LOCAL HAZARD MITIGATION PLAN

TOWN OF LANDGROVE, VERMONT

2024

FEMA Approval Pending Adoption Date: May 8, 2024

Municipal Adoption Date: May 9, 2024

FEMA Formal Approval Date:

Table of Contents

1 INTRODUCTION 3
2 PURPOSE 4
3 COMMUNITY PROFILE 4
Land Use – Land Features - Development Patterns 4
Demographics and Growth Potential 5
Precipitation and Water Features 5
Transportation 5
Electric Utility Distribution 5
Public Safety 6
Emergency Management 6
4 Planning Process 6
Plan Developers 6
Plan Development Process 7
Changes since the 2014 Plan 8
5 HAZARD IDENTIFICATION AND RISK ASSESSMENT 10
Local Vulnerabilities and Risk Assessment 10
Community Vulnerability Analysis 12
Highest Risk Hazard Profiles 12
Cold/Snow/Ice 13
Windstorm/High Winds 14
Inundation/Fluvial Erosion 15
6 HAZARD MITIGATION STRATEGY 20
Mitigation Goals 20
Community Capabilities 20
Administrative and Technical 20
Planning and Regulatory 20
Financial 22
Education and Outreach 22
National Flood Insurance Program 22
Hazard Mitigation Strategies: Programs, Projects, and Activities 23
Identified Hazard Mitigation Actions 24
7 PLAN MAINTENANCE 28
Incorporation into Existing Planning Mechanisms 28
APPENDIX A – Community Outreach 30
APPENDIX B – Meeting Agendas and Notes 32
APPENDIX C – Past Mitigation Actions Updates 33
APPENDIX E – Community Survey Questions 38

APPENDIX F – Historical Event Data 46
APPENDIX G – Certificate of Adoption 55

Table 1- Average annual outage data 6
Table 2 – LHMP Planning Committee 6
Table 3 – Plan development process timeline and detail 7
Table 4 – Existing plans, studies, reports, and technical information 8
Table 5 – Hazard risk assessment 11
Table 6 -Federal Disaster Declarations for Bennington County 12
Table 7 - Location-Vulnerable Assets-Extent-Impact-Probability 18
Table 8 - Community Capabilities -Areas of Improvement 21
Table 9 – Mitigation actions 24

Figure 1 - State map locating Landgrove 4
Figure 2 - Map of natural hazards and critical infrastructure 19
Figure 3 – Five year LHMP plan review and maintenance 29

1 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. The goal of this Plan is to help the community identify risks and provide local mitigation strategies it can take to make Landgrove more disaster resilient and ensure the continuity of government and emergency services.

Hazard mitigation is an action taken to reduce or eliminate the long-term risk to human life and property from both natural and man-made hazards. The work done to minimize the impact of hazard events on life and property is called Hazard Mitigation Planning.

The Federal Emergency Management Agency (FEMA), the Vermont Division of Emergency Management (VEM), and local towns have come to recognize that it is less costly to take action to minimize the impact of natural hazards than to repeatedly repair damage after a disaster has struck. Hazards cannot be eliminated, but it is possible to determine what the hazards are, and which are more likely to occur and tend to have the greatest impact on a community. With some research and outreach, a local community can also determine the extent and impact of these hazards and which assets and areas are most at risk. A culmination of these efforts would be to identify what local strategies and actions can be taken to reduce the severity of the hazard and reduce their impacts on the community. This plan recognizes that communities have opportunities to identify mitigation strategies and measures during all of the other phases of emergency management, preparedness, response, and recovery.

Hazard mitigation planning and strategies include the following benefits:

Structural or land improvements

•

Increased public education and awareness of hazards

•

Altering the hazard area to remove the hazard occurrence

•

Reducing the hazard frequency through structure or land treatment

•

Increased community support for specific actions to reduce future losses

•

Reduction in financial and physical losses caused by hazard events

•

Eligibility for hazard mitigation grants and aid

•

Strengthened partnerships

2 PURPOSE

Hazard mitigation is intended to reduce potential losses from future disasters. Hazard mitigation plans identify potential natural hazards that could affect a community and the projects and actions that a jurisdiction can undertake to reduce risks and damage from natural hazards such as flooding, landslides, wildland fire, and similar events (FEMA 2011).

This plan is intended to identify, describe and prioritize potential natural hazards that could affect the Town of Landgrove and measures to reduce or avoid those effects. The Federal Emergency Management Agency, within the U.S. Department of Homeland Security and the Vermont Division of Emergency Management both advocate the implementation of hazard mitigation measures to save lives and property and reduce the financial and human costs of disasters.

The purpose of this Local Hazard Mitigation Plan is to assist the town in identifying hazards within the town and identify strategies to reduce or eliminate these hazard risks. This plan will focus on the hazards and mitigation programs best suited for the town.

The Town of Landgrove seeks to be in accordance with the strategies, goals, and objectives of the Vermont State Hazard Mitigation Plan. This updated Plan has been reorganized and updated to meet this goal.

3 COMMUNITY PROFILE

Land Use – Land Features - Development Patterns

Landgrove is a small rural town located in Bennington County. The town is situated on the eastern slope of the Green Mountains in Southern Vermont. The town is bordered by Weston to the north and east, Londonderry to the southeast, Winhall to the southwest, and Peru to the west. The Town is 5,696 acres and is located entirely in the Green Mountain physiographic province and the watershed of the Connecticut River (Landgrove Town Plan 2017).

Figure 1 - State map locating Landgrove

The Town Plan, adopted in 2017, explains that the town was legally chartered in 1780 with its municipal limits being determined largely by the town boundaries of adjacent towns. Most development is located in the Village along Utley Brook at the lower end of Utley Flats. The architecture and orientation of buildings in Landgrove continue to reflect the traditional New England village character that is an important part of the town's appeal. The Meetinghouse (built in 1857) and the Farmers and Mechanics Hall (built in 1874) are important structures to the town. These two buildings were expanded into one building ten years ago, which is now known as the Landgrove Town Hall. The Town Hall is located north of the Village, at the edge of Utley Flats and remains an important community asset today. The Town has no water or wastewater facilities, all homes and public buildings have their own well and septic systems.

The Green Mountain National Forest currently owns over 700 acres of forestland in Landgrove. Most of Landgrove is forested, consisting primarily of northern hardwood forests but also of conifer forests with spruce-fur (Landfire Data Distribution Site 2014). Soils in Landgrove are formed in glacial till and tend to be shallow and/or wet, thereby limiting the potential for on-site wastewater disposal systems and limiting development in a number of areas. Landgrove has three town forests – Lynn Pitcher Memorial Forest is approximately 10 acres, Bobby Comfort Town Forest is approximately13 acres, and Wendy Evarts Memorial Forest (acreage is currently unknown). The Fontain Trust and the Vermont Land Trust manages conservation land and there is also current-use land.

Demographics and Growth Potential

The Town of Landgrove has a current population of 177 residents (Census 2020) a 12% increase since the 2010 Census. The town has eight businesses, employing 32 people (Landgrove Town Plan 2017), a decrease since the 2012 Town Plan that indicated 13 businesses. There are an estimated 105 residents in the workforce (American Community Survey). Most commute to work, with a mean travel time of 15 minutes, indicating that many residents work in the general area (American Community Survey). There are also 34 residents that work from home (Landgrove Town Plan 2017).

Precipitation and Water Features

Average annual precipitation is 44 inches of rain with October being the wettest month. Average snowfall is 75.3 inches with January being the snowiest month. Landgrove is within the Connecticut River watershed which includes the Utley Brook

Transportation

Landgrove has just over 15 miles of public roads. None of the roads in Landgrove are paved; except for VT Route 11, which is the only state highway in town and travels through the southern end of town for less than a mile before crossing the town boundary. Class 2 Town Highways serve as principal travel routes within Landgrove and connecting to other towns and/or the state highway system and to VT Route 11, Class 3 Town Highways primarily provide direct access to individual properties throughout the community. The Class 4 segments that continue east from Old County Road and south from Landgrove Hollow Road are particularly important, and those rights-of-way should remain in town ownership. (VTrans Mileage Certificate)

Landgrove has 3 bridges and approximately 115 culverts. There are 253 MRGP segments of that only 13 sections do not meet the standard.

Electric Utility Distribution

Green Mountain Power provides electric service to approximately 244 accounts which service 1,343 meters. The average annual outage information between 2018 and 2022 is listed in Table 1

Table 1- Average annual outage data

Average Annual Outage Data(2018-2022)	
Average number of outages per customer per year	**3.58 times per year**
Total outage duration per customer	**26.33 hours per year**
Average length of each outage	**6.92 hours per year**

Public Safety

There are no emergency services located in Landgrove. The town is serviced by Peru, Weston, and Londonderry fire departments, the Londonderry Rescue Squad and the Vermont State Police from the Rockingham barracks. Health care is available at the Mountain Valley Medical Center, located near the Landgrove/Londonderry town line on Route 11. Other health services in the area are the Vermont Center for Independent Living, and the Mental Health Service of Southeast Vermont. The nearest hospitals are located in Springfield, Rutland, and Bennington. The Town utilizes neighborhood connections to transport residents that need assistance getting to medical appointments.

Emergency Management

The Selectboard Chair is the Town's Emergency Management Director. The closest emergency shelter is located in Londonderry at the Flood Brook School (2.6 miles). The Town of Londonderry has installed a generator so that Flood Brook School can serve both as a warming (evacuation) shelter and an overnight shelter. The shelter can hold up to 340 people for an evacuation, and 125 people overnight. If Landgrove residents were unable to evacuate the town, Landgrove Town Hall could possibly be used as a shelter. However, the building is not currently set up to be a shelter nor does it have a generator.

4 Planning Process

Plan Developers

Stephanie Magnan from SEAM Solutions LLC (consultant) assisted the Town of Landgrove and its Local Hazard Mitigation Planning Committee with updating the Local Hazard Mitigation Plan. In November of 2022, the kickoff meeting was held with the Town Administrator, who worked with the rest of the Committee (Table 2) in between meetings with the consultant to work on deliverable necessary for the plan update. These meetings consisted solely of the Planning Committee members.

Table 2 – LHMP Planning Committee

Local Hazard Mitigation Planning Committee for the Town of Landgrove	
Susan Lenox – Town Administrator	John Ogden – Selectboard Chair
Steve Hall - Selectman	Michael Jeffrey - Selectman
Cameron Chalmers – Health Officer	Stephanie Magnan - Consultant

The consultant met periodically with the Town Administrator to work on tasks outlined in the meeting agendas that were either sent out prior to the meeting or appended to the Zoom/Teams invite (see Table 4 for meeting dates and details) and (Appendix B for meeting

agendas and meeting notes). A community survey was published on the Town's website that received two responses (See Appendix D)

The public and various stakeholders had the opportunity to provide input during the plan update and the draft review, see Appendix A for examples. At the beginning of the plan update process, notification went out via the Town's website along with being posted at the Town Clerk's office, the Planning Committee received no feedback. The notification outreach also included an email to surrounding communities that included the Town Clerk's office of Peru, Winhall, Londonderry, Weston and state stakeholders such as VTrans District Office, Bennington Regional Planning Commission and River Management Engineer at the Agency of Natural Resources, the Planning Committee received no feedback.

The same outreach was also sought with the public and surrounding towns listed above along with state stakeholders when the updated draft plan was submitted to Vermont Emergency Management for their review. The draft plan was also presented to the community on town meeting day. Also included in the outreach were private and non-profit organizations such as Phoenix Fire Company #6 out of Londonderry, Neighborhood Connections, Southeastern Vermont Community Action (SEVCA). Phoenix Fire Company a part of Londonderry Fire and Rescue provide needed fire and EMS services to the area. Neighborhood Connections provides social services programs such as meal programs, transportation to medical appointments and other essential services. SEVCA provide services to vulnerable populations such as housing, fuel, and food assistance along with educational opportunities. These private and non-profit organizations have direct contact with the community as a whole including vulnerable populations. The Planning Committee received no feedback.

Plan Development Process

The 2023 Local Hazard Mitigation Plan is an update to the original 2014 plan which was the first mitigation plan written for the Town by the Bennington County Regional Commission.

Table 3 – Plan development process timeline and detail

11/15/22: Hazard Mitigation Planning Committee kick-off meeting held. Committee members were discussed. An overview of the community and government was discussed along with the strategy and timeline of the plan development.
12/1/22: Notice posted on the Town's website along with announcement along with an email to surrounding communities that the Town is engaged in updating the Local Hazard Mitigation Plan. The notice included that public input is encouraged. No input was received.
12/15/22: Committee discussed and began work on; Introduction, Purpose, and data elements for the Community Profile
1/8/23: Committee worked on Identifying critical facilities
1/12/23: Completed work on Community Profile elements
1/26/23: Planning Committee completed review and update of hazards. The hazards risk assessment was also completed.
2/9/23: Committee reviewed and updated the status of the 2014 mitigation actions.
2/16 & 3/2/23: Discussed progress on capabilities and vulnerabilities, finalized hazard ranking, and reviewed prior hazard mitigation actions
3/30/23: Final review of mitigation goals from prior plan and completed work on mitigation actions for the next 5 years
5/11/23 & 5/18/23: Discussed final review of draft, edits needed, identified gaps to work on
7/20/23: Discussed new LHMP requirements needed and added language based on the new elements needed
8/4/23 - Draft LHMP finalized for presentation to the community including the Selectboard and surrounding communities for public input. The Draft plan was distributed via email to the

community Emergency Management Directors including ACRPC, VTrans, and the DEC's Regional Flood Manager. Draft LHMP also submitted to Vermont Emergency Management for Approval Pending Adoption.

Changes since the 2014 Plan

Although Landgrove's population has increased by 12% the number of businesses has decreased by 38% and there has been no development changes in the town since the last plan update. In the future if there are any changes in development the Town and the zoning Bylaws and this plan will aid in preventing or lessen the impact on community vulnerability.

The Town's mitigation priorities align with the State's Hazard Mitigation Plan which focuses on natural hazards. In the 2014 plan for the Town focused more on all hazards and while man-made hazards, such as hazardous material spills, are no less important natural hazards such as flooding and high winds are more likely to have a heavier financial burden on the Town.

The Planning Committee reviewed the 2017 town plan and 2017 zoning bylaws along with any updates to regional, state, and federal plans listed in Table 4 to ensure any updates or revisions that are relevant to hazard mitigation were incorporated into the new plan. The resources listed in Table 4 were utilized to update information throughout the plan; from changes in demographic and transportation data to providing updates to hazard probabilities and occurrences. Reference to the resources listed in Table 4 are cited throughout the plan. At the time of this plan update the zoning bylaws were also under revision and therefore the plans could not be integrated into each of the planning mechanisms. However, the zoning board reviewed the 2014 Local Hazard Mitigation Plan and incorporated entirely new section devoted to Flood Regulations recognizing the importance of protecting the community from future flood damage by regulating development in flood prone areas.

Table 4 – Existing plans, studies, reports, and technical information

Existing Plans, Studies, Reports and Technical Information	
Local Emergency Management Plan	2017 Landgrove Town Plan
VTrans Transportation Resiliency Planning Tool	Vermont Statewide Highway Flood Vulnerability and Risk Map
FEMA Flood Insurance Rate Maps	2022 FEMA NFIP Insurance Reports
2017-2022 Green Mountain Power Outage Data	2014 Hazard Mitigation Plan
2018 State Hazard Mitigation Plan	2020 US Census Data
Road Erosion Inventory	2020 American Community Survey Five-Year Estimate
2017 Landgrove Zoning Bylaws	National Oceanic and Atmospheric (NOAA) National Climatic Data Center's Storm Events Database

FEMA Disaster Declarations for Vermont	OpenFEMA Dataset:Public Assistance Funded Project Summaries for Vermont

Landgrove has made progress in completing mitigation actions identified in the 2014 plan , (See Appendix C). Both the zoning bylaws and the Town Plan were updated in 2017 and the zoning bylaws are currently being updated and will be incorporating changes based on this updated plan.

Two new elements within a Local Hazard Mitigation plan are now required: Planning for climate change and equitable outcomes.

Climate Change

Climate change has affected the entire state of Vermont, resulting in more frequent and more severe storms including Landgrove. The Town of Landgrove has already been proactive in protecting its community with zoning bylaws for future development, the Town Plan mentions the current impacts of climate change it also mentions becoming more flood resilient with the “changing climate conditions”. Climate change was integrated in determining probability for each of the hazards

Equitable Outcomes

The Town of Landgrove recognizes and has prioritized the need to improve communication and community outreach. The Town is in the process of designing and making significant educational outreach upgrades to their website in order to better communicate with the community. The Town also recognizes the need for developing other methods to provide information and educational outreach opportunities to be as inclusive as possible.

5 HAZARD IDENTIFICATION AND RISK ASSESSMENT

Local Vulnerabilities and Risk Assessment

One of the most significant changes from the 2014 plan is the way hazards are assessed. To be consistent, the Planning Committee chose to take on the model of the Vermont State Hazard Mitigation Plan. Initially the Committee addressed the probability of the known hazard events occurring in the future. See Table 5.

The Committee then ranked the hazard events and their know hazard impacts on the community broken down into four categories: infrastructure, life, economy, and environment. The ranking was then averaged and multiplied by the probability of coming up with the overall score. See Table 5

Even though the town recognizes all natural hazards and the threat they may pose to the residents and infrastructure. The lack of documented occurrences, lower potential impact, and also scoring lower on the risk assessment identifies the following hazards as lower risk hazard and they have been excluded from this plan; hail, landslide, heat, drought, wildfire, earthquake, invasive species, and infectious diseases. However, more information on these hazards can be found in the State Hazard Mitigation Plan.

The Committee identified the following as High Risk Hazards:

Cold, snow, ice and high winds

Fluvial erosion/flash flooding associated with large rain events such as thunder or tropical storms

Inundation flooding

Table 5 – Hazard risk assessment

Hazard Impact	Probability	Potential Impact					Score	Rank
		Infrastructure	Life	Economy	Environment	Average		
Fluvial Erosion/Flash Flooding	**4**	**2**	**2**	**2**	**2**	**2**	**8**	**5**
Inundation Flooding	**3**	**3**	**2**	**3**	**2**	**2.5**	**7.5**	**6**
Wind	**3**	**3**	**2**	**3**	**3**	**2.75**	**8.25**	**4**
Hail	1	1	1	1	1	1	1	11
Landslide/debris flow	1	1	1	1	1	1	1	11
Ice	**4**	**3**	**3**	**2**	**3**	**2.75**	**11**	**2**
Snow	**4**	**3**	**3**	**2**	**1**	**2.25**	**9**	**3**
Cold	**4**	**3**	**4**	**3**	**2**	**3**	**12**	**1**
Heat	2	1	2	1	2	1.5	3	10
Drought	2	1	2	1	3	1.75	3.5	9
Wildfire	2	3	3	2	4	3	6	8
Earthquake	1	1	1	1	1	1	1	11
Invasive Species	3	1	1	3	4	2.25	6.75	7
Infectious Disease	3	1	3	3	1	2	6	8
Hazardous Materials Spill	1	1	1	1	1	1	1	11

	Frequency of Occurrence: Probability of plausibly significant event	**Potential Impact:** Severity and extent of damage and disruption to population, property, environment, and the economy
1	**Unlikely**: < 1% probability of occurrence per year	**Negligible:** Isolated occurrences of minor property and environmental damage, potential for minor injuries, no to minimal economic disruption
2	**Occasionally**: 1% to 10% probability of occurrence per year, or at least one chance in the next 100 years	**Minor:** Isolated occurrences of minor property and environmental damage, potential for minor injuries, no to minimal economic disruption
3	**Likely:** >10% but <75% probability per year, at least one chance in the next 10 years	**Moderate**: Severe property and environmental damage on a community scale, injuries or fatalities, short-term impact
4	**Highly Likely:** > 75% probability in a year	**Major:** Severe property and environmental damage on a community or regional scale, multiple injuries or fatalities, significant economic impact

Community Vulnerability Analysis

The Town gave notice at the beginning of the plan update process and published a Community Hazard Questionnaire that was conducted during the 2023 plan developments. There were only two responses, which did align with Town's hazard assessment. Even though the community response was low, based on the population, the number of individuals involved in the plan update and risk analysis, the Town felt comfortable and confident in representing the majority of the community members. See Appendix D for the survey questions and responses.

Highest Risk Hazard Profiles

The types of hazards having the greatest impact on a regional basis can be gleaned from Table 5, a listing of FEMA Disaster Declarations for Bennington County since 1990. It can be seen from this table that these are typically severe storms with heavy rains that cause flooding. Severe Winter Storms also occur; however, harsh winters are a 'way-of-life' in Vermont and the Town Highway Department is accustomed to operating in heavy snows and low temperatures. Other hazards such as flooding, wildfires, ice jams and landslides are more localized and characteristic of a town's topography, roadways, infrastructure, location of critical facilities (See Figure 2 – Natural Hazards and Critical Infrastructure Map.) , and land use. Landgrove is a small rural town and much of the town-specific data for these localized hazards does not exist. Previous occurrence hazard data specific to Landgrove has been provided where available. However, where no town-specific data exists, the most relevant available data or information has been provided, such as county, regional or state data, or data from a bordering town. Landgrove will strive to improve the recording and maintenance of local hazard data and have included this as part of the monitoring process for this plan. The disaster declarations in table 6 below have included Landgrove as part of the larger county, however, this does not imply that Landgrove experienced damages from these events. Landgrove has no recorded damages from landslides, mudslides, or ice jams. Infectious disease/pandemic cases can occur in Landgrove, but with a rural dispersed population under 200 it is not a high-risk threat to the community at this time. These omissions will be reevaluated during the next plan update with new future conditions data.

Table 6 -Federal Disaster Declarations for Bennington County

Federal Disaster Declarations: Bennington County 1973 – 2023		
FEMA Disaster Number	**Year**	**Description**
4720	2023	Severe Storms, Flooding, Landslides, and Mudslides
4621	2021	Severe Storms and Flooding
4532	2020	Pandemic
4445	2019	Severe Storms and Flooding
4330	2017	Severe Storms and Flooding
4022	2011	Tropical Storm Irene
1816	2009	Severe Winter Storm
1698	2007	Severe Storms and Flooding
1488	2003	Severe Storms and Flooding
1358	2001	Severe Storms and Flooding
1336	2000	Severe Storms and Flooding
1307	1999	Tropical Storm Floyd
1101	1996	Ice Jams and Flooding

518	1976	Severe Storms, High Winds & Flooding
397	1973	Severe Storms, Flooding, & Landslide

Cold/Snow/Ice

In Vermont, most winter weather events occur between December and March months. During the winter season Vermont can see many winter weather events that include snowstorms, mixed precipitation of sleet and freezing rain that can also cause glazing, blizzards, extreme cold, ice storms or a combination of any of the events listed above.

Extreme cold can have a huge impact on human and animal health, businesses including agricultural can significantly impact infrastructure. The definition of extreme cold depends on the local climate. In Vermont extended periods of cold during the winter months are likely to occur. Extreme cold in Vermont can mean below 0 temperatures for an extended period and can sometimes include wind chills driving the temperature even lower.

Winter storms are frequent in Vermont and can consist of heavy snow, mixed precipitation, or ice storms and all may be accompanied by strong winds. According to the 2014 National Climate Assessment, there is an observed increase in severity of winter storms however the has also been an overall decline in total seasonal snowfall. Potential damage can include power outages, traffic crashes, and isolation of some areas. For example, the October 4, 1987, storm stranded travelers in the area and knocked out power for several days. The "Blizzard of 93", one of the worst storms this century virtually shut down Vermont on the weekend of March 13-14 forcing the closure of roads and airports. This was one of the most powerful snowstorms on record. Snowfall amounts ranged from 10” to 28” across the state. In rare cases, the weight of snow may collapse roofs and cause other structural damage. Wind can also accompany snowstorms increasing the effect of the snow damage. In addition to snow, ice storms occur when the lower levels of the atmosphere and/or ground are at or below freezing, and rain is falling through warmer air aloft. The precipitation freezes upon contact with the ground, objects on the ground, trees, and power lines.

Ice storms are events in which rain or we snow freezes as it comes in contact with the ground, trees, power lines, roads, etc. and create hazardous situations. Prolonged ice storms tend to cause power outages and can pose a threat to the community and their ability to heat homes and access to running water. While an ice event may only occur once every 10 years the impact on a community can be significant.

Previous Occurrences

While, like most Vermont towns, Landgrove has not kept track of town specific weather events, according to NOAAs historical storm database for Bennington County, that includes Landgrove, since the last plan update, there have been 32 cold events with 12 of them being extreme cold events where temperatures dipped to between 15 and 30 degrees below zero. Since 2000, the Bennington County area has had 45 cold events.

Appendix E summarizes the 119 winter storm events that have occurred in Bennington County between 1996 and 2022. As can be seen, a high numbers of events occurred in 1997, 2007, 2008, 2009, and 2011. Using National Climatic Data Center, (NCDC) otherwise known as the National Weather Service, data, we categorized the extent of each storm with storms ranked as “High” if they produced more than twelve inches of snow or were categorized by the NCDC as producing heavy or record snows or blizzards or significant icing. The “Blizzard of 93” was categorized as “Extreme”.

There have been two ice storm events recorded in Bennington County since 1950, occurring consecutive years of 2007 and 2008 which resulted in a state of emergency with widespread damage to trees and power outages across southern Vermont.

Extent and Location
Cold, snow, and ice impact the entire planning area. The coldest temperature ever recorded in Vermont was in December of 1933 in Bloomfield, VT at -50 degrees Fahrenheit. Since the last plan update there has been seven extreme cold events where temperatures dipped to 30 degrees below zero with wind gusts up to 50 mph observed in Bennington County that saw wind chills around 50 degrees below zero.

The average annual snowfall in Bennington County is 65 inches, with December, January, February and March as the primary months for snowfall. Extreme snowfall events for one, two and three day events have ranged from 12" to over 20" (NOAA National Climatic Data Center 2014 Cooperative Weather Observer reports - NCDC). Typically, Landgrove is at the high end of this average, but the town is rarely affected by snowfall that is over 20" because it is a common occurrence. Landgrove has a knowledgeable road crew and the proper equipment to manage large amounts of snow on a regular basis. The skill of road crews across Vermont means that only the heaviest snowstorms or ice storms affect the populations.

On average the ice storms resulted in ice accretion of ½ to ¾ of an inch that fell across the county leading to numerous downed tree limbs, power lines and several thousand customers were left without power.

Probability, Impact and Vulnerability
There is a greater than 100% probability of a moderate or greater winter storm affecting Bennington County, including Landgrove in any given year. These are large-scale events, though local impacts may vary greatly. Roads and power lines are most vulnerable, with traffic accidents the most likely to create injuries. Power outages could be short term or last seven or more days. Some roads could potentially remain impassable for long periods as well but this rarely occurs.

Windstorm/High Winds
High winds come in many forms in Bennington County and are included in damages associated with hurricane/tropical Storm, tornado, thunderstorms, and in the winter, wind chill or can be a high wind event without precipitation. In addition to these specific events, high winds are often associated with collisions of major weather fronts when high pressure and low pressure systems create extreme gradients between them. Since 1950 there have been 200 high wind events, one death related event, 153 that caused property damage and one event with crop damage.

Severe thunderstorms are capable of producing high winds (including downdrafts), large hail, lightning, flooding, rains, and tornadoes. Thunderstorm winds are generally short in duration, involving straight-line winds and/or gusts in excess of 50 mph. Thunderstorm winds tend to affect areas of Vermont with significant tree stands as well as areas with exposed property and infrastructure and aboveground utilities. Thunderstorm winds can cause power outages, transportation and economic disruptions, and significant property damage, and pose a high risk of injuries and loss of life. Microbursts and macrobursts are downdrafts that move outward from the base of a thunderstorm and can reach speeds in excess of 80 mph. Microbursts (the smaller of the two in terms of area affected) pose an extreme threat to aircraft. The downward wind can exceed the lift component of an aircraft, making it impossible to maintain altitude, which for low flying aircraft (especially during takeoff and landing) is extremely dangerous.

Thunderstorms range in size and type. An ordinary cell thunderstorm consists of one cell with an updraft and downdraft and produces strong winds, rain, lightning, and even hailstones. Multicell cluster thunderstorms consist of several ordinary cell thunderstorms in

the vicinity of each other. Multicell cluster thunderstorms are extremely prone to causing flash flooding. Squall line thunderstorms move in a line or front that can exceed 100 miles in length, with the strongest rains and winds at the front of the storm. Supercell thunderstorms are the largest, longest lasting, and most devastating thunderstorms. Nearly all tornadoes are formed from supercell thunderstorms. Supercell thunderstorms can also form hailstones larger than golf balls. These supercell storms have clockwise rotating winds that exacerbate the storm. Lightning, hail, flash flooding, and tornadoes are all associated with this type of thunderstorm. Please refer starting on P114 of the 2023 Vermont State Hazard Mitigation Plan (SHMP) for more details and specific wind scales such as the Beaufort the Saffir Simpson Hurricane Wind Scales or the Enhanced Fujita Scale for tornadoes.

Previous Occurrences

Appendix F provides summaries for 147 significant wind events including thunderstorms, strong winds, and tornadoes from 1955 to 2022. Wind speed data is not available for wind events due to the lack of weather stations. NCDC data prior to 2008 did not always include estimates of wind speed. Generally, wind speeds of greater than 55 miles per hour are considered damaging (NOAA 2011). However there were 54 events that were categorized based on property damage assessments in the NCDC database. Damage greater than $10,000 and tornados were categorized as moderate. Most events resulted in minor damage. There have been three recorded tornados in Bennington County, two F1s and one F2. Significant events are described in Appendix F.

Extent and Location

High winds impact the entire planning area. Damaging winds within Bennington, including the previous occurrences described above, are those exceeding 55 miles per hour (NOAA 2006, NOAA 2011). During the December 2009 event, winds were measured at 59 miles per hour at the Morse Airport in Bennington. Higher winds were likely created during the tornado events. Damage from high wind events could be significant, but most likely less than 10% of structures would be affected. Again, power outages could last up to seven or more days.

Probability, Impact and Vulnerability

Wind events causing moderate or greater damage occur almost every other year (40-50%) in Bennington County. Loss of power, internet and access to necessities such as food and water, especially for a long wind event would leave the community vulnerable. However, few have affected Landgrove, so the potential expected probability would be 10-50%. It is likely that as climate change accelerates, we will see exacerbation of wind events such as hurricanes, tropical storms, and thunderstorms. More frequent and intense wind events will increase potential damages described in this plan. With three recorded F1 or F2 tornadoes in Bennington County in the neighboring communities of Pownal, Wilmington and North Bennington it is reasonable to expect Landgrove could experience a tornado as well. Please see Section 4-3: Wind "Wind Trends" in the 2023 SHMP for more information. **https://vem.vermont.gov/plans/SHMP**

Inundation/Fluvial Erosion

Flooding is the most frequent and damaging natural hazard in Vermont and with climate change is it anticipated that both the frequency and magnitude will only increase over time. The National Weather Service (2010) defines a flood as "any high flow, overflow, or inundations by water which causes or threatens damage." A flash flood is … "a rapid and extreme flow of high water into a normally dry area, or a rapid water rise in a stream or creeks above a predetermined flood level." These are usually within six hours of some

event, such as a thunderstorm, but may also occur during floods when rainfall intensity increases, thereby causing rapid rise in flow.
The NWS uses the following impact categories:

- Minor Flooding - minimal or no property damage, but possibly some public threat.
- Moderate Flooding - some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations.

- Major Flooding - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.
- Record Flooding - flooding which equals or exceeds the highest stage or discharge observed at a given site during the period of record keeping.

Floods may reach these magnitude levels in one or more reaches, but not necessarily all.

Runoff from snowmelt in the spring, summer thunderstorms, and tropical storms and hurricanes can all result in flooding. Ice jam flooding can occur on Vermont rivers when substantial ice forms followed by several days of warmth, snowmelt and any rainfall leading to ice breakup. As the ice breaks up on the rivers, chunks of ice form jams which cause localized flooding on main stem and tributary rivers. Ice jams are most prevalent during mid-winter thaws in January and February and in March and April as spring approaches. Flash floods can occur after spring melt of mountain snow, following large storms such as Tropical Storm Irene, or after significant thunderstorms.

The main streams in Landgrove are Utley Brook and Flood Brook. Utley Brook, and several small tributaries, flow through the northern section of town. Flood Brook is in the southern part of town and flows under VT Route 11. There are also many smaller, unnamed streams that flow throughout Landgrove. There is development along streams in Landgrove but none of the buildings are located in the proposed flood hazard zones, as explained above. Development is mostly scattered throughout town with the exception of Landgrove Village, located along the eastern border of Landgrove where there is a cluster of development.

There are two bridges on Utley Brook, the Hapgood Pond Road Bridge (Bridge Number 4L), a two span bridge built in 1934, and the Landgrove Road Bridge (Bridge Number 5), a three span bridge built in 1930, see Figure 2 map of natural hazards and critical infrastructure. When Utley Brook floods, it is common for erosion to occur at the base of the Hapgood Pond Road Bridge. The Hapgood Pond Road Bridge is currently known as the most hazardous structure in Landgrove, as the river is changing its course and is creeping towards the southern buttress. A support wall was built pre-Irene to protect the bridge but suffered severe erosion during the tropical storm. The wall is still keeping the buttress from being exposed to the river, however, it is suspected that the support wall and bridge will be seriously damaged during one of the next major storm events.

Previous Occurrences
Ludlum (1996) describes numerous storm events that have affected Vermont since settlement, but the local impacts of these are difficult to trace. The 1927 flood was the largest disaster in the history of the state. The state received over six inches of rain, with some areas receiving 8” to 9”. Following a rainy October, this storm occurred from November 2 through November 4, causing extensive flooding. Both of the bridges in Landgrove were built shortly after this storm, so it is likely that the storm washed the bridges out.

Two storms occurred in March of 1936. Heavy rains and snowmelt caused significant flooding. Two years later, the 1938 hurricane caused both flooding and extensive wind damage. In 1973, Landgrove lost two of the three town egresses to a washout and Hapgood Pond Road was flooded. This heavy rainfall flood event, referred to by NOAA as "likely the worst in the 73 year period between the Great Flood of 1927 and Tropical Storm Irene", where several watersheds saw record or near record high crests. While Landgrove specifically did not record rainfall amounts nearby Jamaica reported 7.5 inches.

According to the National Climatic Data Center there have been a total of 44 flood or flash flood events in Bennington County from 1955 to 2023. These have been primarily minor and affected either specific streams or towns, not all have been countywide. Table 6 in Appendix F describes ten moderate and extreme events that have occurred since 1990, using the National Weather Service (2023) categories, which likely affected Landgrove. These events were described in the National Climate Database records (2014). It should be noted that only the January 1996 event occurred in the winter, with all other events in the spring, summer or fall. Ice jam flooding does occur and one instance of damage is described below.

Hurricanes and tropical storms that form in tropical waters have historically affected New England but are relatively infrequent. Besides the 1938 storm, Tropical Storm Belle brought significant rains to Vermont in 1976 and Hurricane Gloria brought rain and wind damage in 1985. Landgrove has been subjected to two major tropical storms in the past twenty years but luckily has not sustained much damage.

Extent and Location

Extent data for fluvial erosion is unavailable as there is not system for collecting and storing this data. Damage from past floods has been minimal in Landgrove. The town does not experience as much flooding from major storms as nearby towns because is near the top of the Connecticut River watershed. The town's location makes the likelihood of a storm causing severe flood damage relatively low. There have been no NFIP designated repetitive losses in Landgrove.

During Irene, flooding was not major, but Utley Brook jumped the bank and washed away a local farmers hay bales. The storm caused downed trees and some minor road damage. The Buffum Hill segment of Landgrove Road suffered some erosion along the sides, and Uphill Road was damaged when a beaver dam blew out on a small, unnamed creek (Appendix B). Flood Brook flooded upstream but didn't cause any damage in Landgrove.

During major storms or heavy rains, there are several locations in Landgrove where the roads experience erosion. Sometimes the roads even become impassable. Road erosion in Landgrove is typically caused by beaver dams, nearby springs, or culvert issues.

Probability, Impact, and Vulnerability

Based on data from 1996 to 2023, nine moderate or major flood events have affected Bennington County, resulting in a 50% chance of such an event occurring. However, these have not all directly affected Landgrove, so that probability should range from 10-50%. Based on information from the Vermont Center for Geographic Information and town knowledge, Landgrove has a total of 138 single family residences, 1 mobile home, 2 commercial buildings, 1 commercial farm, 4 lodging establishments, 17 camps, 1 maintenance garage, 1 church, and a few other various buildings, see figure 2 for locations of critical infrastructure. There are no structures in the special flood hazard area or the fluvial erosion hazard zone. However, roads, bridges and culverts are always vulnerable to flood events. With that said the potential proportion damaged within the town from severe flooding would range from 1-10% with injuries of 1-

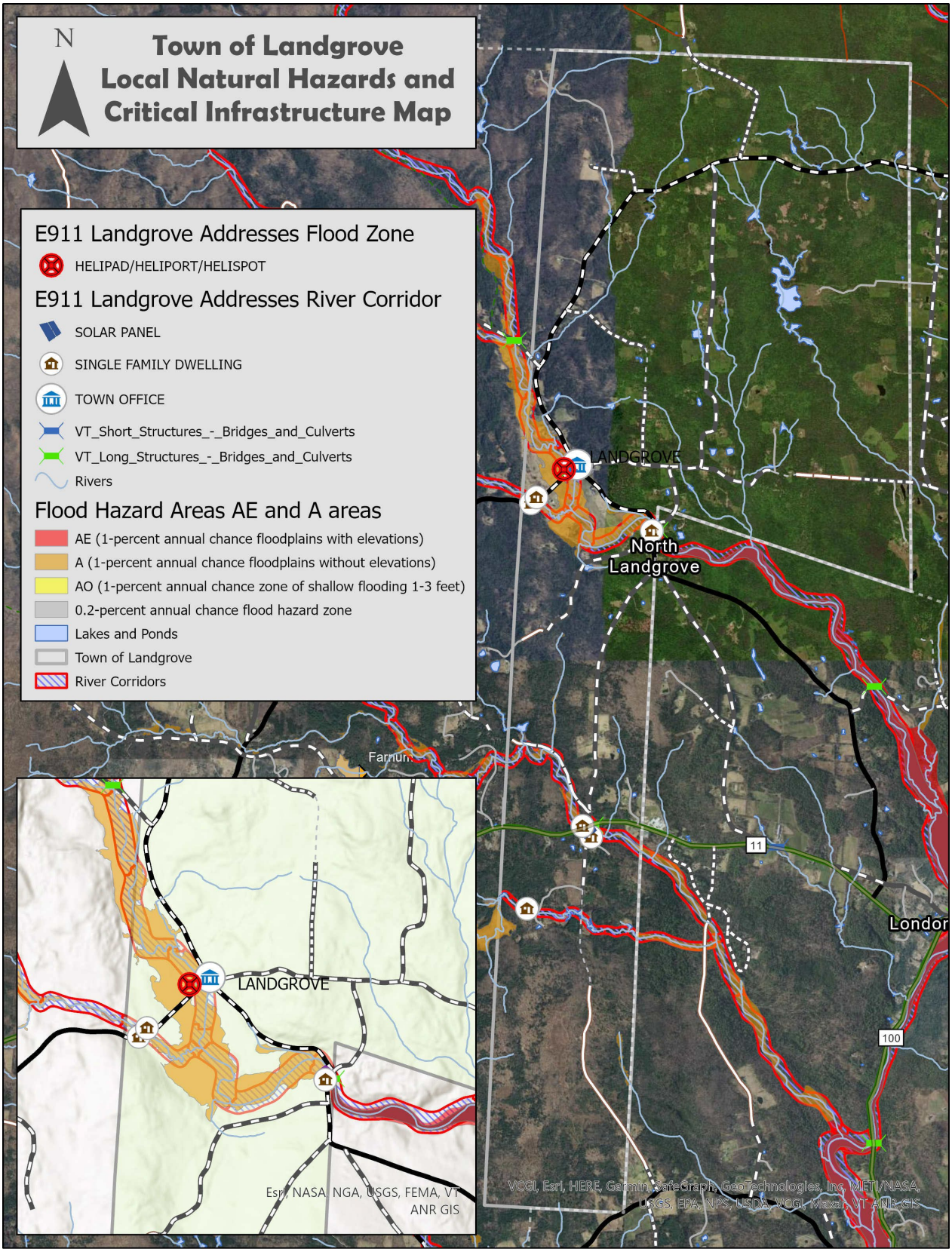
10%. There are no town services that would need to recover quickly after a storm for the town to function again. However, help would be needed for specific property owners may take quite a while depending on the severity of the storm and road conditions.

Table 7 - Location-Vulnerable Assets-Extent-Impact-Probability

HAZARD	LOCATION/EXTENT	VULNERABLE ASSETS	IMPACT	PROBABILITY
Cold/Snow/Ice	Town-wide/Up to 40" snow / -30 degrees / 3/4 " of ice	Roads, culverts, bridges, trees, power lines, telecommunication systems and homes	Loss of power, internet, access to food, water. $1,000 local to $1,000,000 regional damage	Highly Likely
Windstorm/high winds	Town-wide / a few hundred acres of forest / up to 55 mph gusts	Trees, power lines, telecommunications systems, homes	Loss of power, internet possibly access to basic necessities. $1,000 local to $500,000 regionally	Highly Likely
Inundation/Fluvial erosion	Areas adjacent to the Utley Brook/ A thousand acres	Roads, culverts, bridges, houses, recreational fields, wastewater, agricultural lands, fuel pumps, sewer pump stations	Damage to infrastructure, crops, access to basic necessities $55,000 local/ $1,000,000 Reginal damage	Highly Likely

Landgrove is one of the least populated and smallest jurisdictions in Vermont, changes in land use and demographics are extremely unlikely to significantly change the impacts of hazards on the community in the foreseeable future based on present and projected information available.

Figure 2 - Map of natural hazards and critical infrastructure



6 HAZARD MITIGATION STRATEGY

Mitigation Goals

- Significantly reduce injury and loss of life resulting from natural disasters.
- Significantly reduce damage to public infrastructure, minimize disruption to the road network and maintain both normal and emergency access.
- Establish and manage a program to proactively implement mitigation projects for roads, bridges, culverts and other municipal facilities to ensure that community infrastructure is not significantly damaged by natural hazard events.
- Design and implement mitigation measures so as to minimize impacts to rivers, water bodies and other natural features, historic structures and neighborhood character.
- Significantly reduce the economic impacts incurred by municipal, residential, agricultural and commercial establishments due to disasters.
- Encourage hazard mitigation planning to be incorporated into other community planning projects, such as Town Plan, Capital Improvement Plan, and the Local Emergency Operations Plan.
- Ensure that members of the general public continue to be part of the hazard mitigation planning process.

Community Capabilities

Administrative and Technical

Community resources such as knowledgeable and experienced staff community members who have managed and helped with emergency management situations coordination between departments is effective strong working relationships with neighboring Londonderry and Peru communities through mutual aid agreements. Technical support through Bennington County Regional Planning Commission.

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Examples of planning capabilities that can either enable or inhibit mitigation include land use plans, capital improvement programs, transportation plans, stormwater management plans, disaster recovery and reconstruction plans, and emergency preparedness and response plans. Examples of regulatory capabilities include the enforcement of zoning ordinances, subdivision regulations, and building codes that regulate how and where land is developed, and structures are built. Article VI – Flood Hazard Area Regulations of the Zoning Bylaws in accordance with 10 V.S.A. Chapter 32, and 24 V.S.A. Chapter 117 §4424, §4414, and 24 VSA Chapter 59, “there is hereby established a bylaw for areas at risk of flood damage in the Town of Landgrove, Vermont.” This Article regulates the land use and identifies what development can and cannot occur in Special Flood Hazard Areas, floodways and river corridors and permits are required from the Town’s Administrative Officer. The Town’s Administrative Officer is

responsible for reviewing and issuing zoning permits only when all requirements have been met, that includes the following:

- Zoning permit application including plot plan requirements has been properly completed and submitted
- Zoning permit fee has been paid
- Town highway access permit as required has been submitted
- State issued wastewater disposal permit for any development requiring sewage disposal
- Act 250 permit as required
- Applicable local reviews and approvals under the provisions of the Bylaws
- Copies of all previously issued permits have been submitted

The 2017 Zoning By-Laws currently does not have any references to flood regulations; however the updated Zoning By-Laws will have an entire section dedicated to flood regulations and will included language such as: ***828. Substantial Improvement and Substantial Damage Determinations.***
The Administrative Officer will make a determination of substantial improvement or substantial damage in accordance with current FEMA guidelines, which will establish the appropriate standards for repair and rebuilding under this section. The applicant may provide additional documentation including, but not limited to:
(1) A recent building appraisal completed by a qualified professional that documents the structure's market value, excluding land value, prior to the damage or improvement.
(2) A cost estimate provided by a qualified professional that includes material and labor costs and a detailed accounting of the proposed project; or
(3) In the case of substantial damage, an estimate of structure damage prepared by a state or local official using FEMA's Substantial Damage Estimator software.

Table 8 - Community Capabilities -Areas of Improvement

Resource	Description	Effectiveness in Implementing HM Goals	Opportunities for Improving Effectiveness
2017 Town Plan	Plan for coordinated town-wide planning for land use, municipal facilities, etc.	Effective in setting plans and priorities and driving other regulatory measures development in hazard areas including floodplains	Plan is updated on an eight- year cycle or as plan elements are required. It can be strengthened by incorporating HM Planning and strategies
2017 Zoning By-Laws	To manage all flood hazard areas to ensure that development in flood hazard areas minimizes or eliminates the potential for flooding loss and damages.	Effective in standardizing the permitting and review process for development within a flood hazard or river corridor area	Can be more effective by incorporating relevant updates in hazard mitigation and town land-use planning **In the process of being updated

Local Emergency Management Plan	Local municipal procedures for emergency response	Effectively outlines the procedures and highlighting contacts for call-outs, evacuation, etc.	Plan is updated yearly following town meeting. Statewide template guides additional functionality
Vermont State Road Standards – adopted in 2013	State design and construction standards for roads and drainage systems have been adopted	Effectiveness will improve with new Municipal General Road Permit which will consider hydrologically connected road segments. Continued implementation is critical to effectiveness.	Greater consideration of hydrological nature of road segments with new MRGP standards will improve effectiveness

Financial

Financial capabilities are the resources that a community has access to or is eligible to use to fund mitigation actions. The Town has dedicated funds for the highway department and is creating a financial reserve through the ARPA funds to create sound future financial stability for investing in the Town's infrastructure. The Town recognizes they will need to utilize grant opportunities to invest in disaster preparedness.

Education and Outreach

There is a huge effort underway to build out better communication methods in order to educate the community around emergency events and proper preparation for them. The town is also looking at methods to alert residents when there are hazard events.

National Flood Insurance Program

Landgrove has been a part of the National Flood Insurance Program (NFIP) since September 18, 1985, and does not have any repetitive loss structures. The map in Figure 2 shows the location of the Special Flood Hazard Area (SFHA). The map also shows that there is not a proposed floodway in Landgrove and there are no buildings located in the Special Flood Hazard Area only a helipad landing site according to the E911 GIS data and 7 structures are located in the river corridor all, but one is a single family dwelling the other is the town office. The most recent Flood Insurance Rate Map (FIRM), 50003C0115D, was effective 12/5/2015. Map updates are currently underway; however a preliminary was not available at the time of this plan update. The preliminary Flood Insurance Study was released 7/17/2023 but did not include updated information specific to Landgrove. The State of Vermont has adopted building codes for commercial building safety and energy standards which also applies to residential buildings. However, like most municipalities, Landgrove otherwise does not have residential building codes but through the zoning by-laws regulates the location in which a home can be built.

Hazard Mitigation Strategies: Programs, Projects, and Activities

Following a review of Town plans, regulations and resources, river related studies, State and Regional Hazard Mitigation Plans, FEMA's Mitigation Ideas, and input from public meetings, the Hazard Mitigation Committee has identified the following Mitigation/Preparedness Strategies and Actions for the 2023-2028 planning period as outlined in **Table 6**.

The following identified programs, projects, and activities are new, planned, or ongoing for the Town of Landgrove. In Landgrove, the major concern is the impact of serious flooding, fluvial erosion, snow or ice storm and wind incident where power may be out and transportation rouges to the and from the town would be impact, effectively leaving the general public and vulnerable populations at risk due to delayed response time. Because these types of events are expected to become more frequent and with increased intensity due to climate change, the town will be focusing and prioritizing projects that will aid in mitigating the effects of those particular events as opposed to every type of hazard as identified in the past plan. Landgrove is a small town and does not currently have the capacity to assess the potential damage and cost of repairs for all the hazards but they can focus better on the selected few.

These mitigation actions have been chosen by the town as the most cost/effective and feasible actions to be taken during this plan period to lessen the impacts of the hazards identified in **Section 5**. A new column has been added to identify the related goal and objective for each action. It was determined that some of the actions from the previous plan have been carried over here with some modifications either because they have been expanded or because of their on-going cyclical nature.

Identified Hazard Mitigation Actions

Table 9 – Mitigation actions

Mitigation Actions	Responsible Party	Estimated Timeline	Possible Funding	Hazard Addressed	Cost*
Establish a local shelter in town with backup power generator to meet sheltering needs of residents that cannot travel long distances for shelter	Selectboard	2024-2028	VEM – Homeland Security - Grant for historic buildings	Cold/Snow/Ice/Wind/Inundation flooding/Fluvial erosion	Medium
Implement road projects to improve resilience in accordance with the VT Municipal Roads General Program (MRGP) projects	Selectboard	2024-2028	VTrans/Town Funds/ VTrans Grants	Fluvial Erosion	Low - High
Education and Awareness - Identify and develop methods to communicate with populations vulnerable to all potential hazards and those in need of assistance for evacuation and/or sheltering. This will include Town website and hardcopy material available at Town Office and South Londonderry Library along with other outreach	Selectboard/ Emergency Management Director	Ongoing	Town funds/ARPA funds	Cold/Snow/Ice/Wind/Inundation flooding/Fluvial erosion	Low

opportunities as they arise**					
Local Planning and Regulations Local Planning and Regulations - Assess need for driveway standards to assure adequate emergency access particularly to assure adequate access in winter storms, floods and for wildfire protection**	Town Planning Commission	Ongoing	Town General Fund	Fluvial Erosion	Low
Adopt and update flood hazard and river corridor bylaws**	Town Planning Commission; Zoning Administrator	2023-2024	Town General Fund	Fluvial Erosion/Inundation flooding	Low
Construct salt/sand shed so material does not wash into streams**	Selectboard	2024-2028	VTrans/Town Funds	Fluvial Erosion/Inundation flooding	High
Consider adopting river corridor (fluvial erosion hazard zone) bylaws	Town Planning Commission; Zoning Administrator	2023-2024	Town General Fund	Fluvial Erosion/Inundation flooding	Low
Road crew should regularly survey culverts for blockages including	Road Commissioner	2024-2028	Town General Fund	Inundation flooding	Low

photographs and records of damages and costs**					
Identify and replace culverts and bridges that do not meet current Vermont Town Road and Bridge Standards**	Road Commissioner	2024-2028	Town Fund/VTrans/HMGP	Inundation flooding	Low
Plan for evacuating elderly and less fortunate	Selectboard and Emergency Management Director	2024-2028	Town Funds	Cold/Snow/Ice/Wind/Inundation flooding/Fluvial erosion	Low
Provide educational materials and just in time information distribution for weather events via email, VTalert, the Town's website that include information on sheltering in place and preparation for storms, including long term power outages, protecting property, securing propane tanks and transportation disruptions**	Selectboard and Emergency Management Director	Ongoing	Town Funds	Cold/Snow/Ice/Wind/Inundation flooding/Fluvial erosion	Low

*Cost scale:"Low" (Less than $50,000), "Medium" ($50,000-$100,000), "High" (More than $100,000

**Integrated from previous Local Hazard Mitigation Plan

7 PLAN MAINTENANCE

This plan is and will be integrated into existing planning efforts when appropriate. During the annual budget process, the status of proposed projects as well as any newly identified projects will be reviewed by the Landgrove Select Board. If necessary, the plan will be amended to include these new projects. The plan will also be evaluated for effectiveness, the degree to which it is achieving goals of the plan, during the annual budget process. The Select Board will lead this evaluation process. During Town Meeting Day, members of the public will be afforded the opportunity to comment on the status of any projects and on any needed changes to the hazard mitigation plan.

In addition to annual reviews, the Select Board will initiate the update process of this plan two and a half years after this plan has been adopted and approved by:

1. Apply for funding through Vermont Emergency Management
2. Annually updating the analyses of events using new information since completion of the 2024 plan.
3. Annual identification of any new structures.
4. Annually evaluate of potential probability and extent of hazards based on any new information since completion of the 2023 plan.
5. Annually review of completed hazard mitigation projects.
6. Annually identify new projects given the revised hazard evaluation.

The Select Board will hold annual open meetings to solicit opinions and to identify issues and concerns from members of the public and stakeholders. The Town of Landgrove Select Board will work with the Bennington County Regional Commission and the State Hazard Mitigation Officer (SHMO) to review and update their programs, initiatives and projects based on changing local needs and priorities. The BCRC will assist in any necessary coordination and communication with neighboring towns to assure that mitigation actions address regional issues of concern. The revised plan will be submitted for review by the State Hazard Mitigation Officer and FEMA and revised based on their comments. Following approval by FEMA, the Select Board will adopt the completed plan.

Should a declared disaster occur, Landgrove may undertake special review of this plan and the appropriate updates made. After Action Reports, reviews, and debriefings should be integrated into the update process. The plan should also be updated to reflect findings of any completed studies

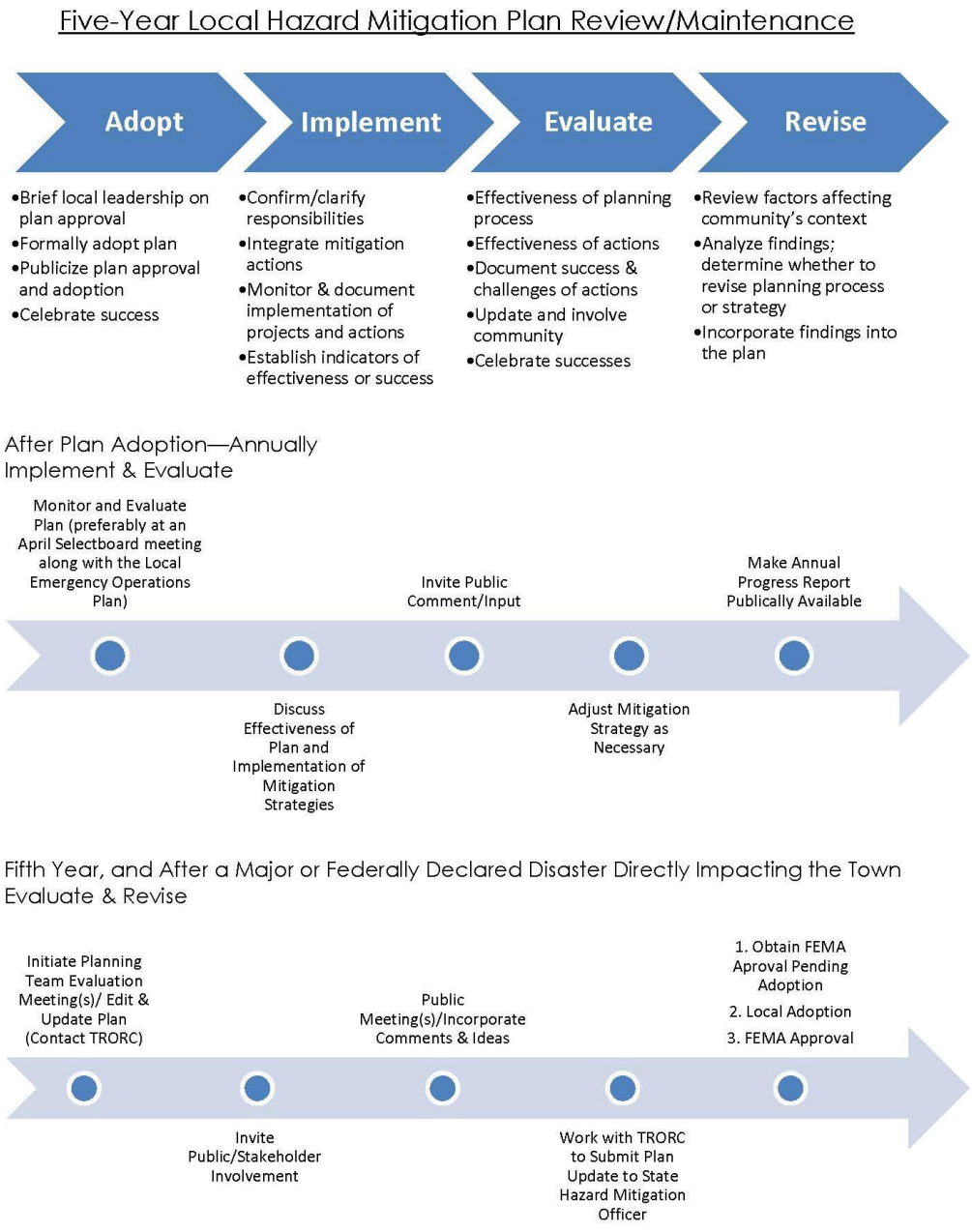
Incorporation into Existing Planning Mechanisms

During the update and re-adoption processes for the Town Plan, bylaws, and/or regulations, the Hazard Mitigation Committee will provide guidance and recommendations to the respective Town Boards for the incorporation and integration of state, regional and local hazard mitigation goals and strategies into the specific programs and practices described in these other planning mechanisms. Throughout the plan update process, the local mitigation priorities identified within this LHMP will continue to be considered, alongside the long-term economic, environmental, and public safety benefits to the community.

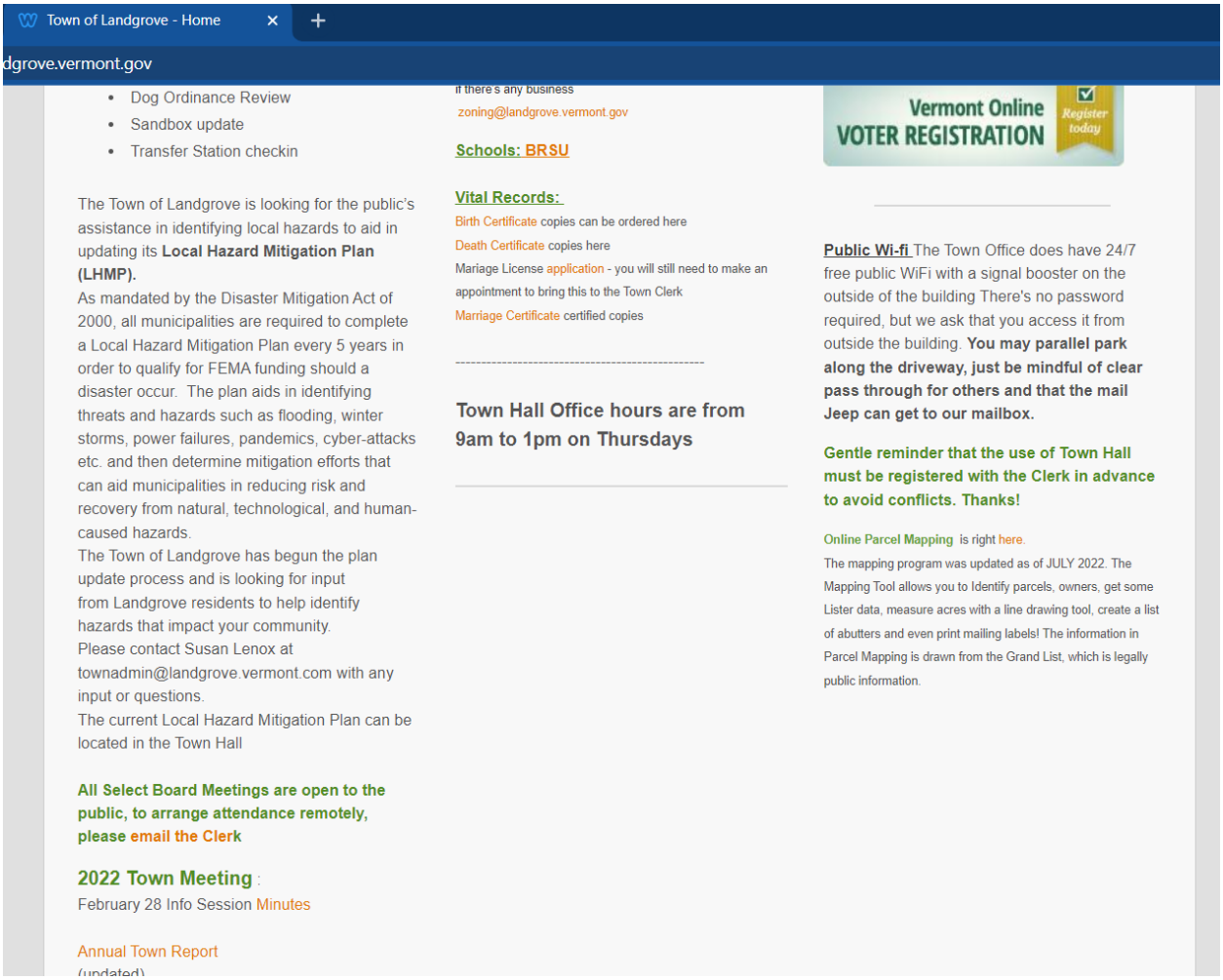
In order to effectively incorporate mitigation strategies into these existing planning mechanisms, it is important to demonstrate how these approaches maximize benefit to the entire community. This can be achieved through the utilization of a cost-benefit analysis, which quantifies the benefits of mitigation against anticipated losses. Such an

analysis is an integral part of prioritizing potential mitigation strategies and actions and is also a requirement for submitting future FEMA mitigation grant applications.

Figure 3 – Five year LHMP plan review and maintenance



APPENDIX A – Community Outreach



Town of Landgrove - Home

dgrove.vermont.gov

- Dog Ordinance Review
- Sandbox update
- Transfer Station checkin

The Town of Landgrove is looking for the public's assistance in identifying local hazards to aid in updating its **Local Hazard Mitigation Plan (LHMP).**
As mandated by the Disaster Mitigation Act of 2000, all municipalities are required to complete a Local Hazard Mitigation Plan every 5 years in order to qualify for FEMA funding should a disaster occur. The plan aids in identifying threats and hazards such as flooding, winter storms, power failures, pandemics, cyber-attacks etc. and then determine mitigation efforts that can aid municipalities in reducing risk and recovery from natural, technological, and human-caused hazards.
The Town of Landgrove has begun the plan update process and is looking for input from Landgrove residents to help identify hazards that impact your community.
Please contact Susan Lenox at townadmin@landgrove.vermont.com with any input or questions.
The current Local Hazard Mitigation Plan can be located in the Town Hall

All Select Board Meetings are open to the public, to arrange attendance remotely, please email the Clerk

2022 Town Meeting :
February 28 Info Session Minutes

Annual Town Report
(updated)

if there's any business
zoning@landgrove.vermont.gov

Schools: BRSU

Vital Records:
Birth Certificate copies can be ordered here
Death Certificate copies here
Mariage License application - you will still need to make an appointment to bring this to the Town Clerk
Marriage Certificate certified copies

Town Hall Office hours are from 9am to 1pm on Thursdays

Vermont Online VOTER REGISTRATION Register today

Public Wi-fi The Town Office does have 24/7 free public WiFi with a signal booster on the outside of the building There's no password required, but we ask that you access it from outside the building. **You may parallel park along the driveway, just be mindful of clear pass through for others and that the mail Jeep can get to our mailbox.**

Gentle reminder that the use of Town Hall must be registered with the Clerk in advance to avoid conflicts. Thanks!

Online Parcel Mapping is right here.
The mapping program was updated as of JULY 2022. The Mapping Tool allows you to Identify parcels, owners, get some Lister data, measure acres with a line drawing tool, create a list of abutters and even print mailing labels! The information in Parcel Mapping is drawn from the Grand List, which is legally public information.

Town of Landgrove Announces Local Hazard Mitigation Plan Update

Stephanie Magnan <steph.magnan@seamsolutionsvermont.com> 6:27 AM (1 minute ago)
to john.broker-campbell, Robert.Faley, clerk, Clerk, winclerk, townclerk, Town

Landgrove Local Hazard Mitigation Plan Announcement

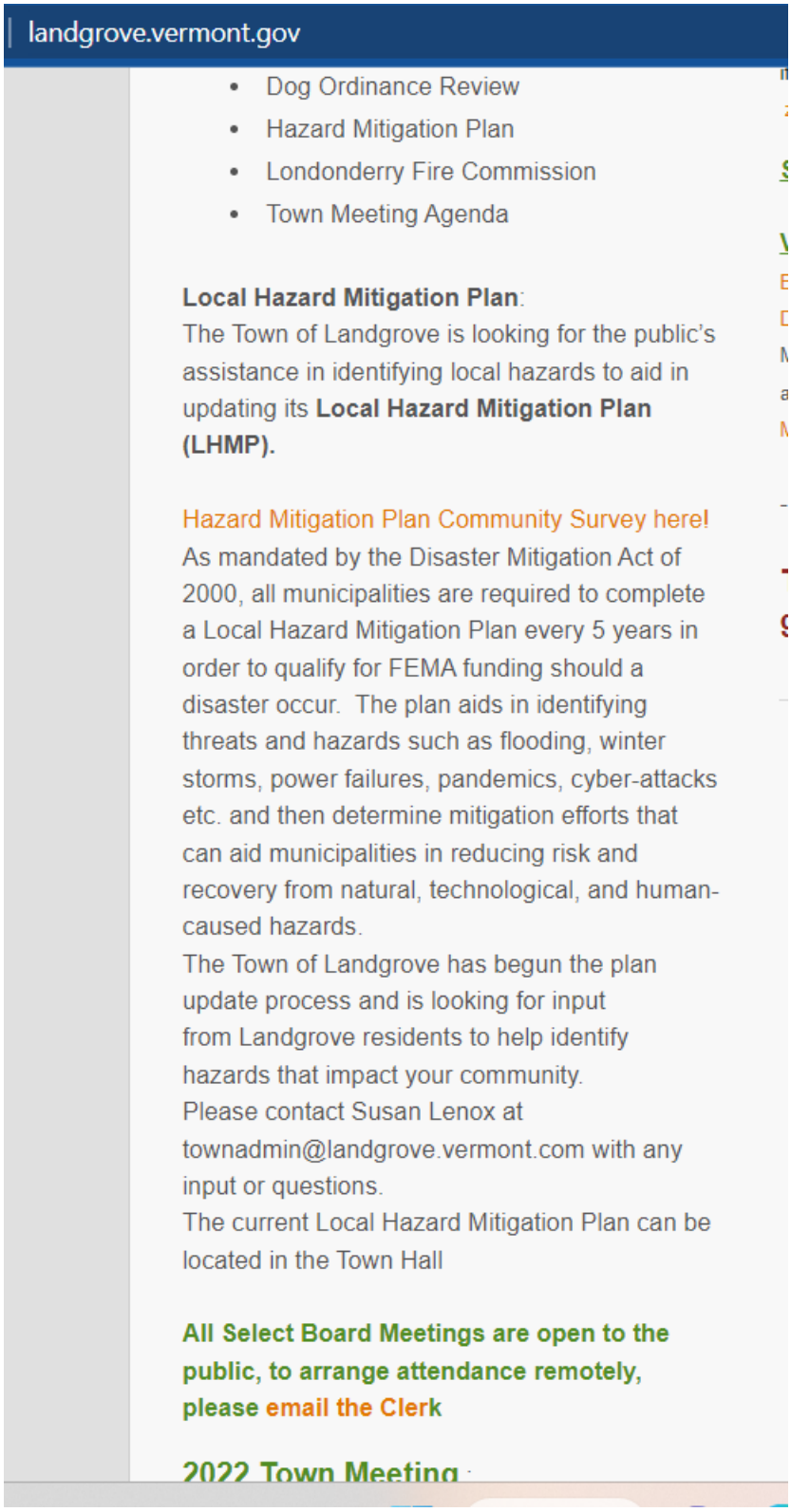
The Town of Landgrove is looking for the public's assistance in identifying local hazards to aid in updating its Local Hazard Mitigation Plan (LHMP).

As mandated by the Disaster Mitigation Act of 2000, all municipalities are required to complete a Local Hazard Mitigation Plan every 5 years in order to qualify for FEMA funding should a disaster occur. The plan aids in identifying threats and hazards such as flooding, winter storms, power failures, pandemics, cyber-attacks etc. and then determine mitigation efforts that can aid municipalities in reducing risk and recovery from natural, technological, and human-caused hazards.

The Town of Landgrove has begun the plan update process and is looking for input from Landgrove residents to help identify hazards that impact your community. Please contact Susan Lenox at townadmin@landgrove.vermont.com with any input or questions.

The current Local Hazard Mitigation Plan can be located in the Town Hall.

Stephanie Magnan
166 Mitchell Rd
Barre, VT 05641
(802) 793-3484
steph.magnan@seamsolutionsvermont.com
https://www.seamsolutionsvermont.com/


landgrove.vermont.gov
Dog Ordinance Review
Hazard Mitigation Plan
Londonderry Fire Commission
Town Meeting Agenda
Local Hazard Mitigation Plan:
The Town of Landgrove is looking for the public's assistance in identifying local hazards to aid in updating its Local Hazard Mitigation Plan (LHMP).
Hazard Mitigation Plan Community Survey here!
As mandated by the Disaster Mitigation Act of 2000, all municipalities are required to complete a Local Hazard Mitigation Plan every 5 years in order to qualify for FEMA funding should a disaster occur. The plan aids in identifying threats and hazards such as flooding, winter storms, power failures, pandemics, cyber-attacks etc. and then determine mitigation efforts that can aid municipalities in reducing risk and recovery from natural, technological, and human-caused hazards.
The Town of Landgrove has begun the plan update process and is looking for input from Landgrove residents to help identify hazards that impact your community.
Please contact Susan Lenox at townadmin@landgrove.vermont.com with any input or questions.
The current Local Hazard Mitigation Plan can be located in the Town Hall
All Select Board Meetings are open to the public, to arrange attendance remotely, please email the Clerk
2022 Town Meeting

APPENDIX B – Meeting Agendas and Notes

APPENDIX C – Past Mitigation Actions Updates

Table 22. Mitigation actions

Hazard	Type	Actions	Responsible Parties	UPDATES	Funding Source(s)	Priority
All Hazards	Education and Outreach	Provide a "be prepared" section of the Town website with links to information for residents	Town Select Board	**Completed**	Town general fund	High
All Hazards	Education and Awareness	Identify and develop methods to communicate with populations vulnerable to potential hazards and those in need of assistance for evacuation and/or sheltering	Town Emergency Management Director	**No progress was made Included in new LHMP actions and will include update website to have educational material along with hard copy of the same materials**	Town general fund	High
All Hazards	Education and Awareness	Identify vulnerable community members through a survey and outreach	Town Emergency Management Director	**Completed**	Town general fund	High
All Hazards	Local Planning and Regulations	Assess need for driveway standards to assure adequate emergency access particularly to assure adequate access in winter storms, floods and for wildfire protection	Town Planning Commission	**Planned, included in updated bylaws and included in new LHMP actions**	Town general fund	High
All Hazards	Local Planning and Regulations	Maintain the Local Emergency Operations Plan annually	Town Select Board; Emergency Management Director	**Completed**	Town general fund	Medium
All Hazards	Local Planning and Regulations	Develop cooperative agreement with Londonderry for sheltering of vulnerable populations	Town Select Board; Emergency Management Director	**Completed**	Town general fund	High
Floods and Flash Floods	Education and Awareness	Educate owners on importance of securing propane tanks and other items that could float or blow away in storms	Town Zoning Administrator	**No progress was made Included in new LHMP actions and will include update website to have educational material along with hard copy of the same materials**	Town general fund	Medium

Floods and Flash Floods	Local Planning and Regulations	Adopt and update flood hazard and river corridor bylaws	Town Planning Commission; Zoning Administrator	**Planned, included in updated bylaws and new LHMP actions**	Town general fund	High
Floods and Flash Floods	Structure and Infrastructure Projects	Road crew should regularly survey culverts for blockages including photographs and records of damages and costs	Town Road Commissioner	**Completed but ongoing and included in new LHMP actions**	Town highway fund	High
Floods and Flash Floods	Structure and Infrastructure Projects	Identify and replace culverts and bridges that do not meet current Vermont Town Road and Bridge Standards	Town Road Commissioner	**Completed but ongoing and included in new LHMP actions**	VT AOT; FEMA HMGP, PDM, FMA	

Table 22. Mitigation actions

Hazard	Type[1]	Actions	Responsible Parties	UPDATES	Funding Source(s)	Priority
Floods and Flash Floods	Structure and Infrastructure Projects	Construct salt/sand shed so material does not wash into streams	Town	**Planned, in progress**	Town; VT AOT	High
Winter storms	Education and Outreach	Provide educational materials on sheltering in place and preparation for winter storms, including longterm power outages and transportation disruptions	Town Emergency Management Director	**Completed**	Town general fund	High
Winter storms	Education and Awareness	Provide materials for residents on methods to protect property from wind events	Town Emergency Management Director; Zoning Administrator	**No progress was made Need to include in new actions and will include update website to have educational material along with hard copy of the same materials**	Town general fund; FEMA HMGP, PDM, FMA	High
Winter storms	Local Planning and Regulations	Develop agreements with adjacent towns for sharing of highway equipment	Town Select Board; Road Commissioner	**Completed**	Town general fund	High
High wind events	Education and Outreach	Provide educational materials on sheltering in place and preparation for winter storms, including longterm power outages and transportation disruptions	Town Emergency Management Director	**No progress was made Need to include in new actions and will include update website to have educational material along with hard copy of the same materials**	Town general fund	High
Hail	Education and Awareness	Distribute weather alert information by email and town website	Town Select Board	**No progress was made Need to include in new actions and will include update website to have educational**	Town general fund	Medium

				material along with hard copy of the same materials		
Drought	Education and Awareness	Provide educational materials on preparing for drought	Town Emergency Management Director	Not Completed – Not relevant based on current hazard ranking	Town general fund; FEMA HMGP, PDM	Medium
Wildfire	Education and Outreach	Acquire materials about fire safety and make available for landowners and homeowners in Landgrove	BCRC	Completed	BCRC	High
Wildfire	Education and Outreach	Provide information on outdoor burning safety prior to the spring and fall fire seasons	Fire warden	Not Completed – Not relevant based on current hazard ranking	Fire wardens	High
Landslide and Debris Flow	Local Planning and Regulations Projects	Consider adopting river corridor (fluvial erosion hazard zone) bylaws	Town Select Board; Planning Commission Director	Include for fluvial erosion .Planned, next by- laws and included in the new LHMP actions	Town general fund	High

Table 22. Mitigation actions

Hazard	Type[1]	Actions	Responsible Parties	UPDATES	Funding Source(s)	Priority
Earthquake	Education and Awareness	Educate property owners on proper construction techniques to reduce potential damage from earthquakes	Town Zoning Administrator	Not Completed – Not relevant based on current hazard ranking	Town general fund	Medium
Hazardous Materials Spill	Local Planning and Regulations	Complete an assessment of hazardous materials and potential accident locations	LEPC 7	Not Completed – Not relevant based on current hazard ranking	Town general fund	Medium
Infectious Disease Outbreak	Local Planning and Regulations	Monitor disease occurrences and potential outbreaks	Town Health Officer	Not Completed – Not relevant based on current hazard ranking	Town general fund	High
Infectious Disease Outbreak	Education and Outreach	Provide educational materials in the town hall and on the town web site on potential infectious diseases	Town Health Officer	Not Completed – Not relevant based on current hazard ranking	Town general fund; VT Health Department	High

Invasive Species	Local Planning and Regulations	Monitor extent of invasive species, particularly forest invasive species such as Emerald Ash Borer	Landgrove Conservation Commission (LCC)	**Not Completed – Not relevant based on current hazard ranking**	Town general fund	High
Invasive Species	Local Planning and Regulations	Complete surveys for ash trees vulnerable to Emerald Ash Borer	BCRC; Bennington County Conservation District; Landgrove Conservation Commission	**Not Completed – Not relevant based on current hazard ranking**	FEMA HMGP, PDM; VT Department of Forests, Parks and Recreation	Medium
Invasive Species	Local Planning and Regulations	Survey for invasive species (e.g., Japanese knotweed) along streams to identify potential erosion areas	Landgrove Conservation Commission	**Not Completed – Not relevant based on current hazard ranking**	VT Department of Forests, Parks and Recreation	Medium
Invasive Species	Education and Awareness	Provide outreach materials for landowners on using native plants and controlling invasive species -	Bennington County Conservation District; Landgrove Conservation Commission	**Not Completed – Not relevant based on current hazard ranking**	Town general fund; VT Dept of Forests, Parks and Rec	High

APPENDIX E – Community Survey Questions

Hazard Mitigation Planning Community Survey for the Town of Landgrove

2 responses

Publish analytics

How long have you lived in Landgrove?

2 responses

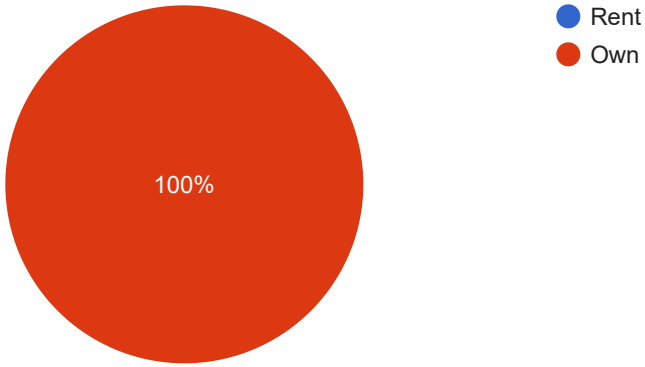
I'm not a full time resident

4 years

Do you rent or own your residence?

Copy

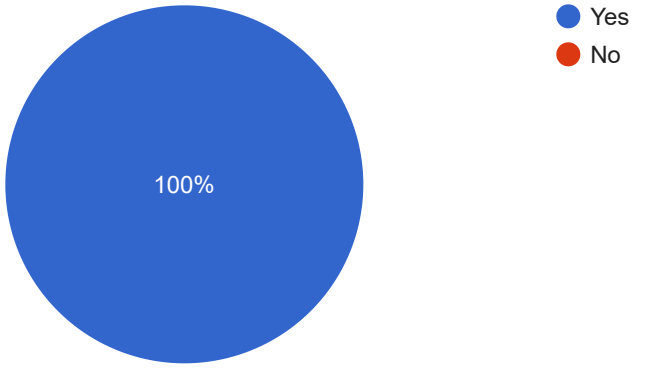
2 responses



Have you experienced a disaster in Landgrove?

Copy

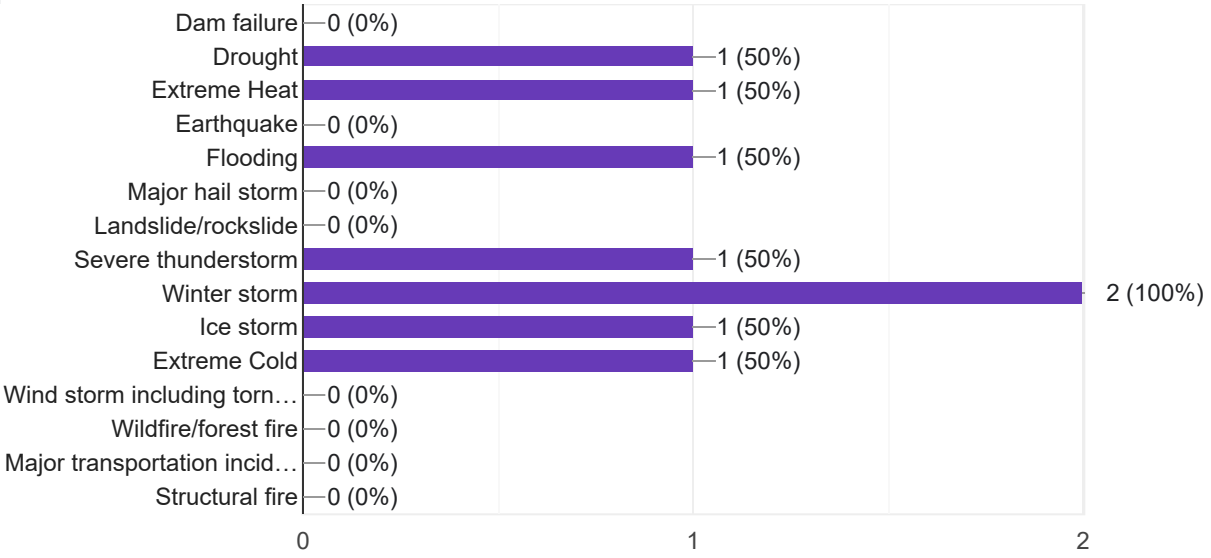
2 responses



If Yes, which of the following disasters have you experienced? (Check all that apply)

Copy

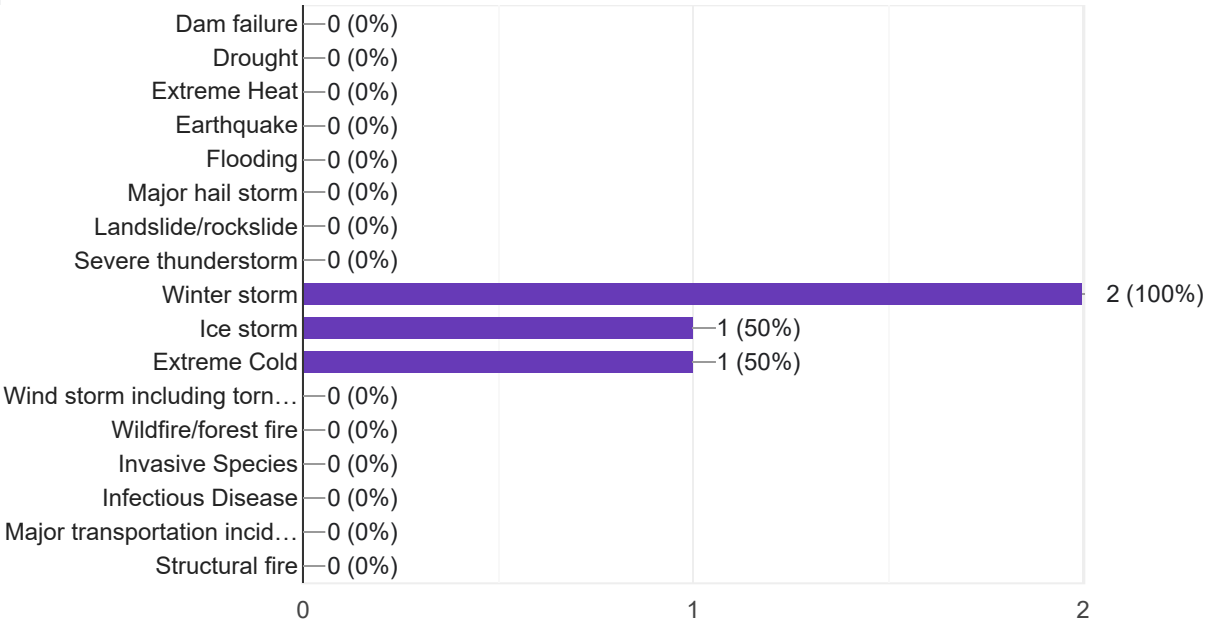
2 responses



Of the following list of disasters what are the top THREE that you are MOST concerned about?

Copy

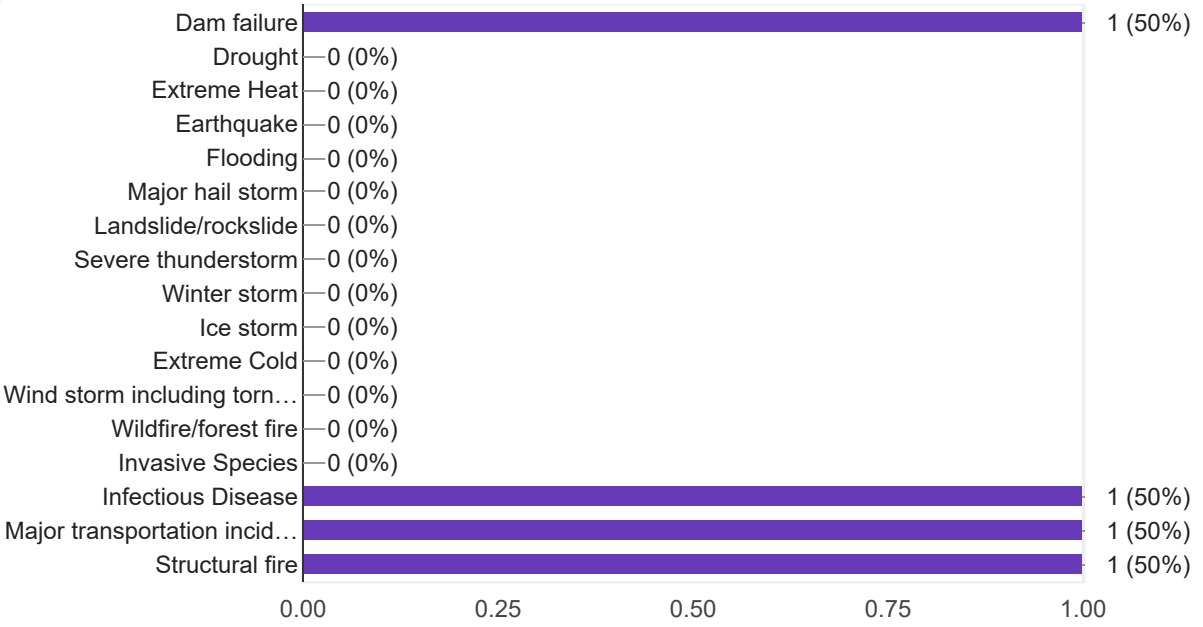
2 responses



Of the following list of disasters what are the top THREE that you are LEAST concerned about?

Copy

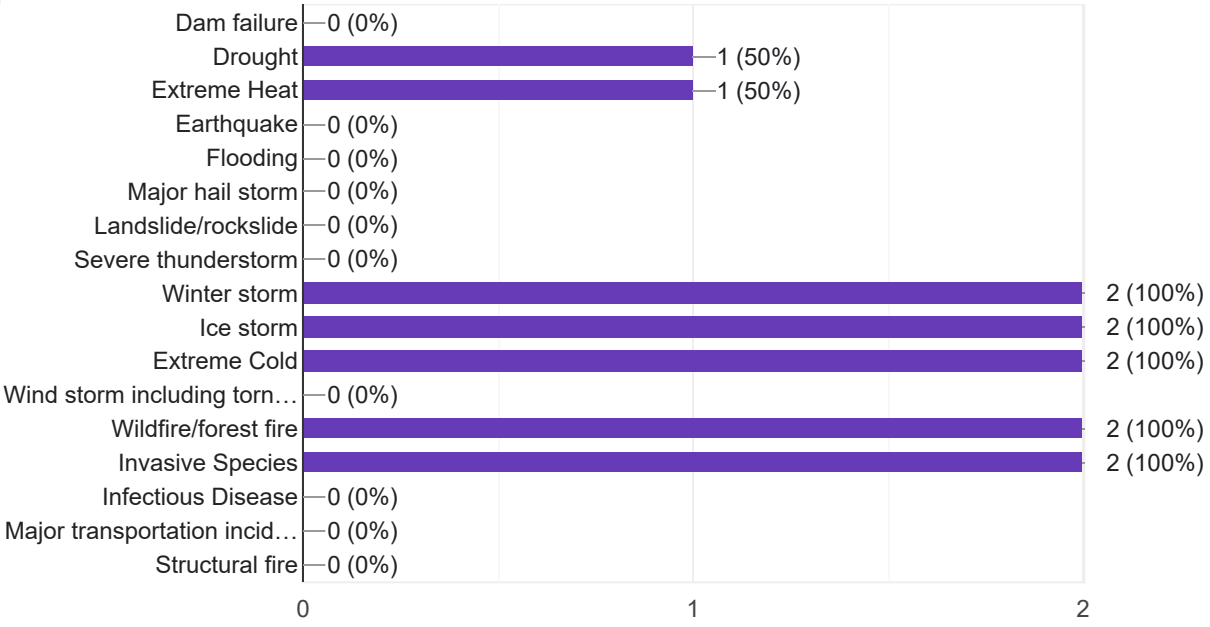
2 responses



Is your home at risk for any of the following disasters? (Check ALL that apply)

Copy

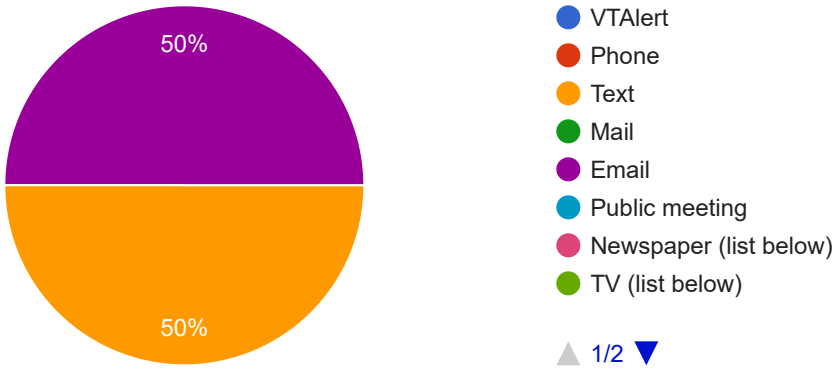
2 responses



What is the most effective way for you to receive information about how to make your home more resilient to natural hazards? (Check the MOST effective way)

Copy

2 responses



List newspaper, TV, radio, social media that you would use for receiving information

2 responses

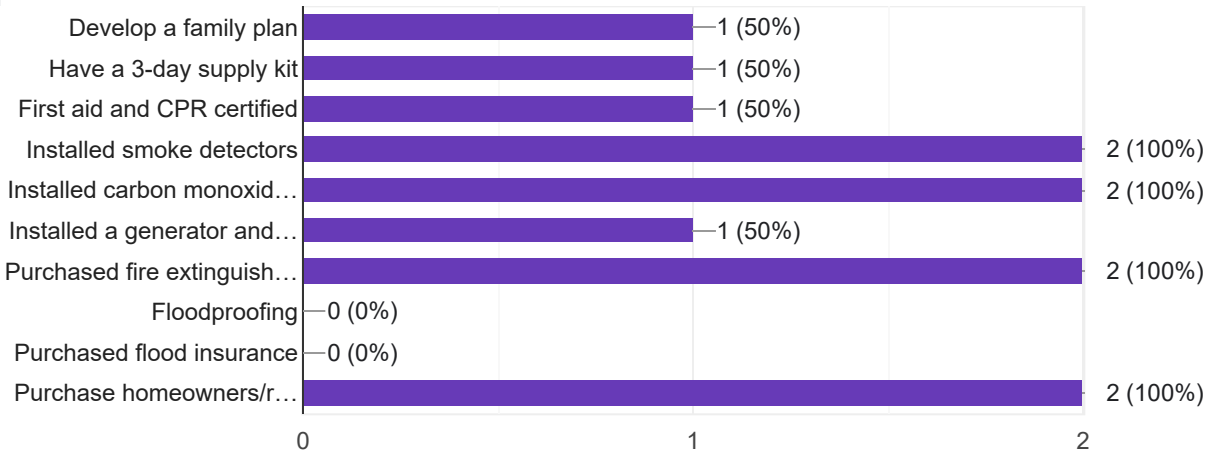
Landgrove town website

Wcax

What actions have your taken to reduce the risk to you and your residence of potential disasters? (Check ALL that apply)

Copy

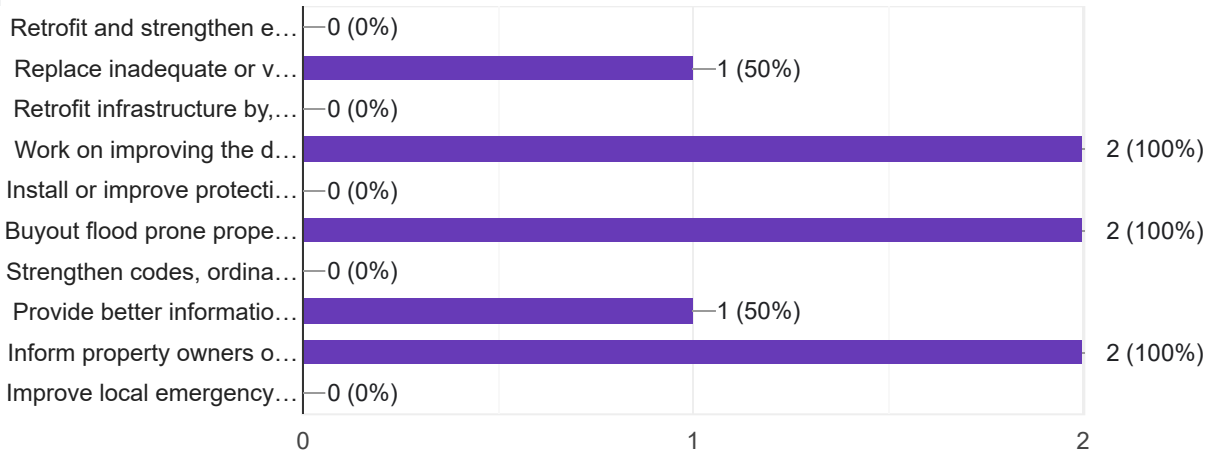
2 responses



Which of the following mitigation project types do you believe local government agencies should focus on to reduce disruptions of services and to strengthen the community (Check ALL that apply)

Copy

2 responses

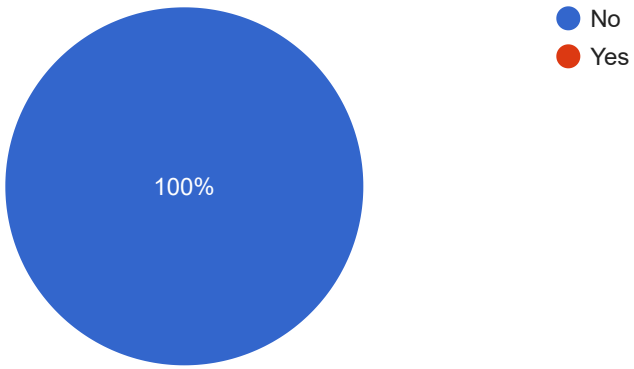


Floodplain Questions

Do you live in a floodplain? (If no, skip to the next section)

Copy

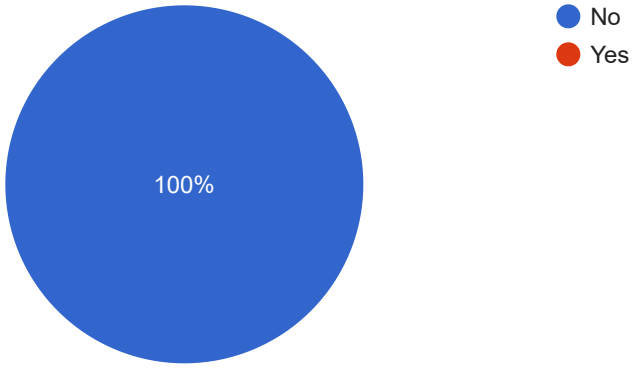
2 responses



Do you have flood insurance?

Copy

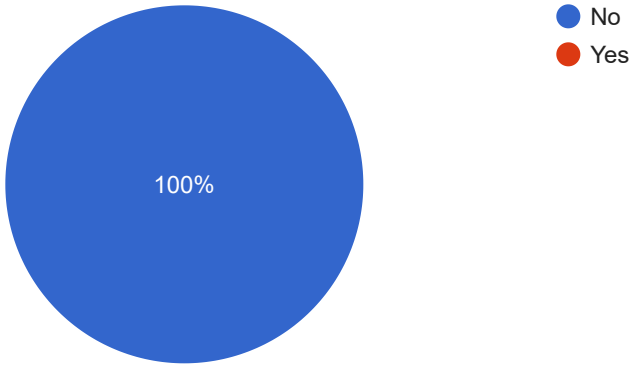
2 responses



If you do not have flood insurance would you like information about flood insurance?

Copy

2 responses



Please leave the best contact information below to receive flood insurance information

0 responses

No responses yet for this question.

Rating what is important to you

APPENDIX F – Historical Event Data

PREVIOUS OCCURENCES FLOODING AND FLUVIAL EROSION

Significant flood events affecting Bennington County. Source: NCDC 2014					
Dates	Type	Description	Area	Category	FEMA
19-20 Jan 1996	Flood	An intense area of low pressure located over the Midc Atlantic region produced unseasonably warm temperatures, high dew points and strong winds. This resulted in rapid melting of one to three feet of snow. In addition to the rapid snowmelt one to three inches of rain fell as the system moved northeast along the coast. This resulted in numerous road washouts and the flooding of several homes across the county. A Cooperative Weather Observer recorded 0.90" of rain in Peru.	Countywide	Moderate	DRc1101 19 Jan to 2 Feb 1996
11-12 May 1996	Flood	A lowcpressure system tracked across New York State and New England, moved to the east coast and intensified creating a prolonged period of precipitation. Over two inches of rain fell over much of western New England resulting in flooding along the Walloomsac River in Bennington County. A Cooperative Weather Observer recorded 3.13" of rain in Peru from May 11c13.	Bennington	Moderate	
8-10 Jan 1998	Flood	Mild temperatures and rain combined to cause small stream flooding throughout Bennington County The Batten Kill rose over eight feet at the Arlington gage, and the Walloomsac River crested nearly two feet above flood stage at Bennington. The main impact was extensive flooding of fields and roadways. Route 7A north of Arlington was closed due to flooding. There was no Cooperative Weather Observer data recorded in Peru during January 1998.	Arlington Bennington Countywide	Moderate	
16-17 Sept 1999	Flood	The remnants of Hurricane Floyd brought high winds and heavy rainfall (3c6 inches) to Southern Vermont. Many smaller tributaries reached or exceeded bankfull. Estimated wind gusts exceeded 60 mph, especially over hilltowns. Power outages occurred across Southern Vermont. A Cooperative Weather Observer recorded 5.75" of rain in Peru from September 16c18.	Countywide	Moderate	DRc1307 16c21 Sept 1999
14-17 Jul 2000	Flash Flood	Thunderstorms caused torrential rainfall with flash flooding washing out sections of roadways in northeast Bennington County and southern Bennington County. Routes 7 and 67 were closed. A Cooperative Weather Observer recorded 4.48" of rain in Peru from July 15c17.	Northeast Bennington County Southern Bennington County Arlington Bennington Shaftsbury	Moderate	DRc1336 14c18 July 2000

17 Dec 2000	Flood	Unseasonably warm and moist air brought a recordc breaking rainstorm to Southern Vermont. Rainfall averaged 2c3 inches. The heavy rain, combined with snowmelt and frozen ground, lead to a significant runoff and flooding. There was no Cooperative Weather Observer data recorded in Peru during December 2000.	Peru Dorset West Rupert	Moderate	DRc1358 16c18 Dec 2000 (Severe Winter Storm)
21 July to 18 Aug 2003		Severe storms and flooding affected Vermont including Bennington County (note: this event does not appear in the NCDC data). There was no Cooperative Weather Observer data recorded in Peru during July 2003, but 6.36" of rain was recorded from August 2c7, .88" from August 10c13, and 2.69" from August 18c19.		Moderate	DRc1488 21 July to 18 Aug 2003
31 Mar to 2 Apr 2004	Flood	Three inches of rain and melting snow caused flooding along the Batten Kill and Walloomsac Rivers. A Cooperative Weather Observer recorded 1.77" of rain in Peru from April 1c2.	Arlington Bennington	Minor	
16-17 Apr 2007	Flood	An intense coastal storm spread heavy precipitation across Southern Vermont, starting as a mixture snow, sleet and rain that later changed to all rain. Liquid equivalent precipitation totals ranged from three to six inches leading to minor flooding across portions of Southern Vermont. A Cooperative Weather Observer recorded 3.92" of rain in Peru.	Arlington	Minor	DRc1698 15c21 Apr 2000
28-29 Aug 2011	Flood/Flash Flood	Tropical Storm Irene produced widespread flooding, and damaging winds across the region. Rainfall amounts averaged four to eight inches and fell within a twelve-hour period. This resulted in widespread flash flooding and river flooding across Southern Vermont. In Bennington County, widespread flash flooding and associated damage was reported countywide, with many roads closed due to flooding and downed trees and power lines. Route 9, the main route across Southern Vermont, was closed. The town of Bennington was inaccessible for a period of time. Record flooding occurred on the Walloomsac River at Bennington. No Cooperative Weather Observer data was recorded in Peru from August 28-30, but 5.6" of rain was recorded on August 31.	Statewide Countywide	Extreme	DRc4022 27 Aug to 2 Sept 2011
7 Sept 2011	Flood	Strong winds also occurred across Southern Vermont, with frequent wind gusts of 35 to 55 mph, along with locally stronger wind gusts exceeding 60 mph. The combination of strong winds, and extremely saturated soil led to widespread long duration power outages. Note: Tropical Storm Irene is also listed under the High Wind Events section of this plan, as Landgrove had reported downed trees from the storm.	North Bennington Countywide	Moderate	

7 Sept 2011	Flood	Large amounts of moisture from the remnants of Tropical Storm Lee interacted with a frontal system producing heavy rainfall with total rainfall amounts ranging from three to seven inches. This heavy rainfall, combine with saturated soil from excessive rains, led to widespread minor to moderate flooding across Southern Vermont. A Cooperative Weather Observer recorded 4.25" of rain in Peru from September 5-8.	North Bennington Countywide	Moderate	

While there were 29 Flood or Flash Flood events that occurred from January 1, 2012 through December 31, 2023, none of these directly impacted the Town of Landgrove.

PREVIOUS OCCURENCES OF WINTER STORMS

Significant winter storm events in Bennington County and Landgrove. Source: NCDC 2014

Dates	Type	Description	Category	Area
2-3 Jan 1996	Heavy Snow	Heavy snow fell across Southern Vermont with the average snowfall ranging from 10-12". A Cooperative Weather Observer recorded 12" in Peru from January 2 to 4.	High	Southern Vermont
12-13 Jan 1996	Heavy Snow	Heavy snow fell across Southern Vermont with snowfall totals ranging from 6-10" with a few locations reporting up to 12". A Cooperative Weather Observer recorded 9" in Peru on January 13.	High	Southern Vermont
26 Nov 1996	Winter Storm	Snow and freezing rain downed trees and power lines, with 10,000 customers without power across Southern Vermont. There was no Cooperative Weather Observer data recorded during November 1996.	High	Southern Vermont
7-8 Dec 1996	Winter Storm	A major storm dumped heavy, wet snow across Bennington and Windham Counties. Approximately 20,000 customers lost power. A Cooperative Weather Observer reported 19.8" in Peru from December 7 to 9.	High	Southern Vermont
31 Mar to 1 Apr 1997	Winter Storm	A late season storm that changed from rain to snow brought 12" of snow to Shaftsbury and 23" to Bennington. A Cooperative Weather Observer recorded 12.5" of snow in Peru on April 1. Power outages were widespread, and Route 9 between Bennington and Brattleboro was closed.	High	Southern Vermont Peru Bennington Shaftsbury
29-30 Dec 1997	Winter Storm	Heavy snow and gusty winds caused power outages across Southern Vermont. Route 7 in Bennington County was closed and there was damage to a mobile home park and cinema in Bennington. A Cooperative Weather Observer reported 14.5" in Peru from December 30 to 31.	High	Southern Vermont Peru Bennington
2-3 Jan 1999	Winter Storm	Sleet and freezing rain resulted in significant ice accumulations across the county.	Moderate	Southern Vermont
Dates	Type	Description	Category	Area
14-15 Jan 1999	Winter Storm	Snow, followed by sleet and freezing rain, along with very cold conditions resulted in heavy accumulations. A Cooperative Weather Observer reported 8" in Peru on January 15.	High	Countywide Dorset
18c19 Feb 2000	Winter Storm	Bennington and Windham Counties received 8c14" of snow. A Cooperative Weather Observer reported 14.3" in Peru from February 19 to 20.	High	Southern Vermont Peru
30c31 Dec 2000	Winter Storm	6c12" of snow fell, with 13" recorded in Pownal and 8" in Bennington. There was no Cooperative Weather Observer data recorded in Peru for December 2000.	Moderate	Southern Vermont
5 Feb 2001	Winter Storm	Heavy snow fell resulting in 12" in Bennington, 14" in Pownal Center, and 9.6" in Sunderland. A Cooperative Weather Observer reported 12" of snow in Peru.	Moderate	
5c6 Mar 2001	Winter Storm	This was considered the largest storm since the Blizzard of '93 with two feet of snow in some areas. Cooperative Weather Observers measured 25" of snow in Pownal and 18.1" in Sunderland. A Cooperative Weather Observer recorded 20" in Peru from March 5 to 7.	High	Southern Vermont Peru Pownal
30-31 Mar 2001	Winter Storm	Heavy wet snow resulted in 9.8" of snow in Sunderland. A Cooperative Weather Observer recorded 15" in Peru from March 30 to 31. Windham County had similar amounts.	High	Southern Vermont Peru Sunderland

6-7 Jan 2002	Winter Storm	A snowstorm produced over a foot of snow across Southern Vermont with 15" of snow recorded in Pownal, and 14" in Sunderland by Cooperative Weather Observers. The Cooperative Weather Observer in Peru recorded 17" from January 7c8.	High	Southern Vermont Pownal
17 Nov 2002	Winter Storm	A storm started with 2c4 inches of snow but changed to freezing rain and gusty winds. There were power outages from Arlington into New York.	High	Southern Vermont Arlington
25-26 Dec 2002	Winter Storm	Snow fell at a rate of 1c3" per hour for a time with 16.2" recorded in Sunderland, 10.5" in Pownal, and 16.5" in Windham County. There was no data for Peru for December 2002.	High	Southern Vermont
6-8 Dec 2003	Winter Storm	The first major storm of the season produced 10c20" across Southern Vermont. Cooperative weather observers measured 21.5" in Pownal and 21.3" in Sunderland. The Cooperative Weather Observer in Peru recorded 11" of snow from December 6 to 7.	High	Southern Vermont Pownal
28 Jan 2004	Winter Storm	Extreme Southern Vermont experienced 7c13" of snow with 12.6" in Sunderland, 9" in Pownal, and 7.5" in Windham County. Only 3.7" was reported in Peru from January 28 to 29.	High	Southern Vermont Sunderland
23 Jan 2005	Blizzard	Frequent whiteout conditions were observed by plow crews. Whiteout conditions were most prevalent across the Green Mountains. A cooperative Weather Observer recorded 14" of snow in Peru.	High	Countywide
15-16 Jan 2007	Ice Storm	Significant icing occurred from the freezing rain leading to widespread power outages. Strengthening winds in the wake of the storm continued to exacerbate power outages across the region.	High	Southern Vermont
2 Mar 2007	Winter Storm	A mix of snow and sleet fell with over one foot in higher elevations and some freezing rain. Landgrove reported 15"and Woodford reported 12". A Cooperative Weather Observer recorded 11.2" of snow in Peru from March 2 to 3.	High	Southern Vermont Woodford Landgrove
16-17 Mar 2007	Heavy Snow	This storm brought widespread snowfall amounts of 10c 18" across Southern Vermont. A Cooperative Weather Observer recorded 13.5" of snow in Peru from March 17 to 18.	High	Southern Vermont
Dates	Type	Description	Category	Area
4-5 Apr 2007	Winter Storm	A mix of rain, sleet and freezing rain changed to snow by the evening. Snow fell overnight, heavy at times, before ending in the morning. Snowfall amounts of 10" were reported in Landgrove and Woodford.	Moderate	Southern Vermont Woodford Landgrove
12 Apr 2007	Winter Storm	A swath of heavy wet snow spread across portions of Southern Vermont. Snowfall amounts were greatest across higher elevations of eastern Bennington and western Windham Counties. Landgrove reported 9" of snow and Woodford reported 9.5". The heavy snowfall led to downed tree limbs and power lines, resulting in power outages.	High	Southern Vermont
15-16 Apr 2007	Winter Storm	A heavy wet snow accumulated 8c12" with 12" in Woodford, 10.5" in Landgrove, and 11" in Windham County. A Cooperative Weather Observer recorded 11" of snow in Peru on April 16. Gusty winds brought down power lines causing widespread outages. Damaging winds were reported by a Cooperative Weather Observer in Sunderland.	High	Southern Vermont

2-3 Dec 2007	Winter Storm	Snow fell moderate to heavy, with some sleet and freezing rain mixing at times. Snow accumulations were 8c12" with 12.5" reported in Landgrove.	High	Southern Vermont Landgrove
16-17 Dec 2007	Winter Storm	Snow, sleet and freezing rain, with total snow and sleet accumulations of 8c14", affected Bennington County and resulted in traffic problems and power outages. A Cooperative Weather Observer reported 12.4" in Sunderland along with damaging winds, 14" in Woodford, and 11.5" in Landgrove. The Cooperative Weather Observer in Peru recorded 11" of snow.	High	Countywide
30 Dec 2007 to 2 Jan 2008	Heavy Snow	This storm brought heavy snow to eastern New York and western New England totaling from 6c12" across Southern Vermont. Snowfall amounts ranged from 6c 11". This led to treacherous travel conditions and the closings, or delayed openings, of numerous schools and businesses. A Cooperative Weather Observer reported 17.2" of snow in Peru from December 31 to January 2.	High	Southern Vermont
4-6 Mar 2008	Ice Storm	This storm system spread freezing rain and sleet across higher elevations of east central New York and portions of Southern Vermont, resulting in significant ice accumulations of one half, to locally up to one inch in the higher elevations of western Windham County and one quarter to less than one half of an inch in lower elevations.	High	Southern Vermont
11-18 Dec 2008 FEMA DR-1816	Winter Storm	A series of snowstorms (two events reported by NCDC from 17-20 December) hit eastern New York and western and southern New England during this period resulting in 3-9" of snow per storm, but accumulating to over a foot during the period. A Cooperative Weather Observer recorded 29" of snow in Peru from December 12 to 22. Icing conditions followed on December 24.	High	Southern Vermont
12c23 Feb 2009	Heavy Snow Winter Storm	Several events were recorded by NCDC with snowfall amounts of 6c12", especially in higher elevations. There were isolated amounts of up to 12" reported in Landgrove and Woodford where snow squalls were more persistent. Over that time period, a Cooperative Weather Observer recorded 19.2" of snow in Peru.	Moderate	Southern Vermont Higher elevations Landgrove Woodford

Significant winter storm events in Bennington County and Landgrove. Source: NCDC 2023

Dates	Type	Description	Category	Area
1-3 Jan 2010	Heavy Snow	This storm brought widespread snowfall to Southern Vermont along with blustery conditions, resulting in blowing and drifting of the snow. Snowfall totals across Bennington and western Windham counties ranged from about 10" up to just over two feet. A Cooperative Weather Observer recorded 38.03" of snow in Peru from January 1c3. A Cooperative Weather Observer recorded 19.1" of snow in Pownal from January 1c4 and another Cooperative Weather Observer reported 21.5" in Sunderland.	High	Southern Vermont

23-24 Feb 2010	Heavy Snow	This system blanketed the area in a heavy wet snow that resulted in treacherous travel conditions and widespread power outages across Southern Vermont. Generally one to two feet of snow accumulated with the highest amounts above 1500 feet. A Cooperative Weather Observer recorded 16.2" of snow in Pownal. There was no Cooperative Weather Observer data for Peru from February 23 to 24.	High	Southern Vermont
26-27 Feb 2010	Heavy Snow	A powerful storm brought heavy rainfall and a heavy wet snow resulting in widespread power outages and dangerous travel conditions across Southern Vermont. Strong and gusty winds developed along the east facing slopes of the Green Mountains of Southern Vermont with gusts up to 50 mph. Snowfall totals of one to two feet were reported across the higher terrain, with lesser amounts of 3c6" below 1000 feet. A Cooperative Weather Observer recorded 22.4" of snow in Peru from February 25c27.	High	Southern Vermont
26-27 Dec 2010	Winter Storm	A nor'easter brought snow and blizzard conditions to Southern Vermont. Cooperative Weather Observers measured 26" of snow in Sunderland and 20" in Pownal. The Cooperative Weather Observer in Peru recorded 14" from December 27c28.	High	Southern Vermont
12 Jan 2011	Winter Storm	Heavy snow fell across Southern Vermont with snowfall accumulations ranging from 14" up to 36", with snowfall rates of 3c6" an hour for a time. A Cooperative Weather Observer measured 20.6" in Pownal. In Peru, 11.5" was recorded from January 12c13.	High	Southern Vermont Pownal
1-2 Feb 2011	Winter Storm	Snow fell at a rate of 1c2" per hour with totals of 12c17" in Southern Vermont. A Cooperative Weather Observer reported 11.6" of snow in Peru from February 2c3.	High	Southern Vermont
25 Feb 2011	Winter Storm	Across Southern Vermont, 12c17" of snow accumulated. No data was recorded from the Cooperative Weather Observer in Peru on February 25.	High	Southern Vermont
29-30 Oct 2011	Winter Storm	An early storm produced 5c14" in Bennington County and 10c16" in Windham County.	High	Southern Vermont
29 Feb 2012	Winter Storm	A complex storm resulted in 8c16" of snow and sleet across Southern Vermont from February 29 to March 1. A Cooperative Weather Observer reported 14.7" of snow in Peru from February 29 to March 2.	High	Southern Vermont

Since March 1, 2012 there have been 46 Heavy Snow or Winter Storm events record in Bennington County

Significant wind events in Bennington County. Source: NCDC 2014				
Dates	Type	Description	Area	Category
27 Jan 1996	High Wind	Damaging winds downed trees, limbs and power lines.	Southern Vermont	Moderate
21 Aug 1997	Strong Wind	Winds gusting to 40 mph, downed trees in Dorset, North Bennington and Sandgate. Approximately 1,000 customers lost power.	Countywide	Moderate
1 Nov 1997	High Wind	Strong and damaging winds caused power outages in Windham and Bennington Counties with approximately 1,000 customers losing power.	Southern Vermont	Moderate

27 Nov 1997	High Wind	Passage of a cold front resulted in winds of 40c50 mph and downed trees and power lines in Windham and Bennington Counties.	Southern Vermont	Moderate
31 May 1998	Thunderstorm Wind Tornado	Several lines of thunderstorms formed ahead of a front. An F2 tornado that originated in Saratoga and Rensselaer Counties followed Route 67 through North Bennington and South Shaftsbury. Damaging winds were reported by a Cooperative Weather Observer in Pownal. Large hail was reported in Shaftsbury.	Countywide Bennington North Bennington Shaftsbury	High
6 July 1999	Thunderstorm Wind	A cold front generated thunderstorms in Southern Vermont. Power lines and trees were downed in Pownal and Stamford, and significant rain fell in Sunderland. Winds were estimated to gust at 90 mph. Damaging winds were reported by the Pownal Cooperative Weather Observer.	Southern Vermont	Moderate
16 Sept 1999	High Wind	Winds from remnants of hurricane Floyd gusted to over 60 mph across Southern Vermont. Significant rains fell in Bennington, Peru and Sunderland.	Southern Vermont	Moderate
31 May 2002	Thunderstorm Wind	Thunderstorms caused damage across Bennington County. Cooperative Weather Observers reported damaging winds in Sunderland and Pownal.	Countywide	Moderate

Significant wind events in Bennington County. Source: NCDC 2014

Dates	Type	Description	Area	Category
5 Jun 2002	Thunderstorm Wind Tornado	Thunderstorms that initially developed in New York produced a macroburst in extreme eastern New York and moved into Southern Vermont. The storms spawned two tornados, one in Woodford Hollow, Bennington County assessed as an F1 with winds of 80c100 mph and the other one near Wilmington, Windham County that was stronger with winds of 125c150 mph. Nonctornadic thunderstorm winds blew some trees down in the town of Pownal. Lightning struck a home in North Bennington causing a very small fire with minimal damage to the structure of the house.	Southern Vermont North Bennington Pownal Woodford	Moderate
21 July 2003	Tornado	A tornado touched down in Pownal, moved through Bennington and continued into western Windham County.	Sunderland Bennington Pownal	Moderate
2 July 2006	Thunderstorm Wind	On July 2, low pressure moved across the southern Quebec Province. A cold front over the eastern Great Lakes at dawn moved into western New England late in the day. The air mass over western New England became marginally unstable enough to generate a few latecafternoon thunderstorms in western New England. A tight pressure gradient over the Northeast was associated with widespread brisk surface wind. A few thunderstorms enhanced the wind locally. A thunderstorm in Stamford became severe late in the afternoon. Strong wind gusts associated with the thunderstorm blew down trees along Route 100 near the StamfordcReadsboro line.	Stamford Readsboro	Moderate
16 April 2007	High Wind	Low pressure created strong winds resulting in extensive tree damage in Dorset. Damaging winds were reported by a Cooperative Weather Observer in Sunderland.	Dorset	Moderate
25 Aug 2007	Thunderstorm Wind	A 50cfoot tall maple tree landed on a van located on Route 8 in Stamford due to strong thunderstorm winds. The van sustained significant damage to the roof and windshield.	Stamford	Low
16 Dec 2007	High Wind	A storm brought sleet and snow as well as high winds resulting in downing of trees and power lines. Damaging winds were reported by a Cooperative Weather Observer in Sunderland.	Countywide	Moderate

9 Dec 2009	Wind	A strong lowcpressure system tracked northeast, into the eastern Great Lakes region creating strong east to southeast winds developed across Southern Vermont during Wednesday morning, before gradually diminishing by Wednesday evening.	Countywide Bennington Pownal Shaftsbury Sunderland Sandgate Manchester Dorset	Moderate
22 Aug 2010	Wind	Strong and gusty east to southeast winds occurred across Southern Vermont, with the higher terrain of the southern Green Mountains being impacted the hardest. Trees and wires were reported down due to high winds in Arlington, Sunderland, Shaftsbury and Bennington. Power outages occurred across Bennington County.	Countywide Arlington Sunderland Shaftsbury Bennington	Moderate
9 June 2011	Thunderstorm Wind	A very warm and humid air mass was in place across the east central New York and adjacent western New England, including Southern Vermont. A series of discrete storms developed into a broken line, which eventually evolved into an organized line of severe storms. Hail and damaging winds were the main threat. Trees and power lines were reported down in Landgrove Town Center by a weather observer due to strong thunderstorm winds.	Southern Vermont North Landgrove	Moderate
28 Aug 2011 FEMA DRc4022	Tropical Storm High Wind	Tropical Storm Irene produced widespread flooding and damaging winds across the eastern New York and western New England. In Landgrove Center, an observer reported a measured wind gust of 41 mph.	Statewide	Extreme

Significant wind events in Bennington County. Source: NCDC 2014

Dates	Type	Description	Area	Category
29 May 2012	Thunderstorm Wind	Strong thunderstorm winds affected Southern Vermont. Falling trees blocked a road in Dorset.	Southern Vermont	Moderate
4 July 2012	Thunderstorm Wind	Numerous trees and power lines were reported downed in Manchester.	Southern Vermont Manchester	Moderate
8 Sept 2012	Thunderstorm Wind	Trees were reported down due to thunderstorm winds approximately 3 miles southeast of North Landgrove. Trees and wires were also downed in Bennington.	Southern Vermont Landgrove Bennington	Moderate
29 Oct 2012	High Wind	Wind gusts of 40c60 mph were reported as a result of the passage of "Superstorm" Sandy.	Western Vermont Woodford	Low
2 June 2013	Thunderstorm Wind	Minor damage was reported in Bennington.	Southern Vermont Bennington	Low
19 July 2013	Thunderstorm Wind	Trees were downed in Manchester.	Southern Vermont Manchester	Low
11 Sept 2013	Thunderstorm Wind	Trees were downed in Arlington.	Southern Vermont Arlington	Low

Since September 12, 2013 there have been 110 High Wind, Strong Wind, or Thunderstorm Wind events in Bennington County with various towns specifically targeted but none solely in the Town of Landgrove.

APPENDIX G – Certificate of Adoption

CERTIFICATE OF ADOPTION

TOWN OF Landgrove, Vermont Selectboard
A RESOLUTION ADOPTING THE Local Hazard Mitigation Plan – Town of Landgrove, Vermont 2024

WHEREAS, the Town of Landgrove has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **Local Hazard Mitigation Plan – Town of Landgrove, Vermont 2024,** which result in loss of property and life, economic hardship, and public health and safety; and

WHEREAS, the Town of Landgrove has developed and received conditional approval from Vermont Emergency Management (VEM) for its **Local Hazard Mitigation Plan – Town of Landgrove, Vermont 2024 (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 Landgrove; and

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

RESOLVED by Town of Landgrove Selectboard:

1. The **Local Hazard Mitigation Plan – Town of Landgrove, Vermont 2024** is hereby adopted as an official plan of the Town of Landgrove;

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

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

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

IN WITNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Landgrove this 9 day of May 2024.

Selectboard Chair | Selectboard Member | ATTEST Town Clerk