Selectboard Approval to send Draft Plan to FEMA: April 6, 2017
FEMA Approval Pending Adoption: August 29, 2017
Belvidere Selectboard Adopted: September 7, 2017
FEMA Formal Approval: October 30, 2017
Plan expires: October 30, 2022

This plan was prepared with funding support of the Hazard Mitigation Grant Program Planning Grant from the Federal Emergency Management Agency. Lamoille County Planning Commission assisted in drafting this plan.
1.0 Introduction
Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazardous conditions. The purpose of this Local Hazard Mitigation Plan (Plan or LHMP) is assess atmospheric hazards facing the community and identify strategies to reduce or eliminate the hazards.

The previous Hazard Mitigation Plan was adopted by the Town of Belvidere on February 5th, 2015 as an “annex” to the multi-jurisdictional All-Hazards Pre-Disaster Mitigation Plan adopted by the Lamoille County Planning Commission in 2012. This plan is intended to be a standalone plan for the Town of Belvidere.

1.1 Community Profile
Belvidere is located in northeast Lamoille County. The town is bisected by the North Branch, a major tributary of the Lamoille River, and is characterized by high mountain streams that feed into the North Branch. It is bordered by Johnson on the south, Eden on the east, Waterville on the west and the towns of Bakersfield and Montgomery on the north.

Belvidere is a predominantly rural, residential community – with 342 residents, it is the smallest town in Lamoille County. The main village center and majority of residential development is clustered along Vermont Route 109, in a valley between the Cold Hollow and Laraway Mountains. In many areas, the mountainous terrain lining Route 109 precludes any future development activity and consequently, Belvidere has experienced very limited development. In fact, between 2010 and 2015, Belvidere’s population slightly decreased- from 348 to 342 residents. As such, mitigation actions proposed in this plan remain focused on reducing hazards to existing buildings and infrastructure rather than on areas of town where new development could potentially occur in the future.

Water and sewer systems are privately owned, with the exception of a public water system that serves the elementary school building. Electricity is distributed by Vermont Electric Cooperative and Green Mountain Power. Fire coverage is provided primarily by the Johnson Fire Department, which covers the towns of Johnson, Waterville and Belvidere. The Johnson fire station is located on Route 15 in Johnson and is approximately 13 miles from Belvidere Center. Ambulance services are supplied primarily by Northern Emergency Medical Service, located in East Johnson. Law Enforcement support is provided by the town’s elected Constable and the Vermont State Police (VSP), dispatched from Williston. The Lamoille County Sheriff’s Office, located in Hyde Park, also provides back-up service. The town has an emergency communications radio and weather radio, but is without a substantial antenna to reliably receive and transmit signals. The area is served by a variety of physicians in private practice, along with the Cambridge Regional Health Center and Copley Hospital in Morrisville. Major medical centers are available in Chittenden County, approximately one hour (45 miles) away.

The town adopts a Local Emergency Operations Plan (LEOP) annually. Critical facilities identified in the LEOP and shown on the Critical Facilities Map include the Town Offices (potentially susceptible to flooding/fluvial erosion) and Belvidere Elementary School (currently only providing kindergarten classes and susceptible to power outages caused by severe wind storms). The School building is designated as both an emergency operations center and community shelter.

Local roads, culverts and bridges are services and maintained by Belvidere. The State of Vermont maintains road infrastructure along Vermont Routes 118 and 109. Belvidere is home to several bridges and buildings of historic significance, as well as numerous old building sites that may be of archeological
interest. Of special interest are the Morgan (covered) Bridge, the Mill (covered) Bridge, the South School, and the Center School. The rural character of the town makes it necessary to have an automobile or other vehicle for transportation. The only public transportation serving the area is an on-demand service provided through a federally subsidized program for the elderly and disabled. Currently Belvidere has only one community grocery (Tallman’s store).

Overall, Belvidere’s capabilities to address natural hazards are considered adequate in relation to the size of the community and the available financial resources. Added demands to improve emergency response and hazard mitigation will necessitate access to more financial resources which, for a small community with a modest tax base, is a significant challenge.

2.0 Planning Process Overview and Public Participation
This plan was prepared during regular monthly public meetings of the Selectboard. All Selectboard meetings are open to the public and public warned according to Vermont’s Open Meeting Law requirements. Lamoille County Planning Commission guided the plan development. The Planning Committee consisted of Selectboard chair, two Selectboard members, Belvidere Emergency Management Director and Town Clerk. Three residents also attended the public meetings. During the development of the plan, no comments from the participating public were received. The following meetings and activities were held to prepare the plan:

- June 2, 2016 –Belvidere Selectboard met with the LCPC to begin the plan update process
- July 7, 2016 – Selectboard and the LCPC reviewed financial incentives associated with the development of the plan, discussed hazards to include in the Hazard Mitigation/Risk Assessment table and reviewed action items included in the 2015 plan.
- Sept 1, 2016 –Selectboard and the LCPC reviewed the Town Road Infrastructure Flood Damage Susceptibility report prepared by the LCPC in 2016.
- January 5, 2017 –Selectboard, with Local Emergency Management Director present at the meeting, reviewed the first plan draft and developed a list of future mitigation actions.
- On February 2, 2017 the Selectboard refined the list of mitigation actions and prioritized the actions.
- Throughout January, February and March 2017, LCPC assisted Belvidere with cataloguing town records related to past hazardous events and damages.

2.1. Existing Plans, Studies, Reports, and Technical Information
To develop this plan, Lamoille County Planning Commission reviewed and referenced the following resources:

- Belvidere Municipal Development Plan 2015-2020
- Belvidere Flood Hazard Ordinance
- Belvidere Highway Codes and Standards (These establish minimum dimensional requirements, and construction and ditching techniques for local roads, bridges and culverts).
- 2016 Belvidere Local Emergency Operations Plan
- 2016 Town Road Infrastructure Flood Damage Susceptibility Study
- 2011 Regional All-Hazards Mitigation Plan and Belvidere Annex to the Regional Plan
- 2013 State of Vermont Hazard Mitigation Plan
- National Centers for Environmental Information, National Oceanic and Atmospheric Administration http://www.ncdc.noaa.gov/stormevents/
- FEMA https://www.fema.gov/disaster
2.2 Planning Process and Neighboring Communities
Neighboring communities have been encouraged to provide input into the development of this plan and review the draft plan. On January 11, 2017, the draft plan was distributed to Local Emergency Planning Committees #11 and #4) members. The LEPCs are composed of emergency management professionals and volunteers and include representatives from all of Belvidere’s neighboring communities, i.e. Johnson, Eden, Waterville, Montgomery and Bakersfield. On Feb 22, 2017 this Plan was posted on the LCPC’s web site and at the LCPC’s Facebook page. The LEPC members and the public were instructed to provide feedback to Lea Kilvadyova, Lamoille County Regional Planner via email or phone.

2.3 Plan Maintenance Process and Continued Public Involvement in the Plan Maintenance Process
Belvidere Selectboard will evaluate Belvidere’s LHMP annually by reviewing the status of mitigation actions and assessing whether plan goals are being achieved and priority actions implemented. This evaluation will occur at public meetings of the Selectboard warned according to the Open Meeting Law requirements. Additionally, any significant disaster event may prompt a review of this plan by the Select Board or Emergency Management Director. One year prior to the expiration of the Plan, the Select Board will initiate and lead the process of the Plan update-with possible assistance from Lamoille County Planning Commission. Continued public involvement will occur through maintaining the existing processes as cited above plus the addition of all evolving required process changes.

3.0 Hazard Identification and Risk Assessment (HI/RA):
A risk assessment measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to atmospheric disasters. During the preparation of this plan, Belvidere evaluated ten atmospheric hazards. These hazards, presented on page 5, were ranked based upon the probability of the event and the community’s vulnerability to the hazard.

Probability is rated in terms of the likelihood the hazard will occur in any given year as follows:

- Rare: Less than 1% probability in the next year; may never have occurred in Vermont;
- Unlikely: 1% to 4% probability in the next year;
- Unusual: 4% to 10% probability in the next year;
- Likely: 10% to 50% probability in the next year;
- Frequent: Greater than 50% probability in the next year.

Vulnerability is rated as high, moderate, or low, based on the community’s susceptibility to the hazard and disruption of daily functions in the community.

Section 3.1 of the plan will address, in detail, two hazards with high community vulnerability. These are Flood/Fluvial Erosion/Ice Jams and Severe Wind Storms. The remaining hazards listed on page 5 i.e. winter storms, wild fire, drought, landslide, earthquakes, hailstorms and extreme temperatures are omitted due to their low or moderate impacts on community vulnerability. Descriptions of the low and moderate impact hazards are limited to hazard definitions and brief information of general nature.
<table>
<thead>
<tr>
<th>Possible Hazard</th>
<th>Probability</th>
<th>Community Vulnerability</th>
<th>At Risk From Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooding, Fluvial Erosion, Ice Jams</td>
<td>Frequent</td>
<td>High</td>
<td>Town offices. Buildings, bridges, culverts adjacent to VT Route 118 and 109 in the northeast area of town; along the North Branch of the Lamoille River parallel to Route 109 and the town center; and located along tributaries of the North Branch.</td>
</tr>
<tr>
<td>Severe Wind Storms:</td>
<td>Likely</td>
<td>High</td>
<td>Belvidere Elementary school building. Buildings, bridges, culverts adjacent to VT Route 118 and 109 in the northeast area of town; along the North Branch of the Lamoille River parallel to Route 109 and the town center; and located along tributaries of the North Branch.</td>
</tr>
<tr>
<td>Thunderstorms, Tropical Storms,</td>
<td>Frequent</td>
<td>Moderate</td>
<td>Property damage, road closures, loss of electricity from fallen trees, infrastructure damage, debris removal</td>
</tr>
<tr>
<td>Hurricanes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe winter storms</td>
<td>Frequent</td>
<td>Moderate</td>
<td>Property damage, road closures, loss of electricity from fallen trees, infrastructure damage, debris removal</td>
</tr>
<tr>
<td>Major wildfire/forest fire</td>
<td>Unusual</td>
<td>Moderate</td>
<td>Widespread damage to structures and natural resources</td>
</tr>
<tr>
<td>Tornado</td>
<td>Unusual</td>
<td>Moderate</td>
<td>Road closures and loss of electricity from fallen trees; major structure damage</td>
</tr>
<tr>
<td>Drought</td>
<td>Unusual</td>
<td>Low</td>
<td>Private well failures, wildfires, agricultural losses</td>
</tr>
<tr>
<td>Landslide</td>
<td>Unusual</td>
<td>Low</td>
<td>Damage to roads and structures</td>
</tr>
<tr>
<td>Earthquake</td>
<td>Unlikely</td>
<td>Low</td>
<td>See VT Geological Survey HAZUS report (9/03 )</td>
</tr>
<tr>
<td>Hailstorm</td>
<td>Unlikely</td>
<td>Low</td>
<td>Damage to structures and other public and private property</td>
</tr>
<tr>
<td>Extreme Temperatures</td>
<td>Unusual</td>
<td>Low</td>
<td>Damage to agriculture crop, plumbing and other infrastructure</td>
</tr>
<tr>
<td>Dam Failure</td>
<td>None</td>
<td>None</td>
<td>There is no dam in Belvidere</td>
</tr>
</tbody>
</table>

3.1 Significant Hazard: Flooding, Fluvial Erosion and Ice Jams

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

Flooding, fluvial erosion are Belvidere’s most commonly recurring hazards. Ice jams are an increasingly dangerous hazard in Vermont, as these can lead to sudden and catastrophic flooding in many locations. Overall, community vulnerability to flooding, fluvial erosion and ice jams is high and likelihood of occurring is frequent.

Location: In Belvidere, parts of community most at risk are the ones located in flood hazard areas depicted on the Flood Hazard Map. Generally, these include lands adjacent to VT Route 118 and 109 in the northeast area of town, lands along the North Branch of the Lamoille River parallel to Route 109 and the town center, and lands located along tributaries of the North Branch.

Extent: The worst flooding that can be anticipated is reflected by the 2011 events during Tropical Storm Irene in southern Vermont, where most areas received between 5 and 7 inches of rain, with the highest recorded amount in the Town of Mendon (11 inches). Had the northern part of the state—including Belvidere—received a comparable amount of rain during Irene, the results would have been equally catastrophic. The extent information for fluvial erosion or ice jams is unavailable.

A history of major flood events that resulted in federal disaster declarations, starting in 1995, is listed below. A historical record for fluvial erosion and ice jams does not exist.

<table>
<thead>
<tr>
<th>Date</th>
<th>DR #</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 1995 (DR-1063)</td>
<td></td>
<td>$6,190</td>
</tr>
<tr>
<td>January 1996 (DR-1101)</td>
<td></td>
<td>$8,627</td>
</tr>
<tr>
<td>July 1997 (DR-1184)</td>
<td></td>
<td>$8,588</td>
</tr>
<tr>
<td>July 1998 (DR-1228)</td>
<td></td>
<td>$18,766</td>
</tr>
<tr>
<td>August/September 2004 (DR-1559)</td>
<td></td>
<td>$9,782</td>
</tr>
<tr>
<td>July 21-August 12, 2008 (DR-1790)</td>
<td></td>
<td>$14,465</td>
</tr>
<tr>
<td>May 2011 (DR-1995)</td>
<td></td>
<td>$5,294</td>
</tr>
<tr>
<td>May 2012 (DR-4066)</td>
<td></td>
<td>$63,000</td>
</tr>
<tr>
<td>May 23, 2013 (DR-4120)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 15, 2014 (DR-4178)</td>
<td></td>
<td>$11,618</td>
</tr>
<tr>
<td>June 9, 2015 (DR-4232)</td>
<td></td>
<td>This event did not impact Lamoille County.</td>
</tr>
</tbody>
</table>

Funds provided in response to these natural disasters were used as follows:

**August 1995**: Record setting heavy rains caused flooding in six north-central counties of Vermont (FEMA-1063-DR-VT). This was the first time since the floods of 1927 and 1934 that a flood not only affected public infrastructure, but also personally impacted the residents of Vermont. Preliminary damage assessments indicated individual losses greater than damages to public infrastructure. Flood levels exceeded the 500-year event in several areas along the Lamoille River. Funds were used to repair an embankment supporting the roadway along town highway #3.

**January 1996**: A mid-winter flood event brought statewide destruction of private and public property with eleven Vermont counties included in the declared disaster area. This event left more than 150 communities eligible for public assistance (FEMA-1101-DR-VT). Funds used to replace lost fill and clean and shape ditches along town highways #2, #3 and #10. Hazard mitigation was not considered cost
effective at these locations at the time. Storm water washed out fill, gravel and riprap and deposited debris at the 60” culvert (Bridge #16) at intersection of town highway #6 and #4.

**July 1997:** Excessive rain in several northern Vermont counties caused flash flooding and destruction of public and private property (FEMA-1184-DR-VT). High velocity waters damaged many roads in Belvidere. Funds were used to replace lost fill and surface aggregate, replace washed out rip rap and to grade and shape roadways and ditches. A new culvert was installed along the Bog Road.

**July 1998:** Eleven of the fourteen Vermont counties experienced severe damage from excessive rainfall (FEMA-1228-DR-VT). The torrential rains came in much the same pattern as they had in the summer of 1997, but occurred further south than the 1997 floods. The flash flooding left many homes destroyed, roads and bridges damaged, and communities cut off from the rest of the state. Belvidere suffered flood damage to road surface, culvert and ditches along Smithville and Back Roads. Funds were used to replace lost aggregate and surface materials and to install a new culvert on the Smithville Road.

**August 12 -September 12, 2004:** (DR 1559): Severe thunderstorms on August 12, 29 and 30 caused flooding and washed out roads. A federal disaster was declared in Addison, Caledonia, Chittenden, Franklin, Lamoille, Orleans and Windham counties. The Town of Belvidere received more than $9,700 in federal share funds for public assistance projects due to damage to roads.

**July 21-August 12, 2008:** Severe storms and flooding caused a federal disaster to be declared in Addison, Caledonia, Essex, Lamoille, Orange, Washington and Windsor counties on September 12, 2008 (FEMA-1790-DR-VT). Belvidere suffered flood damage to roads and more than $14,400 in federal public assistance funds were used for repairs to town highways #5, 8, 10 and 12.

**April 23- May 9, 2011:** Excessive rain and severe floods sweep across northern Vermont and the Champlain Valley, with a federal disaster (DR-1995) declared for Addison, Chittenden, Essex, Franklin, Grand Isle, Lamoille and Orleans counties on June 15, 2011. This declaration extended both Public Assistance and Individual Assistance funds to Lamoille County communities. Belvidere received $5,294 in federal Public Assistance obligated to the town for road and culvert damage sustained during the storm.

**May 29, 2012:** Flash flooding, thunderstorms, heavy rain, and strong winds struck parts of Vermont, including Lamoille County, causing a federal disaster declaration (DR-4066) for Addison, Lamoille, and Orleans counties. Public Assistance funds were allocated to repair roads, bridges, and culverts. Belvidere had five highway projects requiring over $63,000 in federal assistance.

**May 23, 2013:** Heavy rainfall produced flash flooding across Lamoille and Chittenden Counties (DR 4120). Excessive runoff in the steep terrains washed out bridges, culverts and roads. Gradually the flash flooding transitioned to a flood event as larger rivers such as the Lamoille and Browns River responded to the increased flows. Belvidere did not receive federal assistance funds.

**April 15, 2014:** Heavy rainfall and snowmelt caused widespread minor to moderate flooding across Lamoille County, mainly along and west of Route 100 (DR 4178). Numerous highways were flooded and there was widespread damage to gravel roadsides and many culverts failed in Johnson, Belvidere, Cambridge and Waterville. In Stowe, the recreation path sustained damage. Total public assistance Belvidere received $11,618 to repair damage to road and culvert.

### 3.1.1. National Flood Insurance Program (NFIP)

Belvidere participates in the NFIP, and currently three NFIP policies are in force. There are no repetitive
loss properties located in the Town of Belvidere. Flood plain development is regulated by Belvidere Flood Hazard Regulations last adopted in 2006. The regulations are administered and enforced by the Administrative Officer and hearings are held by the Development Review Board.

3.2. Significant Hazard: Severe Wind Storms (Thunderstorms, Tropical storms, Hurricanes)

Hazard Definition: Severe thunderstorms, hurricanes and tropical storms are compound hazards are capable of producing precipitation, high winds, flooding, and fluvial erosion. Thunderstorm winds are generally short in duration, involving winds or gusts in excess of 50 mph. A tropical storm has a maximum sustained wind speed of 39–73 mph. A hurricane is a tropical cyclone with sustained winds that have reached speed of 74 mph or higher.

Thunderstorms and associated hazards can occur anywhere in Vermont at any time of the year; however, spring and summer are the most common times for severe thunderstorms. Since 2011, the year of tropical storm Irene, four FEMA disaster declarations caused by severe storms included Lamoille County. Each storm caused damages to public infrastructure, primarily roads and bridges. In August 2011, tropical storm Irene (DR 4022) caused damages estimated at $640,000 county-wide. In May 2012, a severe storm, tornado and flooding (DR 4066) caused damages estimated at $306,000 county-wide. In May 2013, damages from a severe storm (DR 4120) in Lamoille County were estimated at $145,000. In June 2014, a severe storm (DR 4178) damaged public infrastructure at the estimated price of $326,000 county-wide. Beyond the events described here, Belvidere does not have a historical account of other severe wind storm events.

Location: While severe winds can have an equal impact on the entire community, parts of community most at risk and likely to be impacted by severe winds are the ones located in flood hazard areas depicted on the Flood Hazard Map. Generally, these include lands adjacent to VT Route 118 and 109 in the northeast area of town, lands along the North Branch of the Lamoille River parallel to Route 109 and the town center, and lands located along tributaries to the North Branch. Overall, Belvidere evaluates the probability of a major windstorm event as likely and community vulnerability as high.

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

3.2. Moderate and Low Hazards

3.2.1 Severe Winter Storm

Hazard Definition: Severe winter storms bring the threat of heavy accumulations of snow, cold/wind chills, strong winds, power outages and property damage.

The worst winter storm that can be anticipated in Belvidere would be comparable to the ice storm of January of 1998 when an unusual combination of precipitation and temperature led to the accumulation of more than three inches of ice in many locations, causing closed roads, downed power lines, and damage to thousands of trees. This storm was estimated as a 200–500 year event. Alternatively, the worst snow storm that can be expected is snowfall of up to 30”, which has occurred multiple times. While large snowfalls often disrupt business for one or more days, Vermont communities are well prepared for handling snow. Overall, community vulnerability to a severe winter storm is moderate and likelihood of occurring is frequent.
3.2.2. Tornado
Hazard Definition: A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. In Belvidere, the probability of a tornado is unusual and the vulnerability is moderate.

3.2.3. Hail Storm
Hazard Definition: Hail is a form of precipitation composed of spherical lumps of ice. Known as hailstones, these ice balls typically range from 5–50 mm in diameter on average, with much larger hailstones forming in severe thunderstorms. In Belvidere, the probability of a hailstorm is unlikely and the vulnerability is low.

3.2.4. Wild/Forest Fire
Hazard Definition: A wildfire is the uncontrolled burning of woodlands, brush, or grasslands.

Across much of Vermont, small wildland and brush fires are common, but the probability of major forest fire is very low. Peak wildfire season is in April, just after spring “green-up.” A second window of wildfire vulnerability typically occurs in early fall. Every town in Vermont has a designated Forest Fire Warden, who receives daily updates from the Division of Forestry during periods of elevated risk. The risk of wildfires is most severe in outlying areas of development—away from the town’s major highways—where structures are surrounded by ignitable hard and softwood forests. In Belvidere, the probability of a wildfire is unusual and the vulnerability is moderate.

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

Droughts represent a hazard in late summer, when local spring and well levels are reduced to minimal flows. The local water table reached an all-time low during the nationwide drought of 1988; however, recovery was fairly rapid. The town has no public water reservoirs aside from the one at the Belvidere Elementary School if private wells go dry. In Belvidere, the probability of a drought is unusual and the vulnerability is low.

3.2.6. Earthquakes
Hazard Definition: An earthquake occurs when two blocks of the Earth suddenly slip past one another.

According to the U.S. Geological Survey (USGS), the risk of earthquakes in Vermont and much of northern New England is rated moderate, compared with the high risk attributed to much of the West Coast and lower-Midwest. Lamoille County has not experienced any property damage or loss of life attributed to an earthquake in its history. In Belvidere, the probability of an earthquake is unlikely and the vulnerability is low.

3.2.7. Landslides
Hazard Definition: The term "landslide" describes a wide variety of processes that result in the downward and outward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these.
The risk of a landslide is most often associated with flooding, erosion, and other impacts of heavy rain. Landslides have caused significant property damage in the nearby towns of Johnson and Cambridge in recent years. In Belvidere, a smaller landslide caused by the spring 2011 floods almost washed out a barn. Belvidere’s topography and rural development pattern leaves few homes and critical facilities exposed to the threat a landslide but the threat is present. In Belvidere, the probability of a landslide is unusual and the vulnerability is low.

3.2.8. Extreme Temperatures
Hazard Definition: Extreme Temperatures can include both unusually hot and cold events. The definition of “extreme” in this instance is based on the local climate. In Vermont, a heat wave is defined as a period of three or more consecutive days during which the diurnal maximum temperature meets or exceeds 90°F. Extended periods of cold during winters are likely to occur. One of the most prolonged cold episodes lasted from January 18 to February 3, 1969. The temperature remained below 0°F consistently and water mains around the state burst in record numbers. Other instances include February 1993 and January 1997, both of which were caused by Arctic high-pressure systems. Overall, Belvidere’s vulnerability to extreme temperatures is low and the probability is unusual.

4.0 Goals and Actions: Community Preparedness and Mitigation
Belvidere’s overarching hazard mitigation goal is to reduce and avoid long-term vulnerabilities to hazards identified in this plan. In reaching this goal, Belvidere engages in emergency preparedness activities of an ongoing nature as well as hazard mitigation action projects.

4.1 Community Preparedness Actions
Belvidere’s community preparedness activities include:
- Maintenance and annual adoption of Local Emergency Operations Plan;
- Maintenance of vegetation management schedule for electric right of way. Inspect and remove, if necessary, trees and/or limbs which endanger electrical lines during wind storms (performed by Vermont Electric Cooperative and Green Mountain Power).
- Participation in Local Emergency Planning Committee meetings and activities.
- Continued participation in National Flood Insurance Program;
- Continued Stream Geomorphic Assessments to identify flood and erosion hazards (performed by LCPC).

4.2. Mitigation Actions
When evaluating investments in hazard mitigation, Belvidere considers both the cost of the investment as well as the benefit of the investment to the community. Since the adoption of the 2015 hazard mitigation plan, Belvidere simplified its process to identify priority actions. In 2015, Belvidere used the following criteria to evaluate the priorities: 1) Action responds to significant hazard; 2) Likelihood of Funding; 3) Protects threatened infrastructure; 4) Socially and politically acceptable; 5) Technically Feasible; 6) Administratively realistic; 7) Reasonable cost to benefit; and 8) Environmentally sound.

In this plan, Belvidere determined that some criteria used in 2015 (such as whether the project is politically acceptable, technically feasible or administratively realistic) were hard to evaluate at the planning stage. For this reason, the criteria were streamlined to the following two areas: 1) Cost and 2)
Benefit. Cost is assessed based on a scale of Low (0 - $5,000), Medium ($5,001 - $15,000), High ($15,001 - $50,000) or Very High (More than $50,000). Benefit is defined as improved resilience of existing buildings or improved infrastructure, and improved public safety. Benefit is Low, Medium or High. A note about funding of mitigation actions: While the availability of funding to implement mitigation actions is important to all communities, the criticality of funding is amplified in the small town of Belvidere with the population of 342 people and an annual town budget of $170,000. Grant programs available through FEMA or Vermont funding streams have been invaluable. However, these grant programs require local matching funds and - for high cost projects such as the one currently considered at Bog Road - it may take several years for the town to be able to set aside enough reserve funds to match the grant funding.

Hazard mitigation actions listed in this plan were carefully considered and will be incorporated into a Town Plan during the next town plan update in 2019-2020. During the Town update process, the Planning Commission will review this plan when they begin the process of updating the town plan in 2019 and incorporate the hazard mitigation actions. Additionally, actions identified in this plan will be made available to state agencies for their incorporation into statewide plans including the Tactical Basin Plan for Lamoille River Watershed of the VT Agency of Natural Resources or the List of Priority Infrastructure Projects developed annually by the VT Agency of Transportation.

### 4.2.1 Status of mitigation actions from the previous Hazard Mitigation Plan (2015 Annex)

<table>
<thead>
<tr>
<th>Action</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Replace culvert on Laraway Road</td>
<td>Completed</td>
</tr>
<tr>
<td>2. Replace culvert on Bog Road</td>
<td>In progress: FEMA grant secured</td>
</tr>
<tr>
<td>3. Replace culverts on Back Road</td>
<td>Deferred</td>
</tr>
<tr>
<td>4. Continue geomorphic assessment along North Branch</td>
<td>Not a current priority</td>
</tr>
<tr>
<td>5. Review 2012 Culvert Inventory Study</td>
<td>Completed</td>
</tr>
<tr>
<td>6. Develop winter storm plan annex to LEOP</td>
<td>Not a current priority</td>
</tr>
</tbody>
</table>

Note: Actions 1-5 identified in the previous Hazard Mitigation plan (2015 Annex) are supported by transportation policies and implementation recommendations of the 2015 Town Plan.

New priority actions are listed below. The timeline indicates implementation priorities. The Selectboard will take these priorities into consideration annually, during the town budget development process. An onset of a significant disaster event may prompt a review of the priorities. Otherwise, it is the Selectboard’s intent to implement the actions listed below as funding, time and public support allow.

The mitigation actions listed below focus on structure and infrastructure projects. Actions pertaining to education and awareness programs, revising of local regulations to further limit development in hazardous areas, and natural systems protections were considered and are currently not incorporated into this plan. Hazard mitigation priorities have not changed and remain focused on flooding, fluvial erosion, ice jams and sever wind storms – Belvidere’s predominant natural hazards.
### 4.2.2 Belvidere Mitigation Actions

<table>
<thead>
<tr>
<th>Mitigation Actions</th>
<th>Hazard</th>
<th>Party to Initiate Action</th>
<th>Timeline</th>
<th>Possible Funding</th>
<th>Cost*</th>
<th>Benefit**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upsize culvert on Bog Road (app 20 feet from intersection with Route 109)</td>
<td>Flooding, Ice jams, Severe wind storms</td>
<td>Selectboard</td>
<td>2018 – 2020</td>
<td>FEMA</td>
<td>Very High</td>
<td>High</td>
</tr>
<tr>
<td>Improve culvert at the intersection of Florence Road and Smithville Road</td>
<td>Flooding, Ice jams, Severe wind</td>
<td>Selectboard</td>
<td>2019 - 2020</td>
<td>FEMA, Better Roads program</td>
<td>Medium to High</td>
<td>High</td>
</tr>
<tr>
<td>Improve bridge abutment at the end of Basin Road</td>
<td>Flooding, fluvial erosion, Ice jams, Severe wind</td>
<td>Selectboard</td>
<td>2020 - 2021</td>
<td>FEMA, Better Roads program</td>
<td>Medium to High</td>
<td>Medium</td>
</tr>
<tr>
<td>Improve road approaches to Morgan and Mill Covered Bridges</td>
<td>Fluvial erosion</td>
<td>Selectboard</td>
<td>2021 – 2022</td>
<td>Better Roads Program</td>
<td>Medium to High</td>
<td>High</td>
</tr>
<tr>
<td>Improve section of Smithville Road where road changes from class III to class IV</td>
<td>Severe Wind, Fluvial erosion</td>
<td>Selectboard</td>
<td>2021 – 2022</td>
<td>Better Roads Program, FEMA</td>
<td>High to Very High</td>
<td>Medium</td>
</tr>
<tr>
<td>Other possible mitigation actions for future planning cycles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upgrade culverts on Bog Road just east of Basin Road. Perform associated channel and stone work on headers.</td>
<td>Flooding, Fluvial erosion, Ice jams, Severe wind</td>
<td>Selectboard</td>
<td>Next planning cycle or upon emergency</td>
<td>Better Roads Program; Lamoille County Conservation District</td>
<td>Very High</td>
<td>High</td>
</tr>
<tr>
<td>Improve the 2’ culverts on Back Road and perform associated channel and stone work on headers; Remove tires from bank upstream of Back Road culvert near Boardinghouse Hill Road and reinforce with appropriate bank stabilization methods; Realign same culvert with stream channel.</td>
<td>Flooding, Fluvial erosion, Ice jams, Severe wind</td>
<td>Selectboard</td>
<td>Next planning cycle or upon emergency</td>
<td>VTrans Better Roads Program; ANR Ecosystem Restoration Program; FEMA</td>
<td>Very High</td>
<td>High</td>
</tr>
</tbody>
</table>

*Cost is evaluated based on a scale of Low (0 - $5,000), Medium ($5,001 - $15,000), High ($15,001 - $50,000) or Very High (More than $50,000)

** Benefit is defined as improved resilience of existing buildings, improved infrastructure and improved public safety and is Low, Medium or High
Resolution

Approving the Belvidere Local Hazard Mitigation Plan

The Selectboard of the Town of Belvidere find that:

A) The adoption of a multi-hazard plan is required as a condition for communities to remain eligible for future Federal Emergency Management Agency (FEMA) mitigation grant funds.

B) The Town of Belvidere has prepared the Belvidere Local Hazard Mitigation Plan in order to meet FEMA’s funding requirement, a copy of which is attached as Exhibit A and incorporated herein by reference.

C) The Selectboard has reviewed and considered the Belvidere Local Hazard Mitigation Plan.

D) The mitigation strategies and actions identified in the plan will be implemented only when funding sources have been identified and projects have been prioritized as outlined in the Plan.

NOW THEREFORE,

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

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

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

The foregoing Resolution is hereby adopted this ___the day of _________________, 2017

Selectboard Chair ____________________________________________________________

Selectboard Member _________________________________________________________

Selectboard Member _________________________________________________________

Town Clerk received ________________________________________________________
Resolution

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Selectboard Chair

Selectboard Member

Selectboard Member

Town Clerk received September 7, 2017