species threat that are at their borders so that they can keep an eye out for and work to prevent encroachment.

Hazard	Vulnerability	Extent	Observed Impact	Likelihood
Aquatic Invasive Species/ Infestation	All waterbodies located in the Town of West Fairlee are susceptible to aquatic invasive species proliferation, depending on the species and place-dependent characteristics that allow for growth and spread of problem species.	Eurasian watermilfoil is currently present in Lake Fairlee as well as in the neighboring Lake Morey in Fairlee. There are no other official reports of aquatic invasives in waterbodies of West Fairlee but nearby lakes and rivers are highly susceptible to being introduced to the invasive mentioned in the above table.	Aquatic Invasive Species can out-compete populations of native aquatic plants and create dense surface mats that make fishing, boating, and swimming extremely difficult.	Highly Likely

6. Wildfires

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Wildfire**.

Wildfire may be sparked by natural or human activities. Lightning is one of two main natural causes of wildfire. However, across the United States, approximately 90 percent of wildfires are started by humans. According to FEMA, there are three types of wildfire that can consume natural landscapes and man-made structures and features: surface fire, ground fire and crown fire. Surface fires are slow moving across the forest floor, and, as a result, kill and damage trees. Ground fires are usually caused by lightning strikes, and burn on or below the forest floor. Crown fires, so called for their location in the crown of trees, effortlessly spread through tree tops, often aided by wind.

The Vermont landscape is especially vulnerable to wildfire during the period of time in early spring when all the snow has melted, vegetation has not begun to develop leaves, and the land and vegetation are very dry and/or dead. The majority of West Fairlee (89% of the Town's land area) is covered by forest and includes larger forest blocks like the Brushwood Community Forest which is managed by the West Fairlee Conservation Commission with assistance from the Orange County Forester. This location as well as the Brushwood Community Forest, would likely be vulnerable to increased wildfire damage. In 2010, the West Fairlee Volunteer Fire Department installed two dry hydrants in town which has greatly impacted response efforts in the Wild Hill, Middle Brook, and Blood Brook areas. There was one wildfire in late spring 2001 that covered 7 acres on Marsh Hill Road.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/ Probability
Wildfire	Areas surrounding the Bradford Municipal Forest and the Brushwood Community Forest.	Private property, town buildings, utility infrastructure	Up to this point, the extent of damage has been minimal but all that is needed are the right conditions to experience a more damaging wildfire, especially because 89% of the Town is forested.	Unknown—data gap.	Likely/Highly likely

7. Hazardous Material Spill

Hazardous materials include any biological, chemical, or physical substances that can harm human beings or the environment. [3] These materials can be released in a variety of different ways to varying degrees of severity. When hazardous materials are released, response is required in order to minimize the extent of contamination and to reduce the impact on human health and property

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Hazardous Materials Spill**.

Based on available VT Tier II data, there are four sites in town that have sufficient types and/or quantities of hazardous materials to require reporting. These sites include the West Fairlee Town Clerk, the Town Community Building, the Elementary School, and the Fire Department. The Town of West Fairlee, and the majority of its inhabitants live along Route 113. Route 113 serves as the predominant throughway through West Fairlee, and it connects the Town to neighboring Vershire and Thetford. Route 113 borders the Ompompanoosuc River through the Town of West Fairlee and is vulnerable to contamination in the event of a hazardous material spill. No major, functioning interstate highways or railways run through or near the Town. There are 6 critical facilities in the Town of West Fairlee. There are 264 total structures that are located within 1,000 feet of a potential HAZMAT spill on major roads, such as Route 113. These consist of 248 residential, 7 commercial, 9 government/public/houses of worships. This includes the Volunteer Fire Station and Community Building ~~Center~~. In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be $1,993,200.

It should also be noted that the State of Vermont currently has one fully-trained HAZMAT response team, with vehicles located in Essex Junction, Brandon, and Windsor. The HAZMAT crew chief is available within minutes of a call for the team but on-scene response would be a matter of hours. In the event of a serious accident in Town, there would be little time for evacuation and response would be difficult.

The following data was retrieved from the Vermont Department of Environmental Conservation's Spill List and by searching the archives of local newspapers. The table above is used to illustrate the ease with which trucks and the day-to-day activities in the Town have the potential to create a hazardous material spill and dangerous conditions for emergency responders and town residents.

History of Occurrences:

Date	Event	Location	Extent and Impacts
11/1/2016	Hydraulic oil spill	Route 113 mile marker 2.6	20 gallons of Hydraulic fluid oil was released on roadway and in driveways along road. Vermont Agency of Transportation deployed sand to roadway and pads deployed to pooled fluid. Approximately 2.5 yards of driveway material excavated for disposal.
9/12/2016	Motor oil spill	West Fairlee Road	20 gallons of used oil fell off/out of vehicle onto road. Fire department deployed boom pad and speedy dry.
11/17/2015	Diesel and waste oil spill	823 Route 113	2 cubic yards of Diesel PCS excavated and 5 cubic yards of waste oil pcs excavated during tank removal at Eastman's Garage.

[3] Tufts University. (2016). *Hazardous materials spill.* Office of Emergency Management. Retrieved from http://emergency.tufts.edu/guide/hazardous-spill/

7/22/2007	Diesel oil spill	Route 113 and Beanville Road	A car accident at the intersection of Route 113 and Beanville Road resulted in the release of 44 gallons of diesel fuel release. Fire Department spread SeediDri and collected it for disposal.
6/21/2006	Leaking AST	954 Route 113: West Fairlee Congregational Church	A leaking Above ground storage tank (AST) resulted in groundwater contamination.
6/23/2005	Truck rollover	Wild Hill Road	A truck rollover occurred, but luckily no fuel was lost.
1/8/2004	MBTE	908 Route 113	A MBTE exposure in an unoccupied home contaminated water supply.
11/11/1996	Kerosene Spill	Cray Residence	150 gallons of kerosene were release d from an above ground storage tank (AST).

While only a small number of large hazardous material spills have occurred in the Town of West Fairlee, the potential for a major spill exists. Route 113, particularly at its points of intersection, pose constant threats to the Town of West Fairlee. This route serves as the main thoroughfare for trucks and other motor vehicles transporting a wide-range of goods, including a wide range of hazardous materials, within the confines of West Fairlee. A truck accident and a resulting hazardous material spill could be exceedingly disastrous for the Town and its residents. Route 113 also borders he Ompompanoosuc River, and a hazardous material spill would severely impact the quality of water in the river.

In order to prepare for hazardous material spills in West Fairlee, most members of the West Fairlee Fire Department are trained to the HAZMAT Awareness level.

Hazard	**Location**	**Vulnerability**	**Extent**	**Impact**	**Likelihood/ Probability**
Hazardous Materials Spill	Vermont Route 113, and local roads.	Roads, nearby structures (Fire Station and Community Center) and Ompompanoosuc River	Initially, local impacts only; but depending on material spilled, extent of damage may spread (ex. into groundwater).	264 structures within 1,000 feet of a potential HAZMAT spill on major roads, such as Route 113. These consist of 248 residential, 7 commercial, 9 government/public/houses of worships. This includes the Volunteer Fire Station and Community Center. In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be $1,993,200.	Likely

C. Vulnerability Summary

As a result of the above profiled hazards, the Town believes the following vulnerabilities to be of highest concern due to their potentially severe consequences and likelihood of occurrence:

- **Flash Flood/Flood/Fluvial Erosion:** One of the worst threats, flooding impacts roads and the village center, especially facilities for children, elders, and community emergency shelters. Under-sized bridges and culverts factor into the threat, with West Fairlee being home to many known, problematic choke points (as identified by the LHMP Committee). Out-dated flood hazard mapping for Orange County also compounds existing threats. Furthermore, flood hazard mapping (Special Flood Hazard Areas) does not adequately encompass all areas that could be flooded, thus potentially making some residents too complacent in regard to the threat. In addition, numerous homes and public facilities are located in the 500-year floodplain and could be impaired by a major flood event. Specific vulnerable roads include Roberts Road, Back Street, and Beanville Road. There are 15 residential (6 single family homes and mobile homes) and 1 public gathering located in the special flood hazard area. These structures are valued at $2,265,000. Specific vulnerable structures include Camp Billings, which is located on the shore of Lake Fairlee. There are 36 structures (35 residential and 1 commercial) located within the mapped Vermont River Corridor. These structures are valued at $5,436,000.
- **Severe Summer Weather & Hurricanes/Tropical Storms:** Damage to public and private property and municipal infrastructure can be extensive during severe weather events. Prolonged power outages and downed cellular communications can greatly hamper public and business services for indeterminate periods of time. Specific vulnerable roads include Roberts Road, Back Street, and Beanville Road. There are 15 residential (6 single family homes and mobile homes) and 1 public gathering located in the special flood hazard area. These structures are valued at $2,265,000. Specific vulnerable structures include Camp Billings, which is located on the shore of Lake Fairlee. There are 36 structures (35 residential and 1 commercial) located within the mapped Vermont River Corridor. These structures are valued at $5,436,000.
- **Extreme Cold/Snow/Ice Storms:** Lack of access to power and telecommunication services throughout the Town could severely impede response efforts and could be especially harmful to vulnerable populations (e.g., the elderly and disabled).

VI. Mitigation

A. Mitigation Goals

1. To reduce injury and losses from the natural hazard of flash flooding/flooding/fluvial erosion.
2. To reduce injury and losses from the natural hazard of severe summer weather/ hurricanes/tropical storms.
3. To reduce injury and losses from the natural hazard of extreme cold/snow/ice storms.
4. To increase awareness of the impact of climate change on the primary hazards.
5. To reduce injury and losses from the following secondary natural hazards: Water Supply Contamination, Invasive Species (Aquatic), Wildfire and Hazardous Material Spill.

B. Excerpted Town Plan Goals & Objectives Supporting Local Hazard Mitigation

- The Town of West Fairlee encourages the private conservation of land (page 24).
- Consistent with the guidance of the Vermont Agency of Natural Resources and except for preexisting residential lots, a 100-foot undisturbed natural buffer is required along the lakefront (page 25).
- To encourage agricultural and outdoor recreational use on the high-quality soils of the floodplain (page 26).
- To recognize and maintain the floodplain functions of the valley particularly sediment storage and nutrient retention (page 26).
- New development within the limits of the 100-year floodplain is strongly discouraged. Improvements to existing structures in the floodplain are acceptable, provided that careful planning is done to ensure against unnecessary loss of property or public endangerment (pages 26).
- Preservation of the natural state of streams and, to the extent possible, Lake Fairlee shall be encouraged by the protection of adjacent wetlands and natural areas, protection of natural scenic qualities, protection of streams and Lake Fairlee from invasive plants and elimination of invasive where they have already taken hold, and maintenance of existing streambank and buffer vegetation including trees together with wildlife habitat (pages 45)
- Consistent with the guidance of the Vermont Agency of Natural Resources a buffer zone of 50 feet must be maintained contiguous to all rivers and streams (page 45).
- To identify and encourage land use development practices that will avoid or mitigate adverse impacts on significant wetlands (page 46).
- Structural development or intensive land uses shall not be located in wetlands or within the buffer zones of wetlands established by the rules of the Vermont Water Resources Board. According to these rules, the buffer zone contiguous to a Class One wetland is 100 feet, and the buffer zone contiguous to a Class Two wetland is 50 feet (page 46).
- Developments adjacent to wetlands shall be planned so as not to result in undue disturbance to wetland areas or their function. Mitigating measures to protect the function of a wetland are an acceptable measure (page 46).
- To enhance and maintain use of flood hazard areas as open space, greenways, agricultural and/or non-commercial recreation land (page 48).

- To ensure no net loss of flood storage capacity in an effort to minimize potential negative impacts. These impacts include the loss of life and property, disruption of commerce, and demand for extraordinary public services and expenditures that result from flood damage (pages 48).
- To maintain maps that reflect as accurately as possible the flood hazard areas to assist in appropriate land use decisions (page 48).
- To recognize that upland areas adjacent to unstable rivers and to steep streams may be at risk to erosion during floods (page 48).
- It is the policy of the Town that the preferred uses for flood hazard areas shall be for open space, greenbelts, recreational, agricultural and non-commercial uses (page 48).
- Any land use activity within flood hazard areas which would result in net loss of flood storage or increased or diverted flood levels or increased risk to adjacent areas shall be prohibited (page 48).
- Utilities serving existing development may be located within these areas only when off-site options are not feasible and provided that these utilities or facilities are relatively protected from flooding damage (page 48).
- Flood hazard regulations shall be extended to areas identified as at risk to flood erosion (page 49).
- All upland areas adjacent to unstable rivers and to steep streams that are at risk of erosion during flood shall be identified and mapped (page 49).
- Review and update the town's current Flood Hazard Bylaw (page 49).
- In consultation with regional and State experts, the Town shall consider prohibiting any and all new construction in the flood hazard areas and floodplains (page 49).
- To maintain and ensure the integrity of the town's soils and to prevent soil erosion (page 49).
- All commercial or housing development projects or proposals in areas of shallow soils, steep slopes or high-water table must include detailed plans for avoiding or preventing soil erosion. It shall be the responsibility of owners who develop in these areas to restore all soils lost to erosion, all water bodies or waterways contaminated and wildlife habitats negatively impacted as a consequence of their development (page 49).
- While considering subdivision regulations, the Selectboard and the Planning Commission shall pursue the question of whether these regulations should include measures to protect the integrity of soils generally and especially in areas of shall soils, steep slopes, or high-water table (page 50).
- Continue the quality maintenance and repair of Class 2 and 3 roads (page 82).
- The Town must include in its annual budget a capital reserve fund for road maintenance sufficient to pay for items in the five-year maintenance plan (page 82).

The West Fairlee Town Plan was updated and adopted on 03/7/2017 and has an 8-year lifespan.

B. Hazard Mitigation Strategies: Programs, Projects & Activities

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3)(ii), 201.6(c)(3)(iii) and 201.6(c)(3)(iv).

Vermont Emergency Management encourages a collaborative approach to achieving mitigation at the local level through partnerships with Vermont Agency of Natural Resources, VTrans, Vermont Agency of Commerce and Community Development, Regional Planning Commissions, FEMA Region 1 and others. That said, these agencies and organizations can work together to provide assistance and resources to towns interested in pursuing hazard mitigation projects.

With each mitigation strategy, general details about the following are provided: local leadership, possible resources, implementation tools, and prioritization. The prioritization category is based upon the economic impact of the action, West Fairlee's need to address the issue, the cost of implementing the strategy, and the availability of potential funding. The cost of the strategy was evaluated in relation to its benefit as outlined in the STAPLEE guidelines (includes economic, political, environmental, technical, social, administrative, and legal criteria). A range of mitigation strategies was vetted by the committee, and those that were determined to be feasible are included in the table below.

Strategies given a "High" prioritization indicate they are either critical or potential funding is readily available, and should have a timeframe of implementation of less than two years. A "Medium" prioritization indicates that a strategy is less critical or the potential funding is not readily available, and has a timeframe for implementation of more than two years but less than four. A "Low" prioritization indicates that the timeframe for implementation of the action, given the action's cost, availability of funding, and the community's need to address the issue, is more than four years.

These projects in the table below are dependent on local and external grant funding, landowner concerns and willingness as well as many other factors. This list does not bind the Selectboard to complete these projects but instead reminds them and the Town that these are important mitigation priorities.

The Town of West Fairlee understands that, in order to apply for FEMA funding for mitigation projects, a project must meet more formal FEMA benefit cost criteria. A project seeking FEMA funds would undergo a full benefit-cost assessment in the FEMA-approved format. The Town must have a FEMA-approved Local Hazard Mitigation Plan as well.

The following strategies will be incorporated into the Town of West Fairlee's long-term land use and development planning documents. In addition, the Town will review and incorporate elements of this Local Hazard Mitigation Plan into updates for the municipal plan, zoning regulations, and flood hazard/ fluvial erosion hazards River Corridors bylaws. Specifically, the West Fairlee Planning Commission will incorporate mitigation strategies included in this Plan into the West Fairlee Town Plan's goals, policies, and recommendations. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, zoning regulations and flood hazard/River Corridor bylaws will also be considered after declared or local disasters. The Town shall also consider reviewing any future TRORC planning documents for ideas on future mitigation projects and hazard areas.

Hazard(s) Mitigated	Mitigation Actions	Local Leadership	Prioritization	Possible Resources*	Time Frame
All Hazards	*Ensure that West Fairlee's Local Emergency Management Plan (LEMP) is kept up-to-date, identifies vulnerable areas, and references this plan. (Preparedness)*	Emergency Management Director.	High (Action #1 of 7 in 2011 Plan).	Local resources; TRORC.	Yearly
	Keep gasoline powered generator located at town garage and school operational to be used in an emergency. (Preparedness)	Road Contractor, Principal	Medium (New).	Local Resources	Check generator every six months
	Develop town and neighborhood communication through lists and town list serv	Emergency Management Director.	High (New).	Local Resources	Winter 2022
Flood	*Update flood bylaws with river corridors and higher minimums*	Planning Commission	Medium (Action #5 of 7 in 2011 Plan).	Local Resources	Spring 2022
	Consider buyouts if landowners are willing along river sides of Back St., Beanville Rd	Selectboard	Medium	HMGP grant	Spring 2021
	Upsize culverts to 18" minimum (70/213 or 30% below 18") to mitigate washouts	Road Contractor	High (Action #5 of 7 in 2011 Plan).	Local Resources	Spring 2021 and 2022
	Add road subbase underdrains on Middlebrook Rd to Bradford and Wild Hill to mitigate washouts	Road Contractor	Low (New).	Local Resources	Spring 2025
	Beaver Meadow Road near Ravenwood culvert upsize to 36" or larger based on watershed, stream channel assessment	Road Contractor	Medium (New).	Local Resources	Spring 2023
	Add new concrete kneewalls on Back St Bridge to protect abutments and assess overall bridge condition and create repair plan	Road Contractor	Low (New).	Local Resources	Spring 2025
Fire	*Maintain existing dry hydrants, by checking, servicing, flushing, and opening them annually. Maintenance of hydrants will reduce the loss of life and infrastructure from structure fires. (Preparedness)*	Fire Chief/Fire Department	High (Action #6 of 7 in 2011 Plan).	Local Resources	Every Spring
	VFD survey of large batteries (solar Powerwall)	Fire Chief/Fire Department	Medium (New).	Local Resources	Spring 2020

Hazard(s) Mitigated	Mitigation Actions	Local Leadership	Prioritization	Possible Resources*	Time Frame
Hazardous Material Spill	*Ensure that all emergency response and management personnel continue to receive HAZMAT Awareness training at a minimum. (Preparedness)*	West Fairlee Fire Department	High (Action #7 of 7 in 2011 Plan).	West Fairlee Fire Department resources	Review Yearly
Extreme Cold/Snow/Ice Storms/ Severe Weather (high wind)	*Identify power critical customers that are vulnerable to power outages. (Preparedness).*	Emergency Management Director	High	Local Resources	Spring 2020

*Depending on the mitigation action, local resources may include the following: town personnel/staff time; volunteer time; town budget, donations, among others. ** The second priority action identified in the 2009 West Fairlee Pre-Disaster Mitigation Plan has been completed.

CERTIFICATE OF ADOPTION
December 2, 2019
TOWN OF West Fairlee, Vermont Selectboard
A RESOLUTION ADOPTING THE West Fairlee, Vermont 2019 Local Hazard Mitigation Plan

WHEREAS, the Town of West Fairlee has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **West Fairlee, Vermont 2019 Local Hazard Mitigation Plan,** which result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of West Fairlee has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its **West Fairlee, Vermont 2019 Local Hazard Mitigation Plan (Plan)** under the requirements of 44 CFR 201.6; and

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

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

WHEREAS, adoption of this **Plan** will make the Town of West Fairlee eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by Town of West Fairlee Selectboard:

1. The **West Fairlee, Vermont 2019 Local Hazard Mitigation Plan** is hereby adopted as an official plan of the Town of West Fairlee;

2. The respective officials identified in the mitigation action plan of the **Plan** are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Future revisions and **Plan** maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the process of the implementation elements of the Plan will be presented to the Selectboard by the Emergency Management Director.

IN WITNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of West Fairlee this 2nd day of December 2019.

ATTEST

Town Clerk 12/4/19

Selectboard Chair

Selectboard Member

Appendices

Appendix A: Bridges and Critical Stream Crossings

Critical crossings include stream crossing structures on town highways that cross third order streams or larger. Headwater streams generally include first through third order. Third order was included as these headwater streams will have larger drainage areas and may have larger structures that are more difficult to replace and have a larger impact on the road network.

Culverts:

local_id	material	road	height	width	length	oa_cond
3	Steel Corrugated	BEANVILLE RD	15	15	40	Fair
17	Steel Corrugated	MIDDLEBROOK RD	144	72	40	Excellent
20	Steel Corrugated	MIDDLEBROOK RD	120	90	50	Excellent
30	Steel Corrugated	MIDDLEBROOK RD	120	84	50	Excellent
36	Steel Corrugated	MIDDLEBROOK RD	120	84	60	Good
1	Steel Corrugated	MARSH HILL RD	60	60	30	Good

Town Short Bridges and Large Culverts:

B14		Bear Notch Road	Trib to Middle Brook
B19		King Hill Road	Blood Brook
Culvert Arched	20’ span by 80’ long	Beanville Rd	Beanville Brook

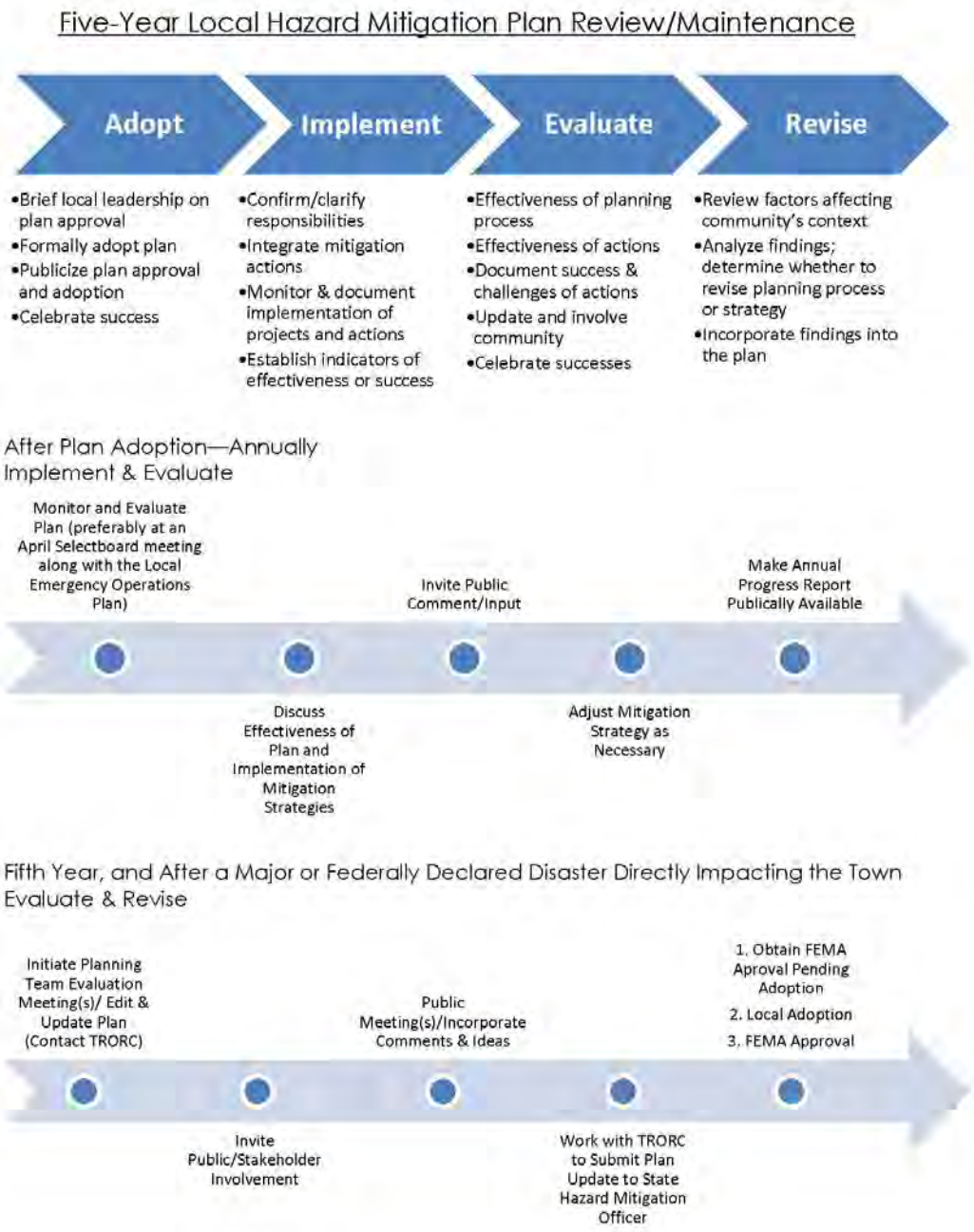
Town Long Bridges:

Bridge Number: 00008, Route: C2001, Approx. Location: 0.1 MI TO JCT W VT113	Report	Photos
Bridge Number: 00019, Route: C3028, Approx. Location: 0.12 MI E OF JCT. VT.113	Report	Photos

Other Town Long Bridges:

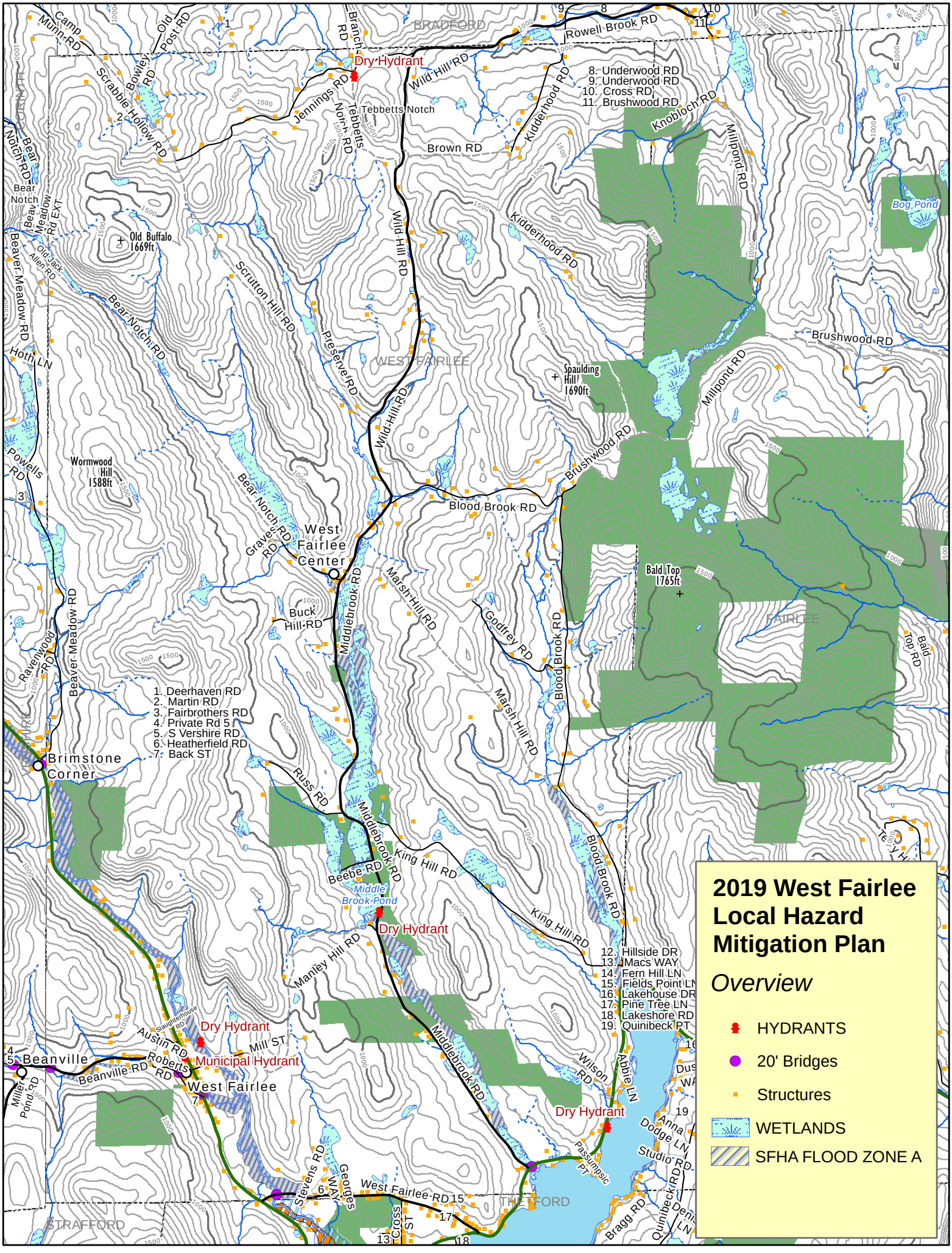
Bridge Number: 00007, Route: C2003, Approx. Location: 0.85 MI TO JCT W VT113	Report	Photos
Bridge Number: 00018, Route: C3029, Approx. Location: 0.01 MI TO JCT W CL2 TH3	Report	Photos

Appendix B: Five-Year Review and Maintenance Plan



Attachments

Attachment A: Map of the Town of West Fairlee


2019 West Fairlee Local Hazard Mitigation Plan
Overview
HYDRANTS
20' Bridges
Structures
WETLANDS
SFHA FLOOD ZONE A
1. Deerhaven RD
2. Martin RD
3. Fairbrothers RD
4. Private Rd 5
5. S Vershire RD
6. Heatherfield RD
7. Back ST
8. Underwood RD
9. Underwood RD
10. Cross RD
11. Brushwood RD
12. Hillside DR
13. Macs WAY
14. Fern Hill LN
15. Fields Point LN
16. Lakehouse DR
17. Pine Tree LN
18. Lakeshore RD
19. Quinibeck PT
Dry Hydrant
Municipal Hydrant
Middle Brook Pond
Bog Pond
Old Buffalo 1669ft
Wormwood Hill 1588ft
Spaulding Hill 1690ft
Bald Top 1765ft
Tebbetts Notch
West Fairlee Center
Brimstone Corner
Beanville
West Fairlee
BRADFORD
WEST FAIRLEE
FAIRLEE
THETFORD
STRAFFORD
Rowell Brook RD
Wild Hill RD
Brown RD
Kidderhood RD
Knobloch RD
Millpond RD
Brushwood RD
Blood Brook RD
Bear Notch RD
Scrutton Hill RD
Preserve RD
Graves RD
Buck Hill RD
Middlebrook RD
Marsh Hill RD
Godfrey RD
Russ RD
King Hill RD
Beebe RD
Manley Hill RD
Austin RD
Mill ST
Roberts RD
Beanville RD
Stevens RD
Georges WAY
West Fairlee RD 15
Cross ST
Wilson RD
Abbie LN
Anna Dodge LN
Studio RD
Passumpsic PT
Bragg RD
Quinibeck RD
Beaver Meadow RD
Ravenwood RD
Powells RD
Hoth LN
Camp Munn RD
Old Post RD
Bowley RD
Scrabble Hollow RD
Jennings RD
Branch RD
North RD
Tebbetts RD
Bear Notch RD
Bear Meadow Rd EXT
Old Jack Allen RD
Miller Pond RD
Slaughterhouse RD
Top RD
Bald