

**Town of Granville, Vermont**  
**Local Hazard Mitigation Plan**

**Adopted October 16, 2019; Approved October 23, 2019**

*Prepared by the Two Rivers-Ottawaquechee Regional Commission and the Town of Granville*

**Table of Contents**

**I. Introduction.....2**

**II. Purpose of the Plan .....2**

**III. Community Profile .....2**

**IV. The Planning Process.....4**

- A. Plan Developers ..... 4
- B. Plan Development Process ..... 5
- C. Status Update on Mitigation Actions Identified in 2014 ..... 8
- D. Existing Hazard Mitigation Programs, Projects & Activities ..... 12
- E. Plan Maintenance ..... 14

**V. Community Vulnerability by Hazard .....15**

- A. Hazard Identification ..... 15
- B. Hazard Profiles for “Top Hazards” ..... 19
  - 1. Hazardous Materials Spill ..... 19
  - 2. Flash Flood/Flood/Fluvial Erosion ..... 21
  - 3. Severe Weather (Thunderstorm, Lightning, High Winds, Hail, Flooding) ..... 26
  - 4. Extreme Cold/Snow/Ice Storm ..... 30
  - 5. Landslides/Mudslides/Rockslides ..... 34

**VI. Mitigation.....36**

- A. Goals ..... 36
- B. Excerpted Town Plan Goals & Objectives Supporting Local Hazard Mitigation ..... 36
- C. Hazard Mitigation Strategies: Programs, Projects & Activities ..... 37

**Appendices .....40**

- Appendix A: Hazard Ranking Methodology ..... 40
- Appendix B: Critical Stream Crossings ..... 41
- Appendix C: Certificate of Adoption ..... 42

**Attachments.....43**

- Attachment A: Map of Granville ..... 43

## **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 Granville 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 Granville in identifying all hazards facing the town, ranking them, and identifying strategies reduce risks from known priority hazards.

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

The 2014 Granville Local Hazard Mitigation Plan was 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.

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

## **III. Community Profile**

Granville, Upper and Lower, was first chartered as the Town of Kingston, August 2, 1781. The name was later changed to Granville in 1833. Population rose to a high of around 1,100 in the mid-1880s. Since then, a steady decline has brought it to a low of about 200 in 1950 and a slow increase since then to a 2000 population of 303. In 2010, the number of people living in Granville dropped slightly to 298. In East Granville, a once-bustling railroad siding and manufacturing district is now a row of houses along Route 12A with no businesses at all. Approximately 46% of the total acreage of the Town is Green Mountain National Forest.

According to the U.S. Census data, there were 244 housing units in Granville in 2010, an increase of 26 from the 218 housing units reported in 2000. Of the 244 housing units, 116 were owner-occupied and 83 were considered seasonal or secondary homes. The median year for housing units built in Granville is 1967, older than the median year for both Addison County and Vermont which is 1972.

The Town lies within the service area of Green Mountain Power, which supplies electrical power to all sections of town.

Granville has a small but dedicated volunteer fire department that works with the Town on a contract basis to provide fire protection, rescue, HAZ-MAT, and emergency medical first response. The fire station houses four fire trucks and other firefighting equipment. The fire department also has mutual fire protection agreements with Hancock, Warren, Ripton, Waitsfield and Rochester. Another mutual aid agreement is currently being worked on with the town of Randolph. The Town is also served by White River Valley Ambulance which provides service to Granville, Hancock, and Rochester. East Granville is served by the White River Valley Ambulance and by Randolph's fire departments.

The Vermont State Police is the primary law enforcement agent in the Town of Granville. A town elected First Constable functions in a supplemental role. A second Constable is also elected for East Granville but serves no law enforcement function.

The closest hospital is Gifford Medical Center, located in Randolph. Medivac services are available by the DHART helicopter.

## IV. The Planning Process

### A. Plan Developers

Jessica Richter, a Planner at the Two Rivers-Ottawaquechee Regional Commission (TRORC), assisted the Town of Granville with updating its Hazard Mitigation Plan. 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
Bruce Hyde	Granville Selectboard Chair	On 5/21/2019, TRORC contacted the Town of Granville to begin updating and developing their new Hazard Mitigation Plan. TRORC staff coordinated with Granville town officials to set up an introductory meeting. The first meeting was scheduled for 6/24/2019. TRORC's staff attended that meeting, followed by subsequent meetings in which participants revised and developed the HMP. See below for more meeting-specific details.
Mark Belisle	Granville Health Officer, E911 Coordinator, Constable, EMD, Animal Control Officer, and Building & Grounds Manager	
Dan Sargeant	Granville Fire Department, Fire Chief	
Jim Dague	Granville Road Commissioner	
Rachel Grigorian	Granville Planning Commission Member	
Bill Cavanaugh	Granville Planning Commission Member	
Dennis Demers	Granville Planning Commission Member	
Ron Millard	Corner School Resource Center of Granville	
Marilyn Doughrity	Granville Resident	
Shawn Doughrity	Granville resident	

#### **Additional Participants in the Process:**

- Megan Bender, Granville Conservation Commission Chair
- Jamie Dague, Granville Conservation Commission Member
- Siobhan Neale, Granville Conservation Commission Member
- Amy Carst, Granville Conservation Commission Member
- Stacy O'Connell, Granville Resident

## B. Plan Development Process

The 2009 Granville Annex was originally part of the 2008 multi-jurisdictional Regional Hazard Mitigation Plan, drafted by Two Rivers-Ottawaquechee Regional Commission, and approved by FEMA on September 30, 2008 with its first local annex.

The Granville Annex received subsequent FEMA approval, but since it was part of a larger plan, FEMA treats its start date as September 30, 2008 and so the Granville 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.

In 2014, the Plan was reconstructed as a single jurisdiction, standalone Granville Local Hazard Mitigation Plan that was submitted for individual approval to FEMA. It was approved on July 22, 2014 and expired on July 22, 2019.

This Plan includes a reranking of the hazard identification table, updates to the history of occurrences for the top hazards, and a reassessment of mitigation actions.

The changes to this plan include:

- **General**
  - Data updates: New hazard incidents including the addition of extreme cold events, emergency declarations, and mitigation actions;
  - Hazards have been reevaluated with the hazard ranking system used by the Vermont Division of Emergency Management and Homeland Security;
  - Discussions on the ability of the Town to expand or improve upon existing mitigation actions, as well as how both development and mitigation work has impacted vulnerabilities within Granville have been added;
  - Essential Services Map has been updated with the most recent geospatial data.
- **Hazards Analysis**
  - Hazardous Material Spill, Severe Weather, Flash Flood/Flood/Fluvial Erosion, Landslides/Mudslides/Rockslides and Extreme Cold/Snow/Ice Storm are still on the list of “top hazards,” which reflects the local officials’ belief that the Town is still vulnerable to these hazards;
  - Landslides/Mudslides/Rockslides were ranked lower within the “top hazards” which reflects reduced prioritization compared to the last Plan.

The following represent the avenues taken to draft the Granville Hazard Mitigation Plan:

- **Activities**
  - 6/24/2019: Met with Granville Town Officials to introduce the update/plan development process, reviewed parts of Granville’s existing Hazard Mitigation Plan (adopted in July 2014), potential hazards, and the data collection/research process. During this meeting, the Granville Town Officials also discussed and ranked hazards. Also reviewed the “Top Hazards” in the Town. Explained to the committee what the next steps in the process were (determine mitigation actions, draft plan, then schedule

a meeting to review and discuss it). A notice regarding this meeting was posted in the Herald of Randolph, on the Granville website, and on the Granville/Rochester/Hancock Front Porch Forum.

- 7/8/2019: Met with Granville Town Officials to devise a list of hazard mitigation actions to address the Town's top five hazards, as determined during the hazard ranking exercise on 6/24/2019. Also discussed updates to the first draft of the Plan. A notice regarding this meeting was posted in the Herald of Randolph, on the Granville website, and on the Granville/Rochester/Hancock Front Porch Forum.
- 7/29/2019: Granville Town Officials and TRORC held a public hearing to review the draft of the Plan and take comments or questions from the public. A public hearing notice regarding this meeting was posted in the Herald of Randolph, on the Granville website, on the Granville/Rochester/Hancock Front Porch Forum, and flyers were posted at various locations around town including in the Town Clerk Office and Town Hall. No changes to the Plan resulted from the hearing.

- **Public participation and involvement (44 CFR 201.6(b)(1))**

*\*\*Note: The meetings listed below were public sessions.*

- 6/24/2019: Met with Granville Town Officials to introduce the update/plan development process, reviewed parts of Granville's existing Hazard Mitigation Plan (adopted in July 2014), potential hazards, and the data collection/research process. During this meeting, the Granville Town Officials also discussed and ranked hazards. Also reviewed the "Top Hazards" in the Town. Explained to the committee what the next steps in the process were (determine mitigation actions, draft plan, then schedule a meeting to review and discuss it). A notice regarding this meeting was posted in the Herald of Randolph, on the Granville website, and on the Granville/Rochester/Hancock Front Porch Forum.
- 7/8/2019: Met with Granville Town Officials to devise a list of hazard mitigation actions to address the Town's top five hazards, as determined during the hazard ranking exercise on 6/24/2019. Also discussed updates to the first draft of the Plan. A notice regarding this meeting was posted in the Herald of Randolph, on the Granville website, and on the Granville/Rochester/Hancock Front Porch Forum.
- 7/29/2019: Granville Town Officials and TRORC held a public hearing to review the draft of the Plan and take comments or questions from the public. A public hearing notice regarding this meeting was posted in the Herald of Randolph, on the Granville website, on the Granville/Rochester/Hancock Front Porch Forum, and flyers were posted at various locations around town including in the Town Clerk Office and Town Hall. No changes to the Plan resulted from the hearing.

- **Governmental participation and involvement (44 CFR 201.6(b)(2))**

- Sent revised draft to Selectboard Chair— 7/16/2019

- **Neighboring community participation and involvement (44 CFR 201.6(b)(2))**

- Notices were placed on the Hancock/Rochester/Granville Front Porch Forum for each public meeting and comments and questions were encouraged: 6/24/2019, 7/8/2019, 7/29/2019.
  - No comments were received from the neighboring towns of Rochester and Hancock.
- Notices were posted in the Herald of Randolph for each public meeting: 6/24/2019, 7/8/2019, 7/29/2019.
  - Notices ran in the 6/20/2019, 6/27/2019, and 7/4/2019 editions.
- After receiving initial comments from Vermont Emergency Management, the draft of the 2019 LHMP was sent to the neighboring towns of Hancock, Rochester, Braintree, Roxbury, Warren, Lincoln, and Ripton, and contact information was provided in order to receive any comments back. No comments were received. – 9/3/2019
- **Review of existing plans, studies, reports, and technical information (44 CFR 201.6(b)(3))**
  - 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.
  - Granville Hazard Mitigation Plan (Adopted 7/22/2014)
    - This Plan was referenced extensively during the plan development process, especially in regard to the worst threats and mitigation action strategies identified in 2009.
  - Granville Town Plan (Adopted 6/16/2014)
    - The Town Plan provided TRORC’s staff with background information on the community, as well as more detail on their emergency services.
  - Granville’s Flood Hazard Bylaw (Adopted 07/27/2009)
    - The Flood Hazard Bylaw was referenced when drafting the Flash Flood/Flood/Fluvial Erosion and Severe Weather sections of this Plan.

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).

### C. Status Update on Mitigation Actions Identified in 2014

The following table outlines the mitigation actions that were proposed in Granville’s 2014 Local Hazard Mitigation Plan (adopted on July 22, 2014 by FEMA).

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

Participants in the new Plan update process reviewed these actions and reported on the status of each:

Hazard(s) Mitigated	Mitigation Action	Local Leadership	Prioritization	Possible Resources	Time Frame	2019 - Status of Mitigation Actions
All Hazards	Ensure that Granville’s Local Emergency Operations Plan (LEOP) is kept up-to-date and identifies vulnerable areas and references this Plan.	Selectboard	High	Local resources	Annually	The LEOP was last updated on 4/27/2018. The newest iteration of the LEOP is the Local Emergency Management Plan (LEMP). The LEMP will be updated on an annual basis.
	Consistently document municipal infrastructure damage after weather events.	Selectboard, Road Commissioner	High	Local resources	As needed	Municipal infrastructure damage is documented as need.
	Designate a shelter at the Granville Town Office.	EMD in coordination with the Selectboard	Low	Local resources	2-5 years	A shelter has been designated at the Granville Town Office.
Hazardous Material Spill	Ensure that all emergency response and management personnel continue to receive HAZMAT Awareness training at a minimum.	Fire Department	High	Local resources	As needed	HAZMAT Awareness training is provided as needed.
	Identify hazardous material storage tanks in flood hazard areas, and raise awareness on risk factors during floods.	Selectboard	Medium	Local resources	2-4 years	Hazardous material storage tanks have been identified but have not been compared against flood hazard area boundaries. The Town will continue to work on this.
Landslides/ Mudslides/ Rockslides	Complete an inventory of locations where critical facilities, buildings, and infrastructure are vulnerable to landslides/ mudslides/rockslides.	EMD, Road Commissioner, Selectboard	High	Local resources	1-2 years	The Town is in the process of completing an inventory of retaining walls within town boundaries.



Hazard(s) Mitigated	Mitigation Action	Local Leadership	Prioritization	Possible Resources	Time Frame	2019 - Status of Mitigation Actions
	Upgrade Butz Road to a Class 2 road to serve as an alternate route in lieu of Buffalo Farm Road.	Selectboard, Road Commissioner, FEMA Coordinator	High	Local resources, state resources (Better Backroads grants, Structures grants), FEMA HMGP and PDM-C grants	1-2 years	The Town is no longer pursuing the upgrade of Butz Road to a Class 2 road due to high project costs.
	Identify specific project areas where bank stabilization is needed.	Road Commissioner, EMD, Planning Commission	Low	Local resources	5 years	The Town is in the process of completing an inventory of retaining walls within town boundaries which will help identify areas in need of stabilization.
Flash Flood/Flood/Fluvial Erosion// Severe Weather	Maintain and update town bridge and culvert inventories. Regularly inspect and maintain town bridges and culverts; and develop a schedule to replace undersized culverts.	Road Commissioner, Selectboard	High	Local resources	Annually/ as needed	The Town maintains and updates the town bridge and culvert inventories as needed. Town bridges and culverts are regularly inspected and undersized culverts are replaced as often as possible.
	As part of the Town Plan updates, consider revising and strengthening the Town's Flood Hazard Bylaw.	Planning Commission	High	Local resources, TRORC/ Municipal Planning Grants	1 year (2014)	The Planning Commission is currently updating the Town Plan and has plans to update the Flood Hazard Bylaw following the conclusion of the Town Plan update.
	Proceed with and close on home-buyout property on Handy Road.	Selectboard	High	Local resources, state resources, HMGP grants	1-2 years	The home-buyout property on Handy Road has been closed out.

Hazard(s) Mitigated	Mitigation Action	Local Leadership	Prioritization	Possible Resources	Time Frame	2019 - Status of Mitigation Actions
	Upgrade culverts on Butz Road at Landis Corner.	Road Commissioner, Selectboard	Medium	Local resources, state resources (Better Backroads grants, Structures grants), FEMA HMGP and PDM-C grants	2-4 years	Culverts on Butz Road at Landis Corner have been upgraded.
	Upgrade the box culvert on Plunkton Road.	Road Commissioner, Selectboard	Medium	Local resources, state resources (Better Backroads grants, Structures grants), FEMA HMGP and PDM-C grants	2-4 years	The box culvert on Plunkton Road has been upgraded.
	Upgrade two culverts on the West Hill Extension Road.	Road Commissioner, Selectboard	Medium	Local resources, state resources (Better Backroads grants), FEMA, HMGP and PDM-C grants	2-4 years	Two culverts on West Hill Extension Road have been upgraded.
	Upgrade one culvert on North Hollow Road.	Road Commissioner, Selectboard	Medium	Local resources, state resources (Better Backroads grants), FEMA, HMGP and PDM-C grants	2-4 years	Culverts on North Hollow Road have been upgraded.

Hazard(s) Mitigated	Mitigation Action	Local Leadership	Prioritization	Possible Resources	Time Frame	2019 - Status of Mitigation Actions
Flash Flood/Flood/Fluvial Erosion// Severe Weather	Identify areas of fluvial erosion that could benefit from river/stream corridor plantings.	Conservation Committee, Planning Commission	Medium	Local resources, White River Partnership, TRORC	2-4 years	In progress. Both the Conservation Commission and the White River Partnership have been involved in river corridor restoration projects over the past 5 years.
Extreme Cold/Snow/Ice Storm	Clear and maintain town road rights-of-way, and work with local utilities to ensure that utility corridors are cleared and maintained.	Road Commissioner, Selectboard	High	Local resources	As needed	Local utility companies and the tree warden clear and maintain town road rights-of-way as needed. The Tree Warden has been marking particularly vulnerable trees in the right-of-way.
	Plan for, budget and maintain roads for safe winter travel.	Road Commissioner, Selectboard	High	Local resources	Annually	The Town plans for, budgets and maintains roads as needed.
	Identify populations that are vulnerable to extreme cold and make a plan to assist them, if necessary, in the event that it occurs.	Resource Office, appointed by the Selectboard	High	Local resources	Annually	The Fire Department has local knowledge of vulnerable households and uses this knowledge in the event of extreme cold.

While the Town of Granville has added 26 homes between 2000 and 2010, there is a lack of residential and commercial development occurring in the Town. The Green Mountain National Forest comprises about half of the land area of the Town to the west, and a foothill to the east isolates the villages of Granville and Lower Granville from East Granville, so existing development and any new development is/would be located in the Route 100 valley. However, there are no current plans for new development in the Town of Granville, including no new developments within the floodplain. In this regard, the lack of development means that no vulnerabilities have been established.

The Town of Granville was hit hard by flooding associated with Tropical Storm Irene. In fact, Granville was one of a handful of towns that were isolated due to the flood damage. Understandably, this increased the awareness of Town officials and residents to Granville’s flooding vulnerabilities. For example, after Tropical Storm Irene, many of the Town’s culverts were upgraded to improve the culvert’s capacity to pass greater quantities of water. The Town continues to upgrade additional culverts as funding becomes available. Over the past 5 years, culverts have been upsized on North Hollow Road, Plunkton Road, Maston Hill Road and Town Line Road. This has reduced the overall vulnerability of these roads to flooding and erosional damage during heavy rain events. Another way the

Town has reduced its overall vulnerability is through the completion of the Handy Road buyout. This property directly bordered the Third Branch of the White River in East Granville and flooding was an immense hazard as the property was directly in the floodplain. This buyout has reduced vulnerability by preventing further loss of property as well as the creation of additional flood storage space for the White River. The Town of Granville also decided to downgrade Buffalo Farm Road, which was prone to landslides, and use the money allocated to fixing the road elsewhere.

### D. Existing Hazard Mitigation Programs, Projects & Activities

The Town of Granville 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) and 201.6(c)(3)(ii)

	Type of Existing Authority / Policy / Program / Action	Resources: Staffing & Funding	Ability to Expand/Improve On
<b>Community Preparedness Activities</b>	Program—Annual update of Granville’s Local Emergency Management Plan (LEMP). Last updated and approved on 4/27/2018.	Volunteer time from the Selectboard/E911 Coordinator; 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 Granville E911 Coordinator. Funding from Vermont DEMHS.	No need to expand or improve on attendance, as it is satisfactory.
	Fire Department	Volunteers	Continued outreach to residents.
	Ongoing Action—The Town of Granville has a website.	Time from the Town Office. Funding from local budgets.	There is no need to expand or improve on this action.
<b>Insurance Programs</b>	Authority/ Program— participation in National Flood Insurance Program (NFIP)  The Town of Granville participates in and is compliant with the NFIP by enforcing its Flood Hazard Bylaw based on the 8/19/1991 FIRM.  [Note: This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3)(ii).]	Time from Floodplain Administrator. Assistance from TRORC and Vermont ANR. Funding from local resources—annual budget.	The Town’s Flood Insurance Rate Map (FIRM) was dated 8/19/1991 and has not been updated since this date.

<b>Land Use Planning</b>	Policy/Program – Granville Town Plan (Adopted 6/16/2014).	Volunteer time from Planning Commission, and assistance from TRORC and other state agencies on specific subject matter.	The Town Plan is updated every eight years, as required by statute. The Planning Commission is currently in the process of updating the Town Plan and may expand or improve upon any section it deems necessary, or that is required by changes in state statute.
	Authority – Granville Flood Hazard Bylaw (Adopted 7/27/2009).	Volunteer time from Planning Commission, and assistance from TRORC and VT ANR.	The Town of Granville’s Flood Hazard Bylaw is somewhat outdated and would benefit from an update. This action has been carried over into the 2019 Plan.
	Action – Road Erosion Inventory	Granville staff time with TRORC assistance. Funding from VTrans.	The Town applied for and received funding to complete a road erosion inventory, which it finished work on in 2018. The inventory analyzed town road locations that have experienced erosion. The Town can use the information collected in this inventory to prioritize road upgrades and infrastructure investments.
<b>Hazard Control &amp; Protection of Critical Infrastructure &amp; Facilities</b>	Authority— Town Road and Bridge Standards (Adopted 02/18/2013)	Adopted by the Selectboard, implemented by the Road Commissioner. 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—Granville Hazard Mitigation Plan (Adopted on 06/16/2014)	Volunteer time from Town officials; assistance from TRORC and VEM. Funding from FEMA; Vermont VEM; TRORC.	The 2019 Granville Local Hazard Mitigation Plan will replace the 2014 Plan. The 2019 LHMP has evolved from the 2014 Plan, including data updates and improvements to mitigation actions. Future iterations of the Town’s LHMP will be updated by the Town at least every five years.
	Action – Up-to-date culvert inventory.	Time from Road Commissioner; Funding from local budget.	The Town updates the culvert inventory on an as needed basis and uses this inventory to inform subsequent culvert upgrades. Most recent updates have included upsizing multiple culverts on North Hollow Road, Plunkton Road, Maston Hill Road and Town Line Road.
<b>Education/Public Outreach</b>	Action – Community Recovery Partnership Meeting (1/30/2012)	Time from town officials, partnering with the State of VT and surrounding communities.	The Town can continue to participate in recovery meetings as needed.
	Action – Compare hazardous material storage tanks to flood hazard areas.	Volunteer time from town officials.	In areas of overlap between hazardous material storage and flood hazard areas, the Town can expand upon their efforts by raising awareness on risk factors during floods through targeted outreach.

## E. Plan Maintenance

This Plan (the Granville Local Hazard Mitigation Plan) will be updated and evaluated annually at a Selectboard meeting, along with the review of their Local Emergency Management Plan (LEMP). The Plan will be updated and evaluated by discussing its effectiveness as well as the need to make any revisions in the update process. The Selectboard will monitor the implementation of the hazard mitigation strategies outlined in this Plan by noting which have been completed and by discussing how to accomplish the remaining strategies. 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 through an opportunity to comment during the meeting. The Plan will be evaluated by determining the status of mitigation strategies and how this status aligns with the timeframes provided in the mitigation actions table. Adherence to the strategies outlined in this Plan will determine the degree of effectiveness. The Town will also evaluate the status of vulnerabilities mentioned in this Plan and will make any necessary changes.

Updates and evaluation of this Plan by the Selectboard and the local EMD will also occur within three months after every federal disaster declaration. The Town shall reference the Local Hazard Mitigation Plan when working on Town Plan amendments or changes to the Town's bylaws.

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).
--

The Two Rivers-Ottawaquechee Regional Commission (TRORC) will help with Plan updates if assistance is requested by the Town of Granville and if funding is available. The Town will reach out to TRORC, ideally, a year before the current plan expires in order to request assistance and begin the update process. If TRORC is unable to assist the Town, then Granville's Town Clerk, Administrative Assistant, EMD and/or Selectboard will update the Plan, or the Selectboard may appoint a committee of interested citizens (including the current local EMD) to draft changes. Ultimately, it will be the Town's responsibility to initiate and update the Local Hazard Mitigation Plan.

The process of evaluating and updating the plan should take place a year before the expiration of the Plan and will include continued public participation which will be advertised through public notices posted on the municipal website, notice within the municipal building, notice in The Herald of Randolph and the TRORC newsletter and blog. Additional stakeholders shall be invited to the meeting; these include: White River Valley Ambulance, Inc., the National Forest Service, 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. These efforts will be coordinated by the Town Clerk.

Updates may include changes in community mitigation strategies; new town bylaws, zoning and planning strategies; progress on the implementation of initiatives and projects; effectiveness of implemented projects or initiatives; and evaluation of challenges and opportunities. If new actions are

identified in the interim period, the plan can be amended without formal re-adoption during regularly scheduled Selectboard meetings.

Granville shall also incorporate mitigation planning into their long-term land use and development planning documents. The 2013 Vermont Legislature passed a law requiring all towns to incorporate flood resiliency elements into their town plans as of July 2014. To do so, flood hazard and fluvial erosion hazards will be identified, and strategies and recommendations will be provided 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, zoning regulations, and flood hazard/ fluvial erosion hazards (FEH) bylaws. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, zoning regulations and flood hazard/FEH 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.

## **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?
- 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 Granville 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 Granville, 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 Granville 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 hold. For instance, in recent years, Vermonters have seen an increase in the number and severity of storms, especially 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 Granville.<sup>1</sup> The worst threats (bolded in the table, below) are then followed-up with discussion and mitigation strategies throughout the rest of this Plan.<sup>2</sup> 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.

---

<sup>1</sup> The ranking methodology used in this Plan (see Appendix A) is closely modeled on that which is used by the Vermont Division of Emergency Management & Homeland Security (VDEMHS). The only changes made were intended to reflect the more limited geographical scope of this analysis, which is focused on a small, rural town rather than the entire State of Vermont (which is the focus of VDEMHS).

<sup>2</sup> It’s important to note that those hazards which were not found to pose the greatest threats may still occur in Granville’s future; however, they are not the focus of this Plan.

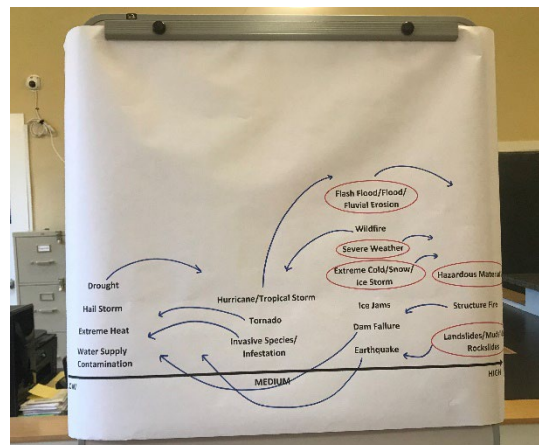


Hazard	Frequency of Occurrence	Warning Time	Potential Impact	Hazard Score
Hazardous Material Spill	Unlikely-Occasionally	None	Major	9.5
Flash Flood/Flood/Fluvial Erosion	Highly Likely	6-12 hours	Moderate	9
Severe Weather (Thunderstorm, Lightning, High Winds, Hail, and Flooding)  *Note: We have defined 'Severe Weather' to include two or more of the above listed hazards.	Highly likely	6-12 hours	Minor-Moderate	8.5
Extreme Cold/Snow/Ice Storm	Highly Likely	6-12 hours	Minor-Moderate	8.5
Structure Fire	Occasionally-Likely	None	Minor	8.5
Landslides/Mudslides/Rockslides	Likely	6-12 hours	Moderate	8
Hurricanes/Tropical Storms	Occasionally-Likely	12+ hours	Major	7.5
Ice Jams	Likely	3-6 hours	Negligible-Minor	7.5
Wildfire	Occasionally	None	Negligible-Minor	7.5
Earthquake	Occasionally	None	Negligible	7
Invasive Species/Infestation	Highly Likely	12+ hours	Negligible	6
Tornado	Occasionally	3-6 hours	Negligible	6
Drought	Occasionally-Likely	12+ hours	Minor- moderate	6
Water Supply Contamination	Unlikely	None	Negligible	6
Dam Failure	Unlikely	None	Negligible	6
Hail Storm	Occasionally	6-12 hours	Negligible	5
Extreme Heat	Unlikely	12+ hours	Negligible	3
Tsunami (Vermont is landlocked.)	N/A	N/A	N/A	N/A
Volcano (Vermont has no active volcanoes.)	N/A	N/A	N/A	N/A

Granville town officials 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 had the potential to occur frequently. Compared to the last iteration of the LHMP, the top hazards remained the same, but with a new ranking of priority. Landslides/Mudslides/Rockslides were ranked lower within the top hazards in this Plan due to a drop in recent occurrences as well as improvements that have reduced vulnerability such as upsizing culverts and downgrading roads to reduce traffic, specifically on Buffalo Farm Road which was downgraded to a Class 4. Flash Flood/Flood/Fluvial Erosion, Severe Weather, and Extreme Cold/Snow/Ice Storm remained as top hazards due to consistent occurrences within the Town. Within the last LHMP, the committee determined that possibility of a large hazardous material spill occurring was small, but they recognized that there is always a threat that a large spill could occur and if it did, it would likely have a significant impact on the Town. Granville town officials also recognized that small and/or minor hazardous material spills occur often. This prioritization still stands and town officials decided to have Hazardous Material Spills remain at the top of the hazards list.

After engaging in discussions using their best available knowledge, the Town of Granville identified the following “top hazards” which they believe their community is most vulnerable to:

- Hazardous Material Spill
- Flash Flood/Flood/Fluvial Erosion
- Severe Weather
- Extreme Cold/Snow/Ice Storm
- Landslides/Mudslides/Rockslides



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 (1950-2019 and 2006-2019), the Spatial Hazard Events and Losses Database for the United States (SHELDUS) 1960-2012, 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	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Type of hazard.	General areas in community that may be vulnerable to the hazard.	Community structures affected by hazard.	General details of the most notable event(s).	Dollar value or percentage of damages.	<u>Occasionally:</u> 1–10% probability of occurrence per year, or at least one chance in next 100 years <u>Likely:</u> >10% but <100% probability per year, at least 1 chance in next 10 years <u>Highly Likely:</u> 100% probable in a year

## B. Hazard Profiles for “Top Hazards”

*Please note:* The following hazard profiles are organized based on their *Hazard Score* as determined by local officials in the hazard ranking methodology.

### 1. Hazardous Materials Spill

Based on available VT Tier II data, there are two sites in the Town of Granville that have sufficient types and/or quantities of hazardous materials that require reporting and these include the Granville Fire Department and the Granville Town Offices. Additionally, the New England Central Railroad runs through East Granville for a short distance, and parallels Vermont Route 12A. This corridor is vulnerable to hazardous material spills. At any given time, there can be hazardous materials aboard a train. The villages of Lower Granville and Granville are located on Vermont Route 100, which runs through the middle of the Town of Granville. Route 100 is a major truck route in this part of the state and sees a moderate amount of truck traffic by Vermont standards. As a result, there is always the threat of a hazardous material spill along Route 100 through the Town of Granville. Fuel oil and gasoline are some of the most commonly transported hazardous materials through Granville.

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**.

Within 1,000 feet of the railroad tracks and Route 100, there are 100 residences (including 13 mobile homes, 2 seasonal homes and 84 single family dwellings) and 14 commercial, industrial or public buildings (including the Town Office, the Granville Fire Station and 3 government buildings). In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be \$564,890. It should 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 occurrences were retrieved from the Vermont Department of Environmental Conservation's Spill List. Entries marked with an asterisk were found by searching through local newspaper archives.

**History of Occurrences:**

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
11/30/2018	Hydraulic oil spill	Post Office Hill Road	1 gallon of hydraulic oil spilled from a GMP line truck.
1/14/2017	Leaking diesel tank	Granville Fire Department	10-15 gallons of diesel leaked from a truck.
11/03/2015	#2 Fuel oil spill	Post Office Hill Road	Underground storage tank leaked #2 fuel oil. Quantity spilled unknown.
10/01/2010	Spill of unknown origin	Route 12A/ Handly Road Junction	Heavy sheen noted on water, petroleum odor.
06/28/2010	Transformer leak	Maston Hill Road	Approximately 5 gallons leaked onto lawn.
<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
8/9/2008*	New England Central Railroad train derailment	South of VT 12A crossing (Note: The train came to a stop in the Town of Braintree, however, according to the local newspaper article, the railcar actually derailed in East Granville, at mile 54.8.)	Last rail car dragged 4 miles, damaging rails (tore up a few miles of rail ties) and spilled 200,000 pounds of lime along rail bed. Train service suspended a few days for repairs.
11/24/2003	Diesel leaked during machinery fire	Plunkton Road	Quantity spilled unknown. Diesel was diked and contained.
08/08/2001	Car accident resulted in spill	Route 12A	Car in brook, oil escaped downstream.
01/17/1996	Tractor trailer accident	Route 100, Granville Gulf	Approximately 40 gallons of diesel spilled.

Although no major spills consisting of hundreds of gallons of hazardous material have occurred in the Town of Granville, the potential for a major spill exists. The major highway along the eastern side of the Green Mountains is Vermont Route 100. Route 100 generally runs north through the Town of Granville for approximately 10 miles, entering in the southeastern corner and extending up to the northern border of the Town. Therefore, the majority of hazardous materials transported through the area by tractor trailer occur along Route 100. The villages of Lower Granville and Granville are built along Route 100, creating the potential for a larger population and more infrastructure to be heavily impacted by a hazardous materials spill in or nearby the village centers.

A small portion of Route 12A passes through the village of East Granville, which is topographically isolated from the villages of Granville and Lower Granville. While it is only a short distance, the area surrounding East Granville and the Route 12A corridor are vulnerable to hazardous material spills, from both vehicular and rail accidents. In 2008, a train derailed in East Granville, and was pulled into the Town of Braintree before the conductor realized what had happened. Luckily, the derailed railcar was carrying lime and not a more noxious chemical. However, this event demonstrates the possibility of a

Hazard	Location	Vulnerability	Extent	Estimated/Potential Impact	Likelihood/Probability
Hazardous Materials Spill	Route 100 corridor, villages of Granville, East Granville and Lower Granville	Road and rail infrastructure, nearby structures	Initially, local impacts only; but depending on material spilled, extent of damage may spread (ex. into groundwater)	Within 1,000 feet of the railroad tracks and Route 100, 100 residences (including 13 mobile homes, 2 seasonal homes and 84 single family dwellings) and 14 commercial, industrial or public buildings (including the Town Office, the Granville Fire Station and 3 government buildings). In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be \$564,890.	Unlikely-Occasionally

rail accident to occur in the region, and more importantly, on the short stretch of railroad tracks in East Granville.

In order to prepare for hazardous material spills in the Town of Granville, all members of the Granville Fire Department have up-to-date HAZMAT Awareness Level training, at a minimum. Five members are trained to the HAZMAT Operations Level.

## 2. Flash Flood/Flood/Fluvial Erosion

Flooding is one of the worst threats to Granville’s residents and infrastructure. Past instances of flooding in Granville 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 and bridges).

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 worst flood disaster to hit the Town of Granville, as well as the overarching region and the State of Vermont, occurred on November 3, 1927. This event was caused by nearly 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 Granville received heavy precipitation.

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 the 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 20<sup>th</sup> and 21<sup>st</sup> century Vermont, second only to the Flood of 1927.

The Town of Granville suffered major 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 Granville in a very short span of time, some of the highest precipitation totals in Addison County (which averaged 3-5 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.

Many of Granville’s roads were damaged by the storm, including parts of: Buffalo Farm Road (the majority of the road), Butz Road, Handly Road, Kennedy Road, Maston Hill, North Hollow Road, Old Stage Road, Plunkton Road, Post Office Hill, Town Line Road, West Hill Extension, and West Hill Road and Route 100. The county-wide damage for Addison County totaled over \$3.5 million. Following the flood damage, the State of Vermont and FEMA have been coordinating on the home buy-out process across the state. There have been three buyouts in Granville; two on Route 100 and one on Handly Road.

If a major flooding event causes the White River to overflow onto RT-100, traffic is often redirected onto Granville’s town-owned roads such as Town Line Road and North Hollow Road.

Unfortunately, flooding is very common across the region, with many events impacting the Town of Granville specifically. Flooding is one of the worst threats to Granville’s residents and infrastructure. The following list indicates the history of occurrence with regard to this hazard in Addison County (given the small population of Granville, town-specific data is limited); an asterisk “\*” denotes the few instances in which town-specific data is available, and federal disaster numbers are listed where appropriate.

**History of Occurrences:**

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
Period of 10/29/2017-10/30/2017 (DR-4356 VT)	Flooding	Addison County; Northern Vermont	Event caused significant damage to utilities. Specific extent data regarding flooding is not available.
10/1/2017*	Severe Flash Flooding; Fluvial Erosion	Town of Granville; Neighboring towns of Hancock and Ripton.	Flash flooding caused local roads to be damaged and wash out. This caused approximately \$150,000 in property damages. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
Period from 6/29/2017-7/1/2017 (DR-4330 VT)*	Severe Flash Flooding; Fluvial Erosion	Town of Granville; County/region-wide	Flash flooding caused local roads to be damaged and wash out. This caused over \$150,000 in property damages. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.

6/9/2015 (DR-4232 VT)	Flooding; Fluvial Erosion	Addison County	Flooding caused county-wide damage to roads and bridges. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
06/2013—07/2013*	Flooding; Fluvial Erosion	Town of Granville, Granville Gulf, East Granville	Culvert on Plunkton Road washed out. Handy Road in East Granville was flooded and a culvert washed out. Vermont 100 in the Granville Gulf washed away and was closed for several days; people were trapped on the road until the water receded. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
05/29/2012 (DR-4066 VT)	Flooding; Fluvial Erosion	Addison County; Lamoille County	This event also included a severe storm and tornado. Major damage to roads and bridges. The estimated amount of storm total rainfall was 3 to 5 inches. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
Period from 08/27/2011— 09/02/2011 (DR-4022 VT)*	Severe Flash Flooding; Fluvial Erosion	Granville, County/region- wide	Tropical Storm Irene. 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. Over \$208 million dollars of Public Assistance funds were approved statewide for this event alone. It is reported that 6-7" of rain fell in Granville. The Town recorded \$584,240.59 in damage, according to FEMA's Public Assistance Database (captures at least 70% of the total damage). Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
Period from 04/23/2011— 05/09/2011 (DR-1995 VT)	Flooding	Addison County	Event also included severe storms. Roads and bridges were primarily impacted.
10/01/2010*	Flooding; Fluvial Erosion	Lower Granville, Town of Granville, County-wide	Runoff from rainfall continued to affect Addison County as the earlier flash flood event transitioned to a flood event. In Granville, tributaries to the White River flooded a barn along Route 100, stranding livestock, and Route 100 was flooded near North Hollow Road. Specific extent data in terms of the physical size of most significantly eroded area is not available for this event.
Period from 07/21/2008— 08/12/2008 (DR-1790 VT)	Flooding	Addison County	Event also included severe storms. Roads and bridges were primarily impacted.
Period from 06/14/2008— 06/17/2008 (DR-1778 VT),	Flooding	Addison County	Event also included severe storms, including excessive rainfall. Damage to road systems reported.

Period from 08/12/2004—09/12/2004 (DR-1559VT)	Flooding	Addison County	Rainfall across Addison County averaged between 1 to 2.5 inches.
Period from 07/14/2000—07/18/2000 (DR-1336 VT)	Flooding	Addison County	Heavy rain was reported across the eastern two-third of Addison County. Several bridges throughout the county were washed out.
Period from 06/17/1998—08/13/1998 (DR-1228 VT)	Flooding; Fluvial Erosion	Addison County	Heavy and prolonged rainfall during this period. Consistently saturated soil conditions caused rivers and streams to remain at or above flood stage while additional rain occurred. Numerous roads were washed out throughout the county. Portions of Route 12A were flooded in and around East Granville. It was reported that local sources of drink water became contaminated. Specific extent data in terms of physical size of most significantly eroded area is not available for this event.
10/21/1996*	Flooding	Granville, County-wide	Rainfall storm totals were generally between 2” to 4.5,” with the heaviest rain along and east of the Green Mountains. The White River flooded portions of Route 100 to a depth of several inches in the Granville, VT area (eastern Addison County) between 9:15 AM EST and 3 PM EST.
10/21/1995*	Flooding; Fluvial Erosion	Granville, County-wide	Flooding was reported in Addison County, Vermont in Granville (White River). Numerous road washouts with road closures and local state of emergencies declared. Specific extent data in terms of physical size of most significantly eroded area is not available for this event.
11/3/1927—11/7/1927 “The Great Flood of 1927”	Severe flooding, landslides	Region-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. Specific extent data in terms of physical size of most significantly eroded area is not available for this event.

The Granville Flood Hazard Area Regulations prohibit new structures in the floodplain and places restrictions on other types of activities within the floodplain. It also specifies land, area and structural requirements in the Granville Flood Hazard Area Regulations.

There are approximately 37 structures, including 31 houses and 6 businesses that are located within mapped flood hazard areas in Granville. The majority of these buildings are located in Granville’s villages. There are no critical facilities located in the floodplain. The flooding that occurred as a result of Tropical Storm Irene is considered to be greater than a 100-year flood and likely closer to a 500-year flood.

Across Vermont, most child and elder care facilities are not registered with the State. Most child day care is private in-home care in Granville, and there are no licensed or registered facilities. There are no elder care facilities in the Town of Granville. Finally, low income housing is not registered with the State, and there are no mobile home parks located in Granville that are registered with the state.



Recent studies have shown that the majority of flooding in Vermont is occurring 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 (DHCA, 1998). 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. There are three residential structures, two industrial structures, and two commercial structures located in the fluvial erosion hazard zone.

A fluvial erosion hazard delineation shapefile and map have been created for Granville as part of the Vermont Agency of Natural Resources' charge to create river corridor maps for the state of Vermont.

Granville maintains an up-to-date list of culverts and culvert condition, and has engaged in culvert upgrading since the 2009 Granville Annex was drafted. The process of upgrading culverts is currently in process. No development projects are planned in Granville in areas that would be vulnerable to flooding. No repetitive loss properties in the Town of Granville are currently listed on FEMA's NFIP list or FEMA's Severe Repetitive Loss List.

Finally, the Town of Granville has discussed whether to maintain portions of Buffalo Farm Road, which experienced three slides during/after Tropical Storm Irene. Buffalo Farm Road is vulnerable to more slides in the future, especially in the presence of flooding conditions. The Granville Selectboard voted not to rebuild the damaged middle section of Buffalo Farm Road, leaving only the two ends of the road passable. The virtual abandonment of Buffalo Farm Road is a way by which the Town is reducing its vulnerability to flooding hazards.

<b>Hazard</b>	<b>Location</b>	<b>Vulnerability</b>	<b>Extent</b>	<b>Observed Impact</b>	<b>Likelihood/Probability</b>
Flooding	Route 100, Butz Road, Handly Road, Kennedy Road, Maston Hill, North Hollow Road, Old Stage Road, Plunkton Road, Post Office Hill, Town Line Road, West Hill Extension, and West Hill Road	Culverts, bridges, road infrastructure. 31 residential and 6 commercial/ industrial/public structures in the 100-year floodplain.	Tropical Storm Irene- 5-7" across county (6-7" in Granville).	From TS Irene: \$584,240.59 for Granville from FEMA's Public Assistance database (captures at least 70% of total damage).	Highly likely

### 3. Severe Weather (Thunderstorm, Lightning, High Winds, Hail, Flooding)

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. 434 hail events were recorded between 2008 and 2018 in the

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 (Thunderstorm, Lightning, High Winds, Hail, Flooding)**.

state, making hail a regular annual occurrence in at least some part of the state. Approximately 15% of these events had hail equal to or greater than 1.5 inches in size. The largest hail during the period was 3.3-inch hail that fell in Chittenden County in 2009 (NCDC). 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 Granville, 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, and lightning, and flooding. These hazards are often experienced in combinations that create many unique weather and emergency management situations. Over the years, Granville 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 could not be found, but the “Remarks” section of NCDC Database helps to illuminate the impact strong winds can have on the Town of Granville. Sizeable hail has also accompanied storms moving through the Town and region.

The following list indicates the history of occurrence with regard to this hazard in Addison County (given that small population of Granville, town-specific data is limited); an asterisk “\*” denotes the few 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.

**History of Occurrences:**

Severe Weather Date	Event					Location	Extent
	Thunderstorm/ severe storm	Flooding	Hail	High Winds	Lightning		
Period of 10/29/2017 – 10/30/2017 (DR-4356)	✓	✓				Addison, Washington, Orange, Grand Isle, Franklin, Orleans, Essex, Lamoille, Chittenden and Windham Counties	A severe storm and subsequent flooding caused damages to utilities. The total public assistance cost estimate was approximately \$3,716,421.
Period of 6/29/2017 – 7/1/2017 (DR-4330)	✓	✓				Addison, Washington, Caledonia, Orange, Windsor, Rutland and Bennington Counties	A severe storm and subsequent flooding caused damages to roads and bridges. The total public assistance cost estimate was approximately \$4,834,837.
06/6/2015 (DR-4232)	✓	✓				Addison and Chittenden Counties	A severe storm and subsequent flooding caused damages to roads and bridges. The total public assistance cost estimate was approximately \$1,344,742.
Period from 06/25/2013 – 07/11/2013 (DR-4140)*	✓	✓				Granville; Orange, Washington and Windsor Counties	This disaster declaration did not apply in Addison County; however, the Town of Granville is one of the few towns in Addison County that is located on the eastern side of the Green Mountain National Forest. As a result, the Town experiences weather patterns more similar to the towns in Orange, Washington and Windsor County than it does with most other towns in Addison County. This disaster declaration included Orange, Washington and Windsor Counties. The damage that occurred as a result of these storms included: culvert on Plunkton Road washed out, VT Rt. 100 washed out and closed for several days, Handly Road was flooded and a culvert washed out.

Severe Weather Date	Event					Location	Extent
	Thunderstorm/ severe storm	Flooding	Hail	High Winds	Lightning		
05/29/2012 (DR-4066 VT)	✓	✓				Addison County	Significant damage to roads and bridges in both Addison and Lamoille County. A tornado was also reported with this event, but it is unclear whether it was in Addison County.
08/21/2011*	✓			✓		Granville, County-wide	Several trees downed by thunderstorm winds and power outage. Property Damage: \$5,000. Wind at 50 kts. (*This weather system produced 70-90 mph straight-line winds in Rutland County.)
Period from 04/23/2011—05/09/2011 (DR-1995 VT)	✓	✓				County-wide	Addison County was granted both Public and Individual Assistance for this disaster declaration.
10/01/2010*		✓				Granville, Lower Granville, County-wide	Runoff from rainfall continued to affect Addison County as the earlier flash flood event transitioned to a flood event. In Granville tributaries to the White River flooded a barn along Route 100, stranding livestock, and Route 100 was flooded near North Hollow Road.
07/18/2008*	✓			✓		Granville, County/ region- wide	An area of thunderstorms moved across central Vermont with pockets of significant damage across Addison, Washington and Orange counties. Several trees down along Route 100 in Granville.” Property Damage: \$10,000. Winds at 50 kts.

Severe Weather Date	Event					Location	Extent
	Thunderstorm/ severe storm	Flooding	Hail	High Winds	Lightning		
08/24/1998*	✓			✓		Granville, County-wide	Numerous trees and power lines were blown down in Granville. \$10,000 in damages.
10/21/1996*		✓				Granville, County-wide	Rainfall storm totals were generally between 2-4.5" with the heaviest rain along and east of the Green Mountains. The White River flooded portions of Route 100 to a depth of several inches in the Granville, VT area (eastern Addison County) between 915 AM EST and 3 PM EST.
10/21/1995		✓		✓		Granville, County/ region-wide	Strong gusty winds preceded and accompanied this front as areas of low pressure moving north along the front enhancing rainfall rates. Flooding was reported in Addison County Vermont in Granville (White River). Numerous road washouts with road closures and local state of emergencies declared.

The main hazard caused by severe weather throughout the Town is flooding. Prior to the flooding from Tropical Storm Irene, the spring of 2011 was particularly wet, and a pre-Memorial Day storm caused some flooding throughout Addison County. More widespread flooding was reported in the surrounding counties of Orange, Washington and Windsor. The road and infrastructure in Granville damaged during this flooding event included flooding on a property on Route 100 that was caused by an ice jam.

The spring and early summer of 2013 brought numerous severe storms and flooding to much of the State of Vermont. The Town of Granville was not eligible for any assistance, as the disaster declaration (DR-4140 VT) did not apply in Addison County. However, the Town of Granville is one of the few towns in Addison County that is located on the eastern side of the Green Mountain National Forest. As a result, the Town experiences weather patterns more similar to the towns in Orange, Washington and Windsor County than it does with most other towns in Addison County. This disaster declaration included Orange, Washington and Windsor Counties. The road and infrastructure damaged during this flooding event was located on: Plunkton Road, Route 100 through the Granville Gulf, and Handly Road.

The summer of 2017 also brought a string of severe storms and flooding to Addison County and the greater central Vermont region. In this case, the Town of Granville was eligible for assistance, as Addison County was included in the disaster declaration (DR-4330). This also made Hazard Mitigation Grant Program assistance available statewide. The per capita impact for Addison County totaled to \$3.96. The

roads and infrastructure impacted by this event included Maston Hill Road and Post Office Hill Road. The total damage the Town sustained from this event totaled to over \$500,000.

The Town maintains an up-to-date culvert inventory, and its work to upgrade culverts remains in process. In addition, the virtual abandonment of Buffalo Farm Road (discussed above) is another way the Town is reducing its vulnerability to severe weather hazards, particularly those with heavy precipitation.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Severe Weather	Town-wide for wind, hail, high winds, lightning and thunderstorm impacts; for flooding: Route 100, Butz Road, Handy Road, Kennedy Road, Maston Hill, North Hollow Road, Old Stage Road, Plunkton Road, Post Office Hill, Town Line Road, West Hill Extension, and West Hill Road.	Town and private buildings, utilities; culverts, bridges, road infrastructure	Tropical Storm Irene- 5-7" across county (6-7" in Granville).	Often minimal, but severe weather has the potential to cause significant damage. From TS Irene: \$584,240.59 for Granville from FEMA's Public Assistance database (captures at least 70% of total damage).	Highly 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 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.

#### 4. 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 due to 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.

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 **Extreme Cold/Snow/Ice Storm**.

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 Waitsfield. A string of storms in March 2001 hit the state, beginning with 15-30 inches on March 5-6<sup>th</sup> (later declared a federal disaster), 10-30 inches on the 22<sup>nd</sup>, and 10-20 inches on the 30<sup>th</sup>. Recent years have seen wet snow storms that have leveled 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. 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 Granville was impacted by this ice storm.

Over the past few winters, Granville 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 Granville and in Addison County.

**History of Occurrences:**

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
3/22/2019	Winter Storm	Addison County	Snowfall totals of 6 to 18 inches across Addison County.
2/12/2019	Winter Storm	Addison County	Widespread 5 to 10 inches of snowfall mixed with freezing rain at times.
1/19/2019	Winter Storm	Addison County	12 to 18 inches of snowfall across Addison County.
1/8/2019	Winter Storm	Eastern Addison County	Snowfall totals ranged from 4 to 15 inches.
11/26/2018	Winter Storm	Eastern Addison County	Heavy wet snow resulted in downed tree limbs and power outages. Snow generally accumulated 5 to 10 inches.
11/15/2018	Winter Storm	Addison County	4 to 8 inches of snowfall.
3/13/2018	Winter Storm	Addison County	Long duration snowfall event that resulted in 8 to 15 inches across Addison County.
2/7/2018	Winter Storm	Addison County	6 to 12 inches across Addison County. At times, 1 to 2 inches of snowfall per hour was observed.
12/22/2017	Winter Storm	Addison County	5 to 8 inches of snowfall.
12/12/2017	Winter Storm	Eastern Addison County	5 to 12 inches of snowfall. Neighboring town Hancock reported 12 inches of snowfall.
3/14/2017	Winter Storm	Eastern Addison County	Snowfall totals ranged from 12 to 30 inches. Neighboring town Hancock reported 15 inches. 20 to 30 mph winds contributed to white-out conditions.
2/12/2017	Winter Storm	Addison County	5 to 10 inches of snowfall.
11/20/2016	Winter Storm	Eastern Addison County	6 to 12 inches reported.
2/2/2015	Winter Storm	Addison County	5 to 8 inches across Addison County.
1/7/2015-1/8/2015	Extreme Cold	Eastern Addison County	In the evening of 1/7/2015, temperatures were 0-10° F with winds of 15-30 mph which created wind chills below -20° to -30° F which lasted overnight into 1/8/2015. Morning temperatures on 1/8/2015 were -10° to -20° F across Addison County.

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
12/9/2014 – 12/12/2014 (DR-4207 VT)	Winter Storm	Addison County/Region-wide	Noted damage to utilities.
12/11/2011	Snow Storm	Granville; County/Region-wide	3-6" of snow in Granville.
03/06/2011 – 03/07/2011	Snow Storm	Granville; County/Region-wide	Approximately 10-20" of snow in Granville.
02/07/2011	Winter Storm	Addison County	Specific extent data regarding storm event unavailable.
12/13/2010	Winter Storm	Addison County	Specific extent data regarding storm event unavailable.
10/15/2010	Winter Storm	Addison County	Specific extent data regarding storm event unavailable.
1/14/2009	Extreme Cold	Eastern Addison County; State-wide	Daytime maximum temperatures in the single digits to below zero while the nighttime minimum temperatures ranged from -10° to -30° F.
12/09/2009	Winter Storm	Addison County/Region-wide	Snowfall accumulations of approximately 6 to 12 inches east of the Green Mountains.
02/22/2009 – 02/23/2009	Winter Storm	Addison County/Region-wide	Snowfall accumulations of approximately 10 to 18 inches across central Vermont.
12/21/2008	Winter Storm	Addison County/Region-wide	Snowfall accumulations of approximately 10 to 18 inches across central Vermont.
02/06/2008 – 02/07/2008	Winter Storm	Granville; County/Region-wide	Approximately 10" of snow in Granville.
12/16/2007 – 12/17/2007	Winter Storm	Granville; County/Region-wide	Approximately 12" of snow in Granville.
04/04/2007	Winter Storm	Granville; County/Region-wide	Combined snow and sleet accumulations ranged from 4-12" with the higher amounts in the higher elevations. This caused some hazardous travel as well as some scattered power outages due to fallen tree limbs and branches. 7" of accumulation in Granville.
03/17/2007	Snow Storm	Granville; County/Region-wide	8-10" of snow in Granville.
3/9/2007	Extreme Cold	Eastern Addison County	Morning minimum temperatures on 3/9/2007 were -10° to -34° F.
3/6/2007	Extreme Cold	Eastern Addison County; State-wide	Temperatures dropped below zero after midnight on 3/6/2007 and dropped even further to -5° to -20° F at dawn. High winds of 15 to 30 mph created wind chills of -20° to -40° F which lasted through the day. Winds subsided on 3/7/2007 but the extreme cold remained through the morning of the 7 <sup>th</sup> at -10° to -30° F.
02/14/2007	Snow Storm	Granville; County/Region-wide	25-30" of snow in Granville.
1/25/2007 – 1/30/2007	Extreme Cold	Eastern Addison County; State-wide	Temperatures began at 0° to -25° F on the morning of 1/25/2007 with a wind chill of -25° to -40° F. This cold front continued through 1/26/2007, rose slightly from 1/27/2007-1/29/2007, but then dropped again to -10° to -30° F on 1/30/2007.
03/13/2005	Snow Storm	Granville; County/Region-wide	6-8" of snow in Granville.
01/23/2005	Snow Storm	Granville; Region-wide	6-8" of snow in Granville.



<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
12/15/2003	Snow Storm	Granville; County/Region-wide	Approximately 17" of snow fell in Granville.
11/13/2003— 11/14/2003	Snow Storm	Granville; Region- wide	13" of snow reported in Granville.
01/04/2003	Snow Storm	Granville; County/Region wide	Approximately 12-18" of snow in Granville (more snow on the western side of the Town).
Period from 03/05/2001— 03/07/2001 (EM-3167)	Snow Storm	County/Region-wide (Addison, Rutland, Windsor Counties)	Specific extent data regarding emergency declaration unavailable.
Period from 01/06/1998— 01/16/1998 (DR-1201)	Ice Storm	County/Region-wide (Addison, Orange, Windsor Counties)	Specific extent data regarding disaster declaration unavailable.

The Town of Granville is no stranger to winter weather and the hazards that it brings. Depending on the event, although particularly with heavy, wet snow or ice, electricity may be knocked out for a few hours or days. The utility company currently serving the Town of Granville, Green Mountain Power, has followed a regular tree-trimming schedule. Granville 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. This process has not been formalized yet, but the Town is working to create such a policy.

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. While roof collapse has not occurred in Granville recently, very heavy snow in the region on February 14, 2007 resulted in the partial or total collapse of 20 or more barn roofs, and led to the deaths of more than 100 cattle.

In general, winter weather is most hazardous to travelers. Icy and snow-covered roads present multiple examples of dangerous driving conditions and situations. In Granville, 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 Department of Emergency Management Homeland Security 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.	Snow fall has varied, from a few inches to over a foot or more. Heavy snow and wind downed trees and power lines. Snow/ice contributed to hazardous driving conditions.	For roof collapse: monetary damages will depend on each structure but, collapse of barn roof is often a total loss. This does not include the loss of livestock. Collapse of a house roof may be at a 50% loss. For car crashes due to poor driving conditions: minimal damage to vehicle to totaled vehicle. Health impacts could vary significantly.	Highly likely

### 5. Landslides/Mudslides/Rockslides

The movement of a mass of rock, debris or earth down a slope by force of gravity is considered a landslide. A landslide occurs when the slope or soil stability changes from stable to unstable due to an outside force, such as an earthquake, a severe storm, erosion, fire or a human-induced activity. Slopes greater than 10 degrees and slopes where the height from the top of the slope to its toe is greater than 40 feet are more likely to slide. A lack of vegetative cover and/or soils with a high water content contribute to the slope’s vulnerability to fail.

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 **Landslide/Mudslide/Rockslide**.

In simple terms, the two factors needed to trigger a landslide are gravity and precipitation. Therefore, because much of Vermont is mountainous and receives relatively high levels of precipitation, the land areas in Vermont have certain predisposition towards landslides. Heavy winter snows combined with spring snow melt and heavy rains in the spring, summer and fall all contribute to high water content in the soil. The majority of landslides within Vermont involve a small quantity of rock and soil materials, but they frequently occur without any warning. Over 200 years ago (1783), landslides in Vermont were made famous in newspaper accounts that chronicled devastating spring flooding events. It is important to highlight the connection between precipitation, flooding and landslides in Vermont.

Following the flooding caused by Tropical Storm Irene, three landslides occurred on Buffalo Farm Road in Granville, spanning a quarter-mile section of the road. FEMA was only willing to pay for one slide repair, but the repairs for the other two slides were far too large and costly for the Town to justify repairing (slide 3 covered an area of 13,000 square feet). The unstable soils were determined by an engineering firm and presented several “resolutions” at a costly amount – but these still would not guarantee an end to future sliding. The Town held a special informational meeting in September 2013, where they discussed whether to rebuild a portion of Buffalo Farm Road, opting to instead use FEMA funds to help pay for alternative projects (with one of the potential projects being the upgrading of Butz

Road to a Class 2 road to serve as an alternate route in lieu of Buffalo Farm Road). Later, the Selectboard voted not to rebuild Buffalo Farm Road. It was downgraded from a Class 2 to a Class 4 road and is accessible by a tracked vehicle on the lower side for emergency and restoration purposes. At this point in time, the Town has no plans to upgrade Butz Road to a Class 2 road due to the high costs needed for this upgrade.

The following data was retrieved from various sources, including the NCDC Database, publications issued by the State of Vermont, and from local knowledge reported by Granville residents. It is important to note that data regarding the specific, physical extent of the reported landslide/mudslides/rockslides events are unavailable and are not reported in the table below.

**History of Occurrences:**

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
7/1/2017	Landslide	West Hill Road & Post Office Hill Road, Granville	Occurred due to severe weather associated with the July 1 <sup>st</sup> , 2017 storm. West Hill Road was subject to major impacts while Post Office Hill Road suffered less serious impacts.
08/28/2011	Landslides	Buffalo Farm Road, Granville	Major slide on road, occurred in conjunction with the flooding caused by Tropical Storm Irene. Quarter mile of road severely damaged/dangerous to vehicle travel.
06/2009—07/2009	Landslides	Buffalo Farm Road, Granville	Occurred in same stretch as 08/28/2011 incident.
06/2008—07/2008	Landslides	Buffalo Farm Road, Granville	Occurred in same stretch as 08/28/2011 incident.
06/1998—07/1998	Landslides	Buffalo Farm Road, Granville	Occurred in same stretch as 08/28/2011 incident.
07/06/1973 (DR-397 VT)	Landslides/Mudslides	Addison, Orange, Rutland and Windsor Counties	
11/3/1927— 11/7/1927  "The Great Flood of 1927"	Severe flooding, landslides	Region-wide	7" of rain in less than 18 hours.

Landslides within the Town of Granville are likely to be associated with heavy precipitation, flooding, erosion and/or snow melt. As previously mentioned, after three landslides on Buffalo Farm Road and the high price required to stabilize the road, the Town of Granville decided to abandon it and designate the road a "legal trail" only. Because much of the Town of Granville is mountainous, there are areas that are currently vulnerable to landslides. These areas include: Buffalo Farm Road, West Hill Road heading

towards the Green Mountain National Forest, and Vermont Route 100 through the Granville Gulf, primarily below the Moss Glen Falls and cliffs beyond the falls. Beaver dam blow outs are also associated with landslides in the Town of Granville, and mainly impact the Granville Gulf, Route 100 and Post Office Hill Road. With the anticipated increase in precipitation events due to global climate change, this particular hazard may become more prevalent in the future.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Landslide/ Mudslide/ Rockslide	Buffalo Farm Road, Route 100 through the Granville Gulf, West Hill Road, and Post Office Hill Road.	Road infrastructure, public and private property.	Often landslides are localized. Ex.: Buffalo Farm Road— only accessible by emergency response teams, requiring the need to find/create an alternative traffic route (the Town upgraded sections of Butz Road for this purpose). Impact to established transportation/emergency response patterns.	Anticipated cost to repair slide 3 on Buffalo Farm Road <i>only</i> : \$2.0-3.5 million. This does not include the cost to repair the other 2 slides that occurred.	Likely

## VI. Mitigation

### A. Goals

1. To reduce injury and losses from the natural hazard of landslides/mudslides/rockslides
2. To reduce injury and losses from the natural hazard of flash floods/floods/fluvial erosion.
3. To reduce injury and losses from the natural hazard of severe weather.
4. To reduce injury and losses from the natural hazard of extreme cold/snow/ice storm.

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

- Future land use that allows easy access to the natural environment and protects it from destruction (page 22).
- Avoid and minimize the loss of life and property, the disruption of commerce, the impairment of the tax base, and the extraordinary public expenditures and demands on public services that result from flooding related inundation and erosion (page 22).

- Ensure that the selection, design, creation, and use of development in hazard areas is safe and accomplished in a manner that is consistent with public wellbeing, does not impair stream equilibrium, flood plain services, or the stream corridor (page 22).
- Manage all flood hazard areas designated pursuant to 10 V.S.A. Chapter 32 § 753, the municipal hazard mitigation plan; and make the Town of Granville, its citizens, and businesses eligible for federal flood insurance, federal disaster recovery funds, and hazard mitigation funds as may be available (page 22).
- To provide regular maintenance and upgrades to Town roads (Class 2 and 3 Highways) provided that the costs do not put an undue burden on the citizens of Granville, and to ensure that future development does not unnecessarily or unreasonably impact the public investment in Town and regional transportation systems or facilities, including highways, bikeways, trails, and rail (page 34).
- To maintain a road system that is safe, efficient, meets the needs of residents, and complements the other goals and policies of this Plan (page 34).
- To consider surface water and groundwater impacts and effects related to proposed or existing uses of land (page 52).
- To maintain or improve surface water quality and quantity (page 52).

The Granville Town Plan was updated and adopted on 06/16/2014, and had a 5-year lifespan. Granville is currently in the process of revising and adopting a new Town Plan by the end of 2019.

The Town of Granville has no intentions, at this time, to take steps to enroll in the NFIP’s Community Rating System (CRS).

### C. Hazard Mitigation Strategies: Programs, Projects & Activities

Vermont’s Division of Emergency Management & Homeland Security encourages a collaborative approach to achieving mitigation at the local level through partnerships with Vermont Agency of Natural Resources, VTTrans, 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.

<p>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).</p>
---

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, Granville’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 were discussed during the Plan review process, 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.

The Town of Granville understands that, in order to apply for FEMA funding for mitigation projects, a project must meet more formal FEMA benefit cost criteria. The Town must have a FEMA-approved Hazard Mitigation Plan as well.

The following strategies will be incorporated into the Town of Granville’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 (FEH) bylaws. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, zoning regulations and flood hazard/FEH 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 Action	Local Leadership	Prioritization	Possible Resources	Time Frame
All Hazards	Ensure that Granville’s Local Emergency Management Plan (LEMP) is kept up-to-date and identifies vulnerable areas and references this Plan.	Selectboard, EMD	High	Local resources	Before May 1 <sup>st</sup> of each year.
	Consistently document municipal infrastructure damage after weather events.	Selectboard, Road Commissioner	High	Local resources	As needed following significant weather events.
Hazardous Material Spill	Ensure that all emergency response and management personnel continue to receive HAZMAT Awareness training at a minimum.	Fire Department	High	Local resources, state resources	As needed
	Compare identified locations of hazardous material storage tanks to flood hazard areas, and in areas of overlap, raise awareness on risk factors during floods through targeted outreach.	Selectboard, Fire Department	Medium	Local resources	Year 2-4

<b>Hazard(s) Mitigated</b>	<b>Mitigation Action</b>	<b>Local Leadership</b>	<b>Prioritization</b>	<b>Possible Resources</b>	<b>Time Frame</b>
Landslides/ Mudslides/ Rockslides	Complete an inventory of locations where critical facilities, buildings, and infrastructure are vulnerable to landslides/mudslides/rockslides.	EMD, Road Commissioner, Selectboard	High	Local resources	Year 1-2
	Identify specific project areas where bank stabilization is needed.	Road Commissioner, EMD, Planning Commission	Medium	Local resources	Year 2-4
Flash Flood/Flood/ Fluvial Erosion/Severe Weather	Maintain and update town bridge and culvert inventories. Regularly inspect and maintain town bridges and culverts; and develop a schedule to replace undersized culverts.	Road Commissioner, Selectboard	High	Local resources	Annually/as needed
	Revise and strengthen the Town's Flood Hazard Bylaw.	Planning Commission	High	Local resources, TRORC/ Municipal Planning Grants	Year 1-2
	Upgrade culverts on Town Line Road.	Road Commissioner, Selectboard	High	Local resources, state resources (Better Backroads grants), FEMA, HMGP and PDM-C grants	Year 1
	Upgrade culverts on Maston Hill Road.	Road Commissioner, Selectboard	Medium	Local resources, state resources (Better Backroads grants), FEMA, HMGP and PDM-C grants	Year 2-4
	Identify areas of fluvial erosion that could benefit from river/stream corridor plantings.	Conservation Committee, Planning Commission	Medium	Local resources, White River Partnership, TRORC	Year 2-4
Extreme Cold/Snow/ Ice Storm	Clear and maintain town road rights-of-way, and work with local utilities to ensure that utility corridors are cleared and maintained.	Road Commissioner, Selectboard, Tree Warden	High	Local resources	On-going/As needed

Hazard(s) Mitigated	Mitigation Action	Local Leadership	Prioritization	Possible Resources	Time Frame
Extreme Cold/Snow/ Ice Storm	Plan for, budget and maintain roads for safe winter travel.	Road Commissioner, Selectboard	High	Local resources	Annually during budget discussions.
	Identify populations that are vulnerable to extreme cold and make a plan to assist them, if necessary, in the event that it occurs.	Resource Office, appointed by the Selectboard	High	Local resources	Annually

## Appendices

### Appendix A: Hazard Ranking Methodology

<u>Frequency of Occurrence</u> Probability	<u>Warning Time</u> Amount of time generally given to alert people to hazard	<u>Potential Impact</u> Severity and extent of damage and disruption
<p>1 = <i>Unlikely</i> &lt;1% probability of occurrence in the next 100 years</p> <p>2 = <i>Occasionally</i> 1–10% probability of occurrence per year, or at least one chance in next 100 years</p> <p>3 = <i>Likely</i> &gt;10% but &lt;100% probability per year, at least 1 chance in next 10 years</p> <p>4 = <i>Highly Likely</i> 100% probable in a year</p>	<p>1 = More than 12 hours</p> <p>2 = 6–12 hours</p> <p>3 = 3–6 hours</p> <p>4 = None–Minimal</p>	<p>1 = <i>Negligible</i> Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries</p> <p>2 = <i>Minor</i> Isolated occurrences of moderate to severe property damage, brief disruption of critical facilities and infrastructure, and potential for injuries</p> <p>3 = <i>Moderate</i> Severe property damage on a neighborhood scale, temporary shutdown of critical facilities, and/or injuries or fatalities</p> <p>4 = <i>Major</i> Severe property damage on a metropolitan or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities</p>



## Appendix B: Critical Stream Crossings

Critical crossings group one includes 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. Most of these are bridges.

RDFLNAME	GROUP_TWO	STRUCT_NUM	OWNER_FIPS	CATEGORY	AOTCLASS	X_COORD	Y_COORD
HANDY RD		1.00107E+14	1035	B	0	-72.7554	44.0136
POST OFFICE HILL		4.00107E+14	1035	B	3	-72.8325	43.9956
POST OFFICE HL		1.00107E+14	1035	B	0	-72.8467	43.9853
WEST HILL RD		70000402250107X	1035	C	3	-72.8667	43.9937

Critical crossings group two includes significantly undersized structures, usually culverts, were identified from the ANR-DEC stream geomorphic assessment survey with openness ratios less than 50%. This measure refers to when structure's width is less than half of the stream bankfull width. Several of these structures may have been damaged during TS Irene or other events and may have been replaced. The town, at some point, should look at these sites and assess their status and need for repair/upgrades.

RDFLNAME	GROUP_TWO	CATEGORY	X_COORD	Y_COORD	CUL_WIDTH	CUL_HEIGHT	CUL_LEN	OpennessR	ChannelWid
GREEN MTN NAT FOREST	Y	C	-72.8872	43.9889	4	4	42	0.370952	7
GREEN MTN NAT FOREST	Y	C	-72.8704	43.9785	6	5	55	0.478545	13

## Appendix C: Certificate of Adoption

DATE

TOWN OF Granville, Vermont Selectboard

A RESOLUTION ADOPTING THE Granville, Vermont 2019 Local Hazard Mitigation Plan

WHEREAS, the Town of Granville has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **Granville, 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 Granville has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its **Granville, 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 Granville; and

WHEREAS, the **Plan** recommends several hazard mitigation actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Granville 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 Granville eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by Town of Granville Selectboard:

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

IN WITNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Granville this 16 day of Oct 2019.

ATTEST

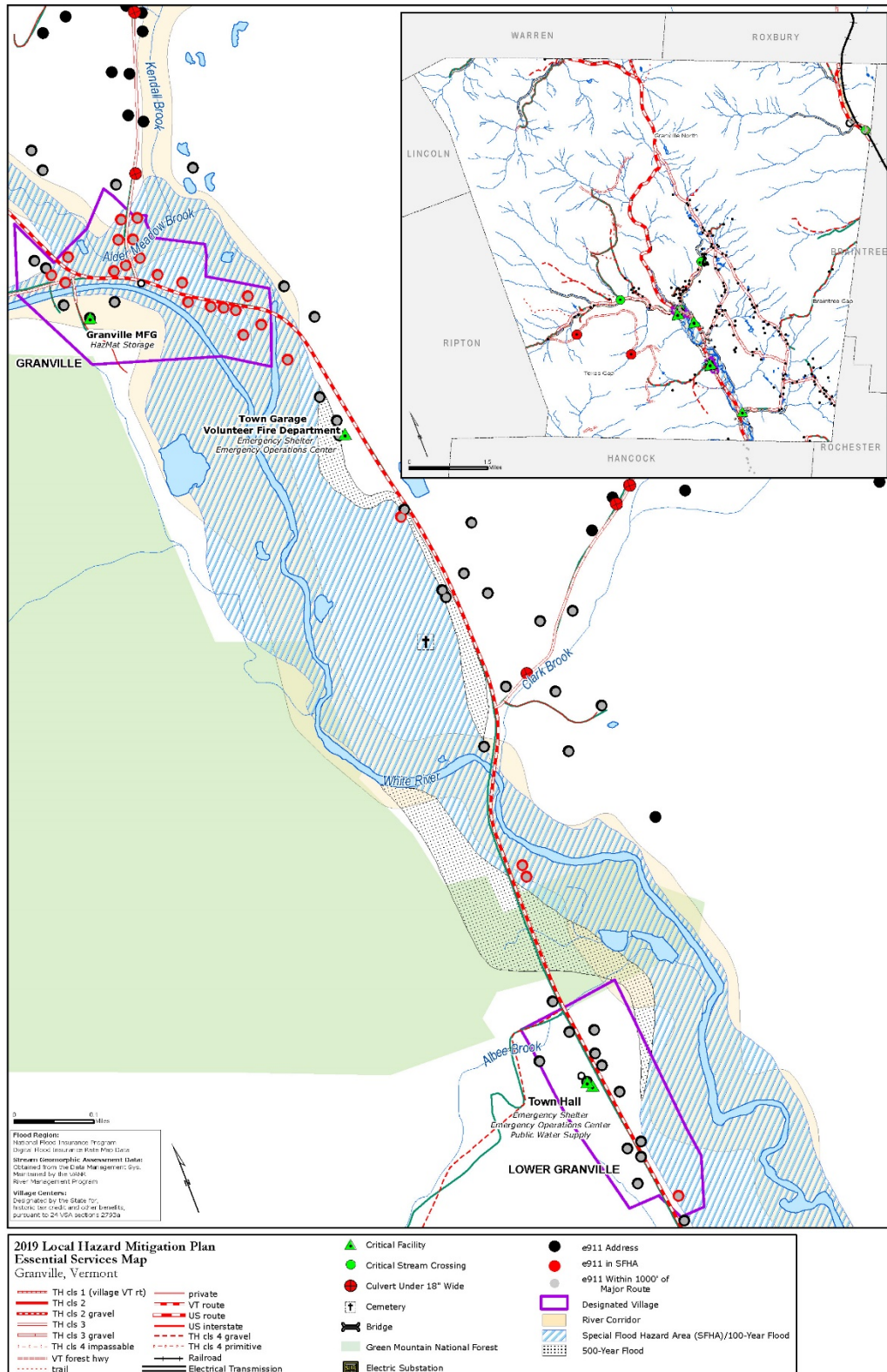
  
\_\_\_\_\_  
Selectboard Chair

  
\_\_\_\_\_  
Town Clerk

\_\_\_\_\_  
Selectboard Member

# Attachments

## Attachment A: Map of Granville



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



**FEMA**

NOV 14 2019

Lauren Oates, State Hazard Mitigation Officer  
Vermont Emergency Management  
45 State Drive  
Waterbury, Vermont 05671-1300

Dear Ms. Oates:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region I Mitigation Division has approved the Town of Granville, Vermont Local Hazard Mitigation Plan effective **October 23, 2019** through **October 22, 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](mailto: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  
Stephanie Smith, Hazard Mitigation Planner, VEM