Adopted by the Town of Barton, Barton and Orleans Village on 1/22/2018

Town of Barton, and Barton and Orleans Villages

Multi-Jurisdictional All-Hazards Mitigation Plan Update

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Prepared by:

Town of Barton, and Barton and Orleans Villages, Vermont

CERTIFICATE OF LOCAL ADOPTION

Town of Barton, and Barton and Orleans Villages

A Resolution Adopting the 2017 Multi-Jurisdictional (MJ)
All-Hazards Mitigation Plan Update

WHEREAS, the Town of Barton, Barton and Orleans Villages have worked with the Northeastern Vermont Development Association to identify hazards, analyze past and potential future losses due to natural and human-caused disasters, and identify strategies for mitigating future losses; and

WHEREAS, the Barton (Town and Villages) MJ All-Hazards Mitigation Plan contains recommendations, potential actions and future projects to mitigate damage from disasters in the Town of Barton and the Barton, Barton and Orleans Villages; and

WHEREAS, a meeting was held by the Barton Selectboard and the Barton and Orleans Village Trustees to formally approve and adopt the Barton MJ All-Hazards Mitigation Plan as an Annex to the Northeastern Vermont Development Association's (NVDA) All-Hazards Mitigation Plan,

WHEREAS, the respective officials identified in the mitigation action plan are hereby directed to pursue implementation of the recommended actions assigned to them;

NOW, THEREFORE BE IT RESOLVED that the Barton Selectboard and Barton and Orleans Village Trustees adopts this MJ All-Hazards Mitigation Plan.

12/18/17	12/26/2017	1/22/2018
Date	Date	Date
Robert Croteau		
Selectboard Chair	Barton Village Chair	Orleans Village Chair
		Gerard R. Wastel
Selectboard Member	Village Trustee	Village Trustee
Paul Sears		
Selectboard Member	Village Trustee	Village Trustee
		Henry Wellwood
Selectboard Member	Village Trustee	Village Trustee

Executive Summary

In 2014, the Town of Barton, Barton and Orleans Village (to be further referred to as the "town") began to update their Local All-Hazard Mitigation Plan from the last approved and adopted version in 2005. The results of this work are contained herein and represent the collaborative efforts of the Hazard Mitigation Planning Team and associated residents, towns, villages and agencies that contributed to the development of this plan. As hazard mitigation is a sustained effort to permanently reduce or eliminate long-term risks to people and property from the effects of reasonably predictable hazards, the town has communicated its efforts related to developing this plan to its residents and surrounding municipalities, providing a formal opportunity to provide input and review relevant sections of the plan. Along these lines, the town has documented the planning process so that future updates can follow an efficient pattern in addition to capturing this important component as means of establishing institutional memory. In realization that eligibility to receive federal hazard mitigation grants and optimize state-level reimburse or "match" dollars during a federally declared disaster is dependent on a federally approved plan, the town remains committed to sustaining its mitigation efforts and by developing this plan, will have a guide for action that will foster enhanced emphasis on mitigation in the years to come. The town realizes the importance of mitigation inherent to its own resilience as well as means to establishing strong partnerships with regional support agencies and associations, state government and FEMA. As the town moves towards formally adopting this Multi-Jurisdictional All-Hazards Mitigation Plan, the purpose of this plan is to:

- Identify specific natural, technological and societal hazards that impact the town in Orleans County
- Prioritize hazards for mitigation planning
- Recommend town-level goals and strategies to reduce losses from those hazards
- Establish a coordinated process to implement goals and their associated strategies by taking advantage of available resources and creating achievable action steps

This plan is organized into 5 Sections:

Section 1: Introduction and Purpose explains the purpose, benefits, implications and goals of this plan. This section also describes demographics and characteristics specific to the town and describes the planning process used to develop this plan.

Section 2: Hazard Identification expands on the hazard identification in the Town Plan with specific municipal-level details on selected hazards.

Section 3: Risk Assessment discusses identified hazard areas in the town and reviews previous federally-declared disasters to identify what risks are likely in the future. This section presents a hazard risk assessment for the municipality, identifying the most significant and most likely hazards which merit mitigation activity. While each of the two Villages and the town have their own unique risks and vulnerabilities, the most significant hazards are considered the same for the three entities and have been profiled, building upon the identified hazards from 2005. They are introduced in the grid below:

Severe winter/Ice storm	Extreme Cold	Flooding/Erosion
	Hazardous Materials Incident	

Section 4: Vulnerability Assessment discusses buildings, critical facilities and infrastructure in designated hazard areas and estimates potential losses.

Section 5: Mitigation Strategies begins with an overview of goals and policies in the most recent Town Plan, which is comprehensive in scope for all three jursidictions, that support hazard mitigation and then formulates a work plan around major infrastructure projects, community awareness and documentation. An analysis of existing municipal actions that support hazard mitigation, such as planning, emergency services and actions of the highway department are also included. The following all-hazards mitigation goals are summarized below:

1) Reduce at a minimum, and prevent to the maximum extent possible, the loss of life and injury resulting from all hazards.
2) Mitigate financial losses and environmental degradation incurred by municipal, educational, residential, commercial, industrial and agricultural establishments due to various hazards.
3) Maintain and increase awareness amongst the town's residents and businesses of the damages caused by previous and potential future hazard events as identified specifically in this Local All-Hazards Mitigation Plan.
4) Recognize the linkages between the relative frequency and severity of disaster events and the design, development, use and maintenance of infrastructure such as roads, utilities and storm water management and the planning and development of various land uses.
5) Maintain existing municipal plans, programs and ordinances that directly or indirectly support hazard mitigation.
6) Develop a mechanism for formal incorporation of this Local All-Hazards Mitigation Plan into the municipal comprehensive plan as described in 24 VSA, Section 4403(5). This mechanism will be developed by the Planning Commission, Selectboard, Village Trustees and NVDA and integrate the strategies into the existing town plan as annexes until the next formal update occurs, where a section devoted to mitigation planning will be integrated into the plan.
7) Develop a mechanism for formal incorporation of this Local All-Hazards Mitigation Plan, particularly the recommended mitigation actions, into the municipal/town operating and capital plans & programs as they relate to public facilities and infrastructure within political and budgetary feasibility. The Planning Commission will review the LHMP and use language/actions from it to inform the integration and update process. Town Meeting Day will serve as the formal time that mitigation strategy budgetary considerations will be approved and incorporated into the town budget.

Section 5 also identifies and provides a detailed discussion on the following mitigation actions:

Action #1: Improve road infrastructure and municipal systems protection programs

Action #2: Improve resilience to severe winter storms

Action #3: Reduce impact of extreme cold durations

Action #4: Raise public awareness of hazards and hazard mitigation actions

Action #5: Continue fluvial geomorphology assessments in collaboration with DEC and develop strategies and regulatory actions in response to identified

Action 6: Reduce risk and impact of hazardous materials incident

In conclusion, Section 5 provides an Implementation Matrix to aid the municipality in implementing the outlined mitigation actions with an annual evaluation process to be coordinated and administered by the Planning Commission.

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SECTION 1: INTRODUCTION AND PURPOSE

1.1 Purpose and Scope of this Plan

The purpose of this Multi-Jurisdictional All-Hazards Mitigation Plan Update is to assist this municipality and its associated villages in identifying all hazards facing their community and in identifying strategies to begin to reduce the impacts of those hazards. The plan update also seeks to better integrate and consolidate efforts of the municipality with those outlined in the Town Plan as well as efforts of NVDA, Vermont State agencies, FEMA and the State Hazard Mitigation Plan. The town is aware that community planning can aid significantly in reducing the impact of expected, but unpredictable natural and human-caused events. Community planning can aid significantly in reducing the impact of expected, but unpredictable natural and human-caused events. The goal of this plan is to provide hazard mitigation strategies to aid in creating disaster resistant communities throughout Orleans County.

1.2 Hazard Mitigation

The Vermont State All-Hazards Mitigation Plan of 2013 defines hazard mitigation as:

> *"Any sustained action that reduces or eliminates long-term risk to people and property from natural and human-caused hazards and their effects. The Federal Emergency Management Agency (FEMA) and state agencies recognize that it is less expensive to prevent disaster or mitigate its effects than to repeatedly repair damage after a disaster has struck. This plan recognizes that communities have opportunities to identify mitigation strategies and measures during all of the other phases of Emergency Management—Preparedness, Response and Recovery. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where they are, where they are most severe and to identify actions that can reduce the severity of the hazard."*

Hazard mitigation strategies and measures can reduce or eliminate the frequency of a specific hazard, lessen the impact of a hazard, modify standards and structures to adapt to a hazard, or limit development in identified hazardous areas. This plan aligns and/or benefits from the 5 goals accomplished as a State since 2010 and as referenced in Section 5 of the State's 2013 Hazard Mitigation Plan and as part of the newly created Emergency Relief Assistance Funding (ERAF) requirements. With enhanced emphasis on community resiliency, many state agencies and local organizations have an increased awareness of the importance of mitigation planning and have produced plans and resources that towns can use to support their planning efforts. This plan will reference, when relevant, pertinent tools and resources that can be used to enhance mitigation strategies.

1.3 Hazard Mitigation Planning Required by the Disaster Mitigation Act of 2000

Hazard mitigation planning is the process that analyzes a community's risk from natural hazards, coordinates available resources, and implements actions to reduce risks. Per *44 CFR Part 201: Hazard Mitigation Planning,* this planning process establishes criteria for State and local hazard mitigation planning authorized by Section 322 of the Stafford Act as amended by Section 104 of the *Disaster Mitigation Act of 2000*. Effective November 1, 2003, local governments now must have an approved local mitigation plan prior to the approval of a local mitigation project funded through federal Pre-Disaster Mitigation funds. Furthermore, the State of Vermont is required to

adopt a State Pre-Disaster Mitigation Plan for Pre-Disaster Mitigation funds or grants to be released for either a state or local mitigation project after November 1, 2004.

There are several implications if the plan is not adopted:

- After November 1, 2004, Flood Mitigation Assistance Grant Program (FMAGP) funds will be available only to communities that have adopted a local Plan
- For disasters declared after November 1, 2004, a community without a plan is not eligible for HMGP project grants but may apply for planning grants under the 7% of HMGP available for planning
- For the Pre-Disaster Mitigation (PDM) program, a community may apply for PDM funding but must have an approved plan to receive a PDM project grant
- For disasters declared after October 14th, 2014, a community without a plan will be required to meet a greater state match when public assistance is awarded under the ERAF requirements (Emergency Relief Assistance Funding)

1.4 Benefits

Adoption and maintenance of this Hazard Mitigation Plan will:

- Make certain funding sources available to complete the identified mitigation initiatives that would not otherwise be available if the plan was not in place
- Lessen the receipt of post-disaster state and federal funding because the list of mitigation initiatives is already identified
- Support effective pre-and post-disaster decision making efforts
- Lessen each local government's vulnerability to disasters by focusing limited financial resources to specifically identified initiatives whose importance have been ranked
- Connect hazard mitigation planning to community planning where possible

1.5 All-Hazards Mitigation Plan Goals

This All-Hazards Mitigation Plan establishes the following general goals for the town and both villages and their residents:

1) Reduce at a minimum, and prevent to the maximum extent possible, the loss of life and injury resulting from all hazards.
2) Mitigate financial losses and environmental degradation incurred by municipal, educational, residential, commercial, industrial and agricultural establishments due to various hazards.
3) Maintain and increase awareness amongst residents and businesses of the damages caused by previous and potential future hazard events as identified specifically in this Local All-Hazards Mitigation Plan.
4) Recognize the linkages between the relative frequency and severity of disaster events and the design, development, use and maintenance of infrastructure such as roads, utilities and storm water management and the planning and development of various land uses.

5) Maintain existing municipal plans, programs and ordinances that directly or indirectly support hazard mitigation.
6) Develop a mechanism for formal incorporation of this Local All-Hazards Mitigation Plan into the multi-jurisdictional municipal comprehensive plan as described in 24 VSA, Section 4403(5). This mechanism will be developed by the Joint Planning Commission, Selectboard, Village Trustees and NVDA and integrate the strategies into the existing town plan as annexes until the next formal update occurs, where a section devoted to mitigation planning will be integrated into the plan.
7) Develop a mechanism for formal incorporation of this Local All-Hazards Mitigation Plan, particularly the recommended mitigation actions, into the multi-jurisdictional municipal and village operating and capital plans & programs as they relate to public facilities and infrastructure within political and budgetary feasibility. The Joint Planning Commission will review the plan and use language/actions from it to inform the integration and update process. Town Meeting Day will serve as the formal time that mitigation strategy budgetary considerations will be approved and incorporated into the town and village budgets

1.6 Community History and Background

The Town of Barton includes Barton and Orleans Villages and is in Orleans County in the rural northeastern part of Vermont. Most of the development occurs near the roads and railroads along the Barton River, Crystal Lake and southeasterly along the Willoughby Brook, which currently defines U.S. Highway 5 and the route of the Washington County Railroad (formerly the Canadian Pacific Railroad), Interstate 91 bisects the town as does the Portland Pipeline. The Portland Pipeline has three lines but only two are currently active.

Major topographic features that have historically limited development include the areas with steep slopes to the east along the northeastern shore of Crystal Lake. Barton Mountain, in the northern central area of the town, and Stillwater Swamp to the east of the mountain, have also had an impact on how the land in Barton has been developed. Generally, the community is characterized by rolling topography with numerous small streams draining the area.
Both Barton and Orleans Villages have several historic properties typical of early architecture. There is a health clinic in Barton Village and a dental clinic in Orleans Village and most of the residents use the North Country Hospital in Newport for their services. The Lake Region High School is a regional high school serving Barton and the surrounding towns. It serves as an emergency shelter. There are 2 other emergency shelters in the community and all have backup generators.

The community has experienced flooding in past years, mostly damaging roads and bridges. The largest employer in Barton/Orleans is Ethan Allen, a major furniture maker. This is where many of the hazardous materials in Barton are located.

Orleans and Barton Villages have their own volunteer fire departments. Barton Fire Department covers Barton Village and Part of Barton Town. Orleans Fire Department covers Orleans Village and part of Barton Town. There are two private Ambulance Companies in Barton and they cover Barton Village and part of Barton Town. The Orleans Emergency Unit covers Orleans Village and part of Barton Town. Barton is part of a 19 community Mutual Aid District. Both villages have municipal water and sewer facilities.

The communities of Barton and Orleans Villages are in the northeastern corner of Vermont, about a 30-minute drive on Interstate 91 to the Canadian border. The community focuses around two village centers, Barton Village and Orleans Village. There is a concentration of housing and commercial development here, surrounded by dispersed homes and a few businesses along the roads in Barton Town. The total population of the community is 2,810. Barton is governed by three separate jurisdictions. The Villages of Barton & Orleans are both incorporated and are situated inside the municipal boundaries of the Town of Barton. Each of the Villages has a Board of Trustees and provides municipal water, wastewater, electric, fire safety & highway services as well as storm water drainage infrastructure. The Town of Barton provides local highway infrastructure & services and is served by the Village electric departments and fire departments. These services are overseen by a volunteer Board of Selectmen. Vermont Electric Coop serves the rest of the community that is not served by either village electric department

Commercially, Barton & Orleans Villages are considered sub-regional service centers. They are approximately a half-hour drive from two regional "urban" centers to the north and to the south, respectively. Both are served by Interstate 91, as well as one state route going through Barton Village and two state routes crossing Orleans. The Villages are not regional centers of employment but do provide services such as grocery, gas & auto repair, restaurants, banking and retail stores. Ethan Allen, a Furniture Plant, is the largest employer in the entire community, with 365 employees.

Development has established in Barton & Orleans along the Barton River, Crystal Lake, and Willoughby River. Railroads and roads have also been somewhat confined to the stream and valley topography of Vermont, with more rolling or flat lands historically used for agriculture. Barton Village sits at the confluence of the Barton River & Crystal Lake in the southern part of

town. At the confluence of the Barton River and Willoughby River in the northwestern corner of town, the Village of Orleans has grown up.

Economic activity is, for the most part, depressed and has been since the last plan approval in 2005. With that, changes in development is minimal. Land use regulation is carried out jointly by the three jurisdictions. A Joint Planning Commission is appointed by the legislative bodies and is charged with development review and drafting the Comprehensive Municipal Plan and Joint Zoning Bylaw (zoning & subdivision regulations) and participation in NFIP & Program for Continued Compliance (FEMA Element C2). Utility Partners LLC is the contracted operator of the Barton Villages Water and Wastewater facilities.

1.7 Summary of Planning Process

The work to update this plan was led by the planning team made up of municipal officials representing each jurisdiction, school officials, local business owners in the manufacturing, fuel and rail industry and the regional planning organization (NVDA). The update project followed a work plan which provided the public and other stakeholders the opportunity for two-way communication. Existing documents were also researched and incorporated into the plan update.

Planning team members, for the most part, fulfill multiple roles in the community and represent a broad array of stakeholders. The following table presents the Planning Team members and their title:

2017 Barton Mitigation Planning Team Roster

Name	**Organization**	**Position**
John Morley III	Orleans Village	Village Manager, Road Foreman, Electric Utility Manager, Regional Planning Commission
Bob Croteau	Barton Town	Selectboard, Regional Planning Commission Representative
E.J. Rowell	Orleans Village	EMD & Fire Chief
Nathan Sicard	Barton Village	Trustee, Planning Commission
Clem Landrey	Barton Town	Road Foreman
Dave Snedeker	NVDA	Executive Director
Bruce Melendy	NVDA	Regional Emergency Planner
Kristin Atwood	Barton Town	Town Clerk
Sam Putnam	Railroad	Transportation Manager
Scott Oeschger	D&C Transport	Safety Coordinator
Evan Riodan	Barton Village	Electric Dept. Manager

Robert Rice	Ethan Allan	Safety Representative
Holly Fortin	Blanchard Fuel	Office Manager
Kim Hastings	Orleans Elem.	Principal
Marilyn Prue	Orleans Village	Office Manager
Andre Messier	Lake Region HS	Principal

Slowly and with the help of NVDA, the town began to update the plan in 2014. The last approved plan for the town was in 2005. This approval came after formal adoption of an Annex of the NVDA-developed, 2005 Northeast Kingdom Multi-Jurisdictional Hazard Mitigation Plan. The 2005 plan was all-but forgotten and is considered too general and basic for current mitigation planning needs and requirements. While the town, by default of daily operations, experience with major disasters since 2005 and advancements in mitigation planning and guidance from state agencies, has enhanced is mitigation efforts since 2005, these enhancements were not a direct result of the 2005 plan. There is a current understanding of the need to integrate the content of this update and its goals, actions and reporting into the daily operational structure and awareness of all town officials so that mitigation planning establishes itself as a consistent topic of concern and discussion. The planning team was developed, representing the community and regional partners as best as possible and planning updates were given consistently a warned, community meetings. In August of 2017, NVDA hired a consultant to assist in meeting the requirements necessary for an approved updated plan. Formal correspondence then began between the planning team and the consultant with a formal meeting occurring on 8/31/17. Additionally, a survey was drafted asking for community input and made available through the town's standard public notification process with access in the town office. The survey introduced the importance and informational needs of a LHMP and asked for specific concerns the resident and/or business owner had. All neighboring towns were sent notification via the town clerk of the plan's development and subsequent drafts and were given an opportunity to provide input through email and/or phone call to the town clerk. No responses were obtained from this solicitation. Following FEMA guidance in Local Mitigation Plan Review Tool Regulation Checklist, the plan was written using data sources that included:

- Surveys and warned, public meetings collecting public comment (issues raised were addressed in plan and the public meeting)
- 2008 Town Plan draft (provided current goals and regulations supporting mitigation, recent capital expenditures and infrastructure value helped to drive vulnerability assessment)
- 2006 Flood Hazard Regulations (Used for historical foundation for future investigation in joining the NFIP)
- 2013 Vermont State Hazard Mitigation Plan (provided key guidance language and definitions throughout the plan).
- Vermont Agency of Natural Resources (ANR) and Transportation (VTrans) (Provided key policy recommendations on environmental conservation, high accident locations, climate change and fluvial erosion data).

- Vermont Departments of Health (VDH) and Environmental Conservation (DEC) (provided information related with public health services that could be impacted during a disaster and state support functions designated to both VDH and DEC. DEC also provided river corridor data for mapping purposes.
- FEMA Open Source (data.gov) Data for Disaster History and PA funding (provided comprehensive declared disaster by year and type as well as project descriptions and cost per event).
- FEMA NFIP "Bureau.Net" database (provided detailed information on repetitive loss properties and associated flood insurance claims).
- EPA's Incident Action Checklist for cold weather resilience of water systems (provides a guidance tool for public works to cross-reference actions on the system).
- 2013 ACCD Mobile Home Resilience Plan (served as resource for future mitigation actions)

Based on the information obtained, input from town and state officials, the planning team, state and federal databases, local associations and NVDA, the plan was created. While many small communities in Vermont face similar circumstances (e.g. flooding, winter storms and remote residents), each one has unique considerations and opportunities. There was a point made to capture the subtle characteristics of the town and its distinct villages. From this, the specific risks, vulnerabilities and mitigation strategies were developed and applicable, broken down to the specific entity impacted. NVDA's role in assisting the entire region with all facets of planning provided crucial information and NVDA's Emergency Management Planning representative attended planning team meetings and provided guidance. While the LEPC provides the best platform to engage representatives from various towns and agencies, all bordering towns were contacted with planning objectives and asked to provide input through a formal email invitation. Vermont's Department of Emergency Management and Homeland Security (DEMHS) also provided information during the development of the plan. DEMHS also has representation at the LEPC meetings and will continue to provide input and guidance as the town moves forward with their mitigation strategies.

On September 18th, 2017, the planning team held a warned public meeting to review the identified hazards and associated mitigation strategies. The draft plan was then revised based on input and presented to the town. Much of the input from residents (e.g. survey results) focused on road resilience and snow removal. The revised draft was made available for review at the town office and residents were informed via meeting minutes and the town bulletin board of the ability to review the draft and additional opportunity for formal comment and suggestions. Minor edits were made to the plan following state recommendations and the final draft was resubmitted to DEMHS and then to FEMA for formal review and approval pending municipal adoption. A resolution of adoption is anticipated following final FEMA approval.

SECTION 2: HAZARD IDENTIFICATION

The 2005 Plan profiled the following hazards (bold indicates continued inclusion in this update):

- **Flooding**
- **Hazardous Materials**
- **Severe Winter Storm/Ice**
- Fire: Urban

For this update, the planning team considered the continued inclusion or deletion of the 2005 hazards profiled by developing and researching the natural hazard categories outlined in the state mitigation plan and for each, considered prior history, current trends and available data to estimate risk. As highlighted above, some profiled hazards remain a risk for the town. However, other hazards, due to lack of occurrence frequency, risk and/or vulnerability have been removed in this update. The definitions of each hazard, along with historical occurrence and impact, are described below.

• **Natural Hazards:** weather / climate hazards (drought, hurricane/tornado, high winds, severe winter storm, extreme temperatures, climate change, lightning, hail), flooding, geological hazards (landslide / erosion, earthquake, naturally-occurring radiation), and fire hazards.

Profiled Natural Hazards: Severe Winter Storm/Ice, Flooding, Extreme Cold Temperature

Additional Profiled Hazards: Hazardous Materials Incident (Only for Barton and Orleans Villages)

2.1 Natural Hazards Overview

The number of natural disasters in Orleans County (11) is near the US average (12).
There have been 10 major disasters (Presidential) declared and three emergencies declared. The causes of the natural disasters have been; Floods: 9; Storms: 7; Winds: 2; Heavy Rain; 1 Landslide: 1; Snowstorm: 1; Tropical Storm: 1 (Note: Some incidents may be assigned to more than one category). The following discussion on natural hazards is based upon information from several sources but specific extent data for Albany was largely not available. However, Orleans County and specifically, nearby Newport City data can be used to capture the extent of natural hazard events for the town. General descriptions are based upon the *2013 Vermont State Hazard Mitigation Plan.* According to NOAA Storm data, there were over 460 severe weather events from 1995-2015 in Orleans County. Events specific to the town, in addition to declared disasters include:

- 9/6/98, 6/26/02 thunderstorms
- 5/29/12 hail/tornado
- 7/29/13 flash flood

The highest risk hazards (severe winter/ice storm, flooding, extreme cold and hazardous materials incident) have been profiled to provide the basis of future mitigation strategies. However, lower risk natural hazards (drought, tornado, tornado, high winds, extreme heat, hail, landslide, earthquake, naturally-occurring radiation and fire hazards) are omitted from full profiling because they do not pose enough risk to substantiate mitigation efforts at this time.

Table 2-1: Summary of Vermont Emergency Declarations

Number	Year	Type
3338	2011	Hurricane Irene
3167*	2001	Snowstorm
3053	1977	Drought

Source: FEMA

Table 2-2: Summary of Vermont Major Disaster Declarations since 1998 (Orleans County: Bold and "" denotes Town/Village PA received)*

Number	Year	Type
4207	**2015**	**Severe Winter Storm**
4232	**2015**	**Severe Storms and Flooding**
4178	**2014**	**Severe Storms and Flooding**
4163*	**2014**	**Severe Winter Storm**
4140*	**2013**	**Severe Storms and Flooding**
4120	2013	Severe Storms and Flooding
4066*	**2012**	**Severe Storms, Tornado and Flooding**
4043	2011	Severe Storms and Flooding
4022*	**2011**	**Tropical Storm Irene**
4001	2011	Severe Storms and Flooding
1995*	**2011**	**Severe Storms and Flooding**
1951	2010	Severe Storm
1816	2009	Severe Winter Storm
1790	2008	Severe Storms and Flooding
1784	2008	Severe Storms, Tornado and Flooding
1778	2008	Severe Storms and Flooding
1715	**2007**	**Severe Storm, Tornado and Flooding**
1698	2007	Severe Storms and Flooding
1559*	**2004**	**Severe Storms and Flooding**
1488	2003	Severe Storms and Flooding
1428*	**2002**	**Severe Storms and Flooding**
1358	2001	Severe Winter Storm
1336	2000	Severe Storms and Flooding
1307*	**1999**	**Tropical Storm Floyd**
1228	1999	Severe Storms and Flooding
1201	**1998**	**Ice Storm**

2.1.1. Profiled Hazards

An Introduction to Climate Change:

From 1962 to 2006, each five-year period resulted in 0-6 Major Disaster Declarations in Vermont. From 2007-2011, there were 11. It is commonly accepted that weather extremes are becoming more commonplace in Vermont. Since 2011, record setting snow, rain and cold have been experienced in the state. In recent years, it has become evident that human activities, mostly associated with the combustion of fuel, have added to the natural concentration of greenhouse gases in the atmosphere and are contributing to rapid climate change on a global scale. While projections of the effects of climate change vary, it is generally predicted that Vermont will have warmer temperatures year-round, with wetter winters and drier summers. An increase in the size and frequency of storms is also predicted. Thus, climate change in the next century will likely increase the chance of weather-related hazards occurring. An increase in precipitation may also result in increased flooding and fluvial erosion. Drier summers may increase the chance of drought and wildfire. A warmer climate may also result in the influx of diseases and pests that cold winters previously prevented. The severity of climate change is also difficult to predict, though the effects may be mitigated somewhat if greenhouse gas emissions are reduced soon. In 2011, Governor Shumlin formed the *Vermont Climate Cabinet*. The Cabinet, chaired by the Secretary of Natural Resources, is a multidisciplinary approach to enhance collaboration between various state Agencies. Its primary objectives include providing the Governor with advisory information and facilitating climate change policy adoption and implementation. In 2013, the Vermont Agency of Natural Resources (ANR) released the Climate Change Adaptation Framework which addresses climate change exposures, vulnerability-specific elements within each of the natural resource sectors, and ongoing and proposed actions that can be or have been taken to prepare for the expected changes. In line and in conjunction with the ANR report, the primary goal of a VTrans climate change adaptation policy is to minimize long-term societal and economic costs stemming from climate change impacts on transportation infrastructure.

Severe Winter Storm

Winter storms impact the entire planning area. According to the *2013 Vermont State All-Hazards Mitigation Plan*:

> *"A winter storm can range from moderate snow to blizzard conditions. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period. A blizzard is a snowstorm with sustained winds of 40 miles per hour or more with heavy falling or blowing snow and temperatures of ten degrees Fahrenheit or colder. An ice storm involves rain, which freezes upon impact. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires, and similar objects and to produce widespread power outages."*

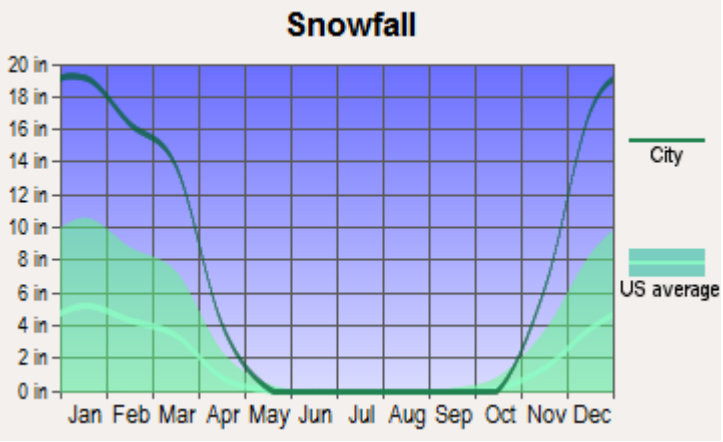
Winter storm frequency and distribution varies from year to year depending on the climatological patterns but snowfall in the town is significantly higher than the national average. County-wide, the winter of 2010-2011 was the third-snowiest on record with a total of 124.3 inches. The record of 145.4 inches was set in 1970-1971. The potential for a major snowstorm

that exceeds the capabilities of town exists every year but with the recent increase in snowfall totals and cold temperature duration, the town realizes that further consideration is required. NOAA's National Centers for Environmental Information is now producing the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two thirds of the U.S. The RSI ranks snowstorm impacts on a scale from 1 to 5, similar to the Fujita scale for tornadoes or the Saffir-Simpson scale for hurricanes. NCEI has analyzed and assigned RSI values to over 500 storms going as far back as 1900. As such, RSI puts the regional impacts of snowstorms into a century-scale historical perspective. The index is useful for the media, emergency managers, the public and others who wish to compare regional impacts between different snowstorms. The RSI and Societal Impacts Section allows one to see the regional RSI values for particular storms as well as the area and population of snowfall for those storms. The area and population are cumulative values above regional specific thresholds. For example, the thresholds for the Southeast are 2", 5", 10", and 15" of snowfall while the thresholds for the Northeast are 4", 10", 20", and 30" of snowfall. 2010, 2012 and 2015 have some of the highest rankings for notable storms in Barton. These rankings are based, in part on the severity of the storm using the following system. Since 2000, there has only been one event that reached a category 4 in the Northeast, five reached Category 3, eight were “significant” and all others were notable.

Table 2-3: NOAA’s Regional Snowfall Index (RSI) and Barton Snowfall vs. U.S. Average

CATEGORY	RSI VALUE	DESCRIPTION
1	1–3	Notable
2	3–6	Significant
3	6–10	Major
4	10–18	Crippling
5	18.0+	Extreme

Barton Snowfall vs. U.S. Average



Regionally, the winter of 2010-2011 was the third-snowiest on record with a total of 124.3 inches. The Town has seen damage from declared snow disasters in the past, primarily dealing with debris removal from downed trees. In any Vermont community, this potential exists every winter. While there is no record of snowfall for Barton, nearby Newport City had the following events which serve to reflect the extent with which snow can impact the area. In January of 2015 received 28'' of snow compared to only 11.3'' in 2014. Historic January snowfall totals fell in 1987 (47.5''), 1978 and 1979 (46.5'', 45.8''). Total average snowfall in December is 26.2'', January is 22.6'', February averages are slightly less at 16.9'' and March is 18.3''. February 14th-15th, 2007 saw the greatest 24-hour max snowfall total at 23.5''. The snowfall totals are annual averages based on weather data collected from 1981 to 2010 for the NOAA National Climatic Data Center. Barton Village and Orleans Village have their own electric facilities. Both serve residents and businesses beyond the village boundaries. Vermont Electric Coop serves the rest of the community that is not served by either village electric department. Power outages are frequent during storms with high winds causing the trees to fall on power lines.

Ice Storm

Major Ice Storms occurred in January 1998 and again in December 2013. While Barton was not affected by the ice storm of 1998, ice jams frequently back up water on Barton River threatening flooding. One of the problems with weather related storms is the loss of power. The North American Ice Storm of 1998 was produced by a series of surface low pressure systems between January 5 and January 10, 1998. For more than 80 hours, steady freezing rain and drizzle fell over an area of several thousand square miles of the Northeast, causing ice accumulation upwards of 2'' in some areas. Barton received less than .5'' of ice. On December 13th, 2013, another ice storm hit portions of Orleans County, resulting in the greatest disruption of electric service since 1998 at 96 hours for some customers regionally but the greatest impact for residents in Barton and associated villages was 16 hours on February 16th, 2013. While there is evidence that supports an increase in weather and precipitation severity, the incidence of ice storms remains fairly spaced out. The town expects to have another ice storm but unlike rain and snow events, the occurrence of a major ice storm is not expected every year (www.wrh.noaa.gov/map/?wfo=sto).

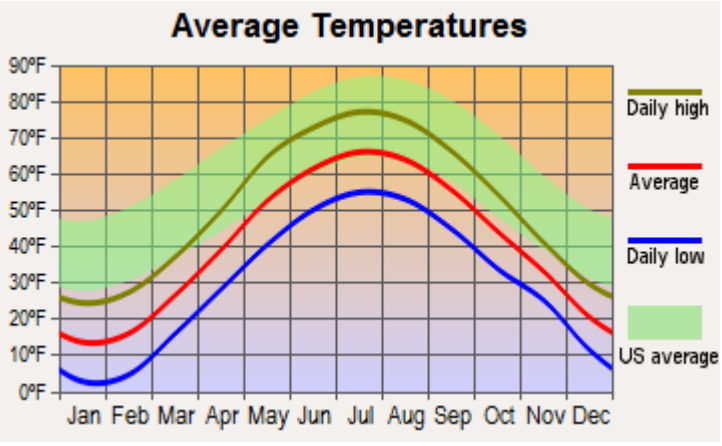
Extreme Cold

While there is no historical evidence to support a concern over the consequences of extremely hot temperatures on human health and safety, high temperatures can help to create severe storms as the one evidenced on September 11th, 2013, where record heat helped to produce damaging hail and winds in parts of the NEK and other areas of Vermont and NY. Recent extremes in cold temperatures is a concern and impact the entire city and region. 2015 tied the coldest winter (January to March) on record (1923) for Vermont as a whole according to the NOAA's National Climatic Data Center whose dataset dates to 1895. The National Weather Service has the following, recent, temperature records for nearby Newport City are:

- Highest: 95 degrees, August 2001
- Lowest: -38 degrees, February 1933

Cold temperatures are expected in the Northeast but they can pose a serious threat to health and safety, especially as the severity and duration increases in conjunction with other technological (e.g. power outage, fuel oil delivery disruption) and societal (ability to purchase heating fuel) factors. The winter of 2015 was the coldest anyone could remember with a mean temperature of 7.8 degrees Fahrenheit. However, the January of 1994 had a mean temperature of 2.7 degrees Fahrenheit which is the coldest mean temperature since 1930 and January is the statistically coldest month in all of Vermont. Since 1930, January produced temperatures in the negative 20's and 30's consistently for Orleans County with record cold temperatures occurring in 1957 and 1933 (-38). While the temperatures for the town remain within averages seen in the last 85 years, dangerously cold temperatures are expected every winter. There is no evidence to support concern over increases in high temperatures for the town as it relates to health and human safety at this time.

Table 2-4: Barton Temperature Ranges vs. National Average



Flooding

Flooding is the most common recurring hazard event in the state of Vermont. June 2015 broke records across the state for the wettest on record. The area received 7 to 8 inches of rain in June

but flooding did not result. Recent history, including the flooding events of 2011 and the records set in 2015 suggest that increases in total rain fall and severity are to be expected along the lines seen with the records set across the state recently. There are three sources of historical precipitation data for Vermont. The data are reported at the county level: 1) recurrence time intervals for 24-hour rainfall storm depth, 2) annualized daily frequency of rainfall, and 3) rainfall-intensity frequencies. The first source of data is the recurrence time intervals for 24-hour rainfall storm depth. The recurrence depth data describes the expected intensity of major rainfall events with respect to both rainfall depth and frequency of occurrence.

Table 2-5: 24-Hour Rainfall Depths (inches) for Common Recurrence Intervals (ANR, 2002)

County: Orleans
1-yr, 24-hr Rainfall Depth: 2.1''
2-yr, 24-hr Rainfall Depth: 2.2''
10-yr, 24-hr Rainfall Depth: 3.1''
100-yr, 24-hr Rainfall Depth: 5.0''

The second source of data are the annualized daily frequencies of rainfall, which were obtained from the National Climatic Data Center (NCDC), Climate Normals program for 1981–2010. The data provides the average number of days per year with measurable precipitation (greater than 0.01 inches) on a county by county basis. This data allows for the conversion of the annual probabilities derived from the recurrence time intervals to daily probabilities. The annualized estimated daily frequency of measurable rainfall for Orleans County is 174 days (highest in the state) with 119 days of rain and 55 days of snow. The final source of data are rainfall-intensity frequencies. Hourly precipitation totals throughout the state of Vermont were obtained from the NCDC's Cooperative Observer Program (COOP). Hourly rainfall data were available for 26 COOP locations between 1962 through 2012. Each station is associated with the specific county in which it was located, and the hourly precipitation totals for each station are aggregated by county to yield a frequency distribution of hourly rainfall intensities.

Table: 2-6: Orleans County Rainfall-Intensity Range (in. /hr.)

County: Orleans
$x \leq 0.01$: 22.5%
$0.01 < x \leq 0.05$: 25.6%
$0.05 < x \leq 0.10$: 38%
$0.10 < x \leq 0.15$: 3.2%
$0.15 < x \leq 0.20$: 5.9%
$0.2 < x \leq 0.25$: .8%
$0.25 < x$: 4.7%

Flood Vulnerability

All of the three jurisdictions in the planning area have the potential to be affected by flooding. Although Orleans Village has not specifically recorded as much damage as the Town & Barton Village, the community continues to have concerns about impacts of future flooding.

Both Villages are built around the confluence of streams and rivers. In Barton Village, this is the Crystal Lake Outlet, and in Orleans Village, the Willoughby River. In terms of infrastructure risk, the villages are nearly 100% paved while the town has 40 miles of dirt roads. Data obtained from the SHELDUS Spatial Hazards Events & Losses Database maintained by the University of South Carolina catalogs flooding events over approximately the past 10 years and reports 19 events in the county (ending in 2013).

Flooding is the most common recurring hazard event in the state of Vermont. There are three main types of flooding that occur in Vermont: flooding from rain or snow melt, flash flooding and urban flooding. Flooding has also been known to occur as a result of ice jams in rivers adjoining developed towns and cities. These events may result in widespread damage in major river floodplains or localized flash flooding caused by unusually large rainstorms over a small area. The effects of all types of events can be worsened by ice or debris dams and the failure of infrastructure (especially culverts), private and/or beaver dams. Rain storms are the cause of most flooding in town. Winter and spring thaws, occasionally exacerbated by ice jams, are another significant source of flooding, especially when coupled with high rain levels. Much of this flooding is flash flooding, occurring within hours of a rainstorm or other event. Flash flooding, as opposed to flooding with a gradual onset, causes the largest amount of damage to property and infrastructure. Floods cause two major types of damage: water damage from inundation and erosion damage to property and infrastructure. The *2013 Vermont State All-Hazards Mitigation Plan* discusses flooding extensively. While that plan is concerned with all of Vermont, the information on flooding is all relevant in that:

"Recent studies have shown that most flooding in Vermont occurs in upland streams and road drainage systems that fail to handle the amount of water they receive. Due to steep gradients, flooding may inundate these areas severely, but only briefly. Flooding in these areas generally has enough force to cause erosion capable of destroying roads and collapsing buildings. These areas are often not mapped as being flood prone and property owners in these areas typically do not have flood insurance (DHCA, 1998). Furthermore, precipitation trend analysis suggests that intense local storms are occurring more frequently. Additionally, irresponsible land use and development will exacerbate the preexisting vulnerability. Urban flooding usually occurs when drainage systems are overwhelmed and damages homes and businesses. This flooding happens in all urban areas, but specifically in Burlington where the area is located at the bottom of a gradient, which adds to the intensity of this localized flooding…

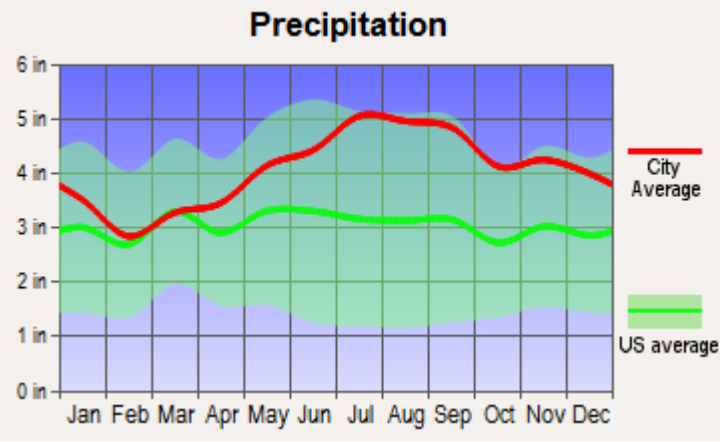
…Over the past two decades, flood damage costs have risen dramatically in Vermont due to increasing occurrences of flooding and increases in vulnerability associated with unwise land use development in flood plains or within stream corridors. The geography and topography are right for a significant localized storm with extreme damage at almost any location in Vermont. Heavy rains with previous ground saturation, which causes runoff, are a significant part of the flooding formula in Vermont. Steep topography and narrow, inhabited, stream and river valleys further increase the dangerous nature of this hazard. Furthermore, precipitation trend analysis suggests that intense, localized storms that can cause flash flooding are occurring with greater frequency. While flooding will continue, planning and other mitigation measures can help minimize damages.

All of Vermont's major rivers have inhabited flood plains. While residents in mountain valleys are at risk, they may not be aware of the danger or may choose to ignore it. There are

many reasons property owners are reluctant to relocate to less flood prone ground, not the least of which is the lack of personal experience of flooding. In addition, many communities originated beside rivers and streams; some of the most attractive property is located in vulnerable areas. Lakeshore property in Vermont is vulnerable to flooding from high water levels, either by surface water erosion or flooding. Occasionally, water-saturated ground and high-water tables cause flooding to basements and other low-lying areas. Lakeshore property is highly desirable and valuable, making the development of lakeshore areas very likely, even with the high potential for flooding. Restrictions on lakeshore property development have significant negative economic and tax revenue impacts that must be carefully weighed against the gains in personal safety and protection of property."

Vermont experienced major floods long before Federal disaster assistance became available. The most destructive recorded event was in November of 1927. In the month before the flood, rains in excess of 150% of normal precipitation fell after the ground had frozen. The flood itself was precipitated by 10 inches of rain falling over the course of a few days. The flood inundated parts of many towns and damaged or destroyed numerous bridges in the county. As the history of the flooding cited above bears out, the geography and topography are right for a significant localized storm with extreme damage at almost any location in Vermont. Numerous floods have resulted in Presidentially-declared disasters and an influx of Federal disaster assistance. Of these disasters, 1973 flood inflicted widespread damage across the state and the residual rains of Hurricane Belle in 1976 resulted in substantial federal disaster assistance in Vermont. The greatest 24-hour rainfall record for nearby Newport City occurred in late August 2011 at 4.01''. The greatest level of precipitation in any month for the same City occurred in August 2011 at 11.12''. Previous experiences have proven to the town that flooding is the greatest risk and another flood event is probable by the time this plan requires an update. With this conviction, the need to complete viable mitigation actions to town infrastructure becomes incredibly important and the town remains aware of this. The estimated Capacity-Disruption Levels Given a Measured Rainfall Event can be interpreted as the conditional probability that a particular roadway capacity disruption occurs, given that a rainfall event occurs. For Orleans County, the probability that the intensity of a rain event will result in approximately a 2%, 7.5%, or 13.5% roadway capacity reduction are 7.35%, 23.96%, or 1.3%, respectively *(Source: A Risk-Based Flood-Planning Strategy for Vermont's Roadway Network, 2015).*

Table 2-7: Barton Precipitation vs. U.S. Average



Historically, damages occur on the small streams and not the rivers. River flooding is low velocity and the flash flooding and washouts are more closely associated with what occurs. Additionally, the majority of damage has been a result of inadequate highway facilities which then lead to erosion damage.

Inundation and Floodplains

Regarding flood inundation issues, the *2013 Vermont State All-Hazards Mitigation Plan* states:

> *"While inundation-related flood loss is a significant component of flood disasters, the predominant mode of damage is associated with the dynamic, and often catastrophic, physical adjustment of stream channel dimensions and location during storm events due to bed and bank erosion, debris and ice jams, structural failures, flow diversion, or flow modification by man-made structures. Channel adjustments with devastating consequences have frequently been documented wherein such adjustments are linked to historic channel management activities, flood plain encroachments, adjacent land use practices and/or changes in watershed hydrology associated with conversion of land cover and drainage activities. The 100-year, or "base" floodplain is the national standard for floodplain management. The area is shown on City Flood Insurance Rate Maps (FIRMs) as issued by FEMA. The 100-year floodplain has one chance in a hundred of being flooded in any given year. The probability that a 100-year flood will occur is a statistical determination based on past flooding in an area. This is not to say that a flood of such magnitude cannot occur two years in a row or twice in the same year. The term only means that in any given year, the odds are 1% that the area will be flooded. The same logic holds true for defining a 500- year flood. In this case, a flood of the 500-year magnitude has a 0.2% chance of occurring in a year. Much flood damage in Vermont occurs along upland streams, damaging private property and infrastructure such as bridges, roads, and culverts. The failure of beaver dams, private ponds and public and private culvert crossings contributes to flood surges and often dramatically increased damage downstream. Homes and other private investments along these streams are generally not recognized as a flood area on FEMA maps of flood hazard zones and, thus, are not typically identified as being vulnerable to flooding or erosion. City plans and zoning regulations have generally not identified these stream corridors as areas needing protective setbacks for development or zoning."*

Fluvial Erosion

Erosion occurs on a consistent, but small-scale, basis within the riparian corridor of the town's streams and rivers. This is a part of normal natural processes and as such is necessary for the proper functioning of the ecosystem of these waterways. However, fluvial erosion on a large scale can damage stream banks and undercut infrastructure such as roads, bridges and culverts as well as agricultural land and structures, causing severe damage. Fluvial erosion on a large scale can cause stream bank collapses, which are generally classified as landslides. Most flood damage is associated with fluvial erosion rather than inundation. The *2013 Vermont State All-Hazards Mitigation Plan* contains the following discussion of fluvial erosion:

> *"Vermont's landscape has historically contributed greatly to the widespread practice of the channelization of rivers and streams in order to maximize agricultural land uses and facilitate*

the development of transportation infrastructure. Channelization, in combination with widespread flood plain encroachment, has contributed significantly to the disconnection of as much as 70% of Vermont's streams from their flood plains. In this unsustainable condition and when energized by flood events, catastrophic adjustments of the channel frequently occur, usually with consequent fluvial erosion damage to adjacent or nearby human investments. All areas of the state suffer equally from fluvial erosion hazards. Some areas have suffered more than others simply because of the location of storm tracks. Transportation infrastructure and agricultural property are the most frequently endangered types of human investment affected by fluvial erosion hazards. Residential, commercial and other municipal properties are also frequently endangered. Changes in watershed hydrology that significantly influence fluvial stability are commonly associated with urbanization or with silvicultural practices. However, watershed scale hydrologic changes have been observed in Vermont as a localized phenomenon either in small, highly urbanized watersheds or in small, rural sub watersheds where clear cutting of a large percentage of the watershed land area has recently occurred. Stream geomorphic assessments and a fluvial geomorphic database maintained by the Agency of Natural Resources have identified main stem rivers typically channelized from 60-95% of their lengths. When human investments and land use expectations include all the land in the valley up to the river banks, there results extreme public interest in maintaining this unsustainable morphological condition despite its great cost and resultant hazard to public safety."

The Vermont Agency of Transportation (VTrans) applies the term "scour critical" to stream crossing structures especially vulnerable to streambed scour—the undermining of bridge supports by water action and erosion. A spreadsheet database is maintained by VTrans and continually updated by the Bridge Inspection Program. Structures inspected are only those of 20 ft. or longer owned by a municipality or the state. The scour critical rating is based on the structure itself, and does not consider debris jams, outflanking, channel change, or other issues commonly associated with fluvial erosion. Water supply source and distribution systems are also endangered by fluvial erosion. Many water distribution systems involve buried pipes that cross streams, which are vulnerable to fluvial erosion. In December 2014, the Vermont Department of Environmental Conservation (DEC) released the "Flood Hazard Area and River Corridor Protection Procedures" guide, outlining specific actions and considerations. Erosion of stream banks was a concern but is less-so now. A FEMA study has shown very little increase in velocities resulting from over-bank events which are infrequent and have subsequently not caused channel migration.

Ice Jams

Ice jams, which can cause rapid and catastrophic flooding, are considered increasingly hazardous in parts of Vermont. In addition to the inundation damage they cause, ice jams can block infrastructure such as roads and culverts. Ice jams are not as much of a concern in Newport as elsewhere in Vermont. A list of historic ice jams, including municipalities and streams, is maintained by the Vermont Division of Emergency Management and the Vermont Agency of Natural Resources. There has been some damage and minor flooding as a consequence of ice jams in the past. Ice jams are not as much of a concern in town as elsewhere in Vermont. A list of historic ice jams, including municipalities and streams, is maintained by

DEMHS and the Vermont Agency of Natural Resources (ANR). The US Army Corps of Engineers Cold Regions Research and Engineering Laboratory maintains a more specific database of ice jams, which includes over 903 events in Vermont with the latest occurring in 2013. The Clyde River has had two recorded ice jams. Other NEK areas have high rankings. Passumpsic had 19 (10th highest in the state) and St. Johnsbury had 38 (5th highest in the state) with the Connecticut River being number one in the state with 84 recorded ice jams and the Passumpsic River with only one. On a positive note, the total number of events has been decreasing since 2004.

(Source: http://rsgisias.crrel.usace.army.mil/apex/f?p=524:39:10954063060296::NO::P39_STATE:VT)

Dams

Dams in Barton, and Barton and Orleans Villages:

- Barton Reservoir
- May Pond
- Paine Site No. 2
- Crystal Lake
- Paine Site No. 1

Crystal Lake is owned by the state of Vermont and inundation maps have been created. Barton Village maintains its drinking water dam but the status of the others is unknown. According to the *2013 Vermont State All-Hazards Mitigation Plan*, "*The VT Agency of Natural Resources (ANR) Dam Safety Program maintains an inventory of 1205 dams (including 85 ANR owned dams) with impoundments greater than 500,000 cubic feet*". Failure of any of these dams could result in significant downstream flooding. A dam breech is remains the biggest threat to the municipal sewer system. There have been no recent or historically relevant flooding events associated with the failure of any dam in *Vermont.* However, as stated in FEMA Guide P-956 "Living with Dams: Know Your Risks" (2013): *"Although dam failures are infrequent, the impacts can be catastrophic, often far exceeding typical stream or river flood events."*

Hazardous Material Incident:

A major Superfund Amendment and Reauthorization Act (SARA) provision is Title III, also referred to as SARA Title III or the Emergency Planning and Community Right-to-Know Act (EPCRA). EPCRA establishes guidelines for Federal, State and local governments and industry regarding emergency planning and providing communities with information on hazardous chemicals within their jurisdiction. The State of Vermont's implementation of its SARA requirements were approved by the Legislature in 1994. Orleans County was designated as an emergency planning district and DEMHS established a Local Emergency Planning Committee, known as LEPC #10, for the county. The function of the LEPC is to carry out duties proscribed in SARA Title III. In addition, Vermont statute dictates that the LEPC shall insure that the local emergency response plan has been implemented upon notification of a release of hazardous chemical or substance, consult and coordinate with municipal emergency service providers, DEMHS and the managers of all HAZMAT facilities within Orleans County regarding the

facility plan, and review and evaluate requests for funding. Farmers are not required to report agricultural chemicals stored on their properties, but they do not typically store and keep large amounts of these chemicals.

One of the most serious potential threats to the Barton area is the threat of a hazardous material incident near the centers with greater populations. There are typically two trains per day traveling between Canada and White River Junction that go through each village. There was a train derailment approximately years ago with an ammonia spill. The surrounding area was evacuated at the time. Some of the tracks have been washed out due to flooding, with a small segment near Orleans in the floodplain. Interstate 91 has a great potential for a hazardous incident with heavy truck traffic between Canada and points south. The Ethan Allen Furniture Plant has many chemicals and its own plan with its first response group. The factory employs about 500 workers.

The municipal and private water supplies for the villages and surrounding areas are protected from potential HAZMAT spills. The wells for the municipal water supplies are in fenced in enclosures and checked daily. The Portland Pipeline traverses Barton and is monitored regularly for leaks and spills by the Portland Pipeline Company. With two substantial above-ground fuel storage tanks and frequent sedentary rail-car storage of fuel in the town, there is concern for the potential of a catastrophic explosion and fire. While the perceived risk is low, concern remains.

SECTION 3: RISK ASSESSMENT

3.1 Designated Hazard Areas

3.1.1. Flood Hazard Areas

All of Orleans County is located in the Barton River watershed, a drainage area of approximately 164 square miles. The mainstem of the Barton originates from Tildy's Pond in Glover, then travels through Barton and the Village of Orleans, on to Lake Memphremagog's South Bay in Coventry. The Barton River watershed contains one large tributary watershed, the Willoughby River (62 square miles), which drains from Lake Willoughby in Westmore, runs through Evansville and enters the Barton River just north of Orleans Village. There are 19 structures in the Barton Village floodplain (with 8 policies and $864,700 in total coverage), 6 in Orleans Village (with 8 policies and $2,676,700 in total coverage) and 12 in Barton Town (with 14 policies and $945,500 in total coverage). *Source: NFIP Insurance Report/Town and Village Maps*

3.1.2. Fluvial Erosion Hazard Areas

About two-thirds of Vermont's flood-related losses occur outside of mapped floodplains, and this reveals the fundamental limitations of the FEMA FIRMs. A mapped floodplain makes the dangerous assumption that the river channel is static, that the river bends will never shift up or down valley, that the river channel will never move laterally, or that river beds will never scour down or build up. River channels are constantly undergoing some physical adjustment process.

This might be gradual, resulting in gradual stream bank erosion or sediment deposit – or it might be sudden and dramatic, resulting a stream bank collapse. The losses experienced during the May 2011 storms and Tropical Storm Irene were most often related to the latter. In fact, this type of flood-related damage occurs frequently in Vermont, due in part to the state's mountainous terrain. Land near stream banks are particularly vulnerable to erosion damage by flash flooding, bank collapse, and stream channel dynamics. The Vermont Department of Environmental Conservation, Agency of Natural Resources, has identified river corridors, which consist of the minimum area adjacent to a river that is required to accommodate the dimensions, slope, planform, and buffer of the naturally stable channel and that is necessary for the natural maintenance or natural restoration of a dynamic equilibrium condition. In other words, the river corridor provides "wiggle room" for a stream as its channel changes over time. Keeping development out of the river corridors therefore reduces vulnerability to erosion.

Table 3-1: Repetitive Loss Properties

Area/Type	Repetitive Losses	BCX Claims	Polices
Barton Town/all residential	2	2	14
Barton Village/all residential	3	0	8
Orleans Village/all residentail	0	0	8

Resource: FEMA Repetitive Loss/BCX Claims. NOTE: BCX claims are ones located out of the SFHA.

3.2 Non-designated Hazard Areas

3.2.1. Ice Storm Damage

On December 13th, 2013, another ice storm hit portions of Orleans County, resulting in the greatest disruption of electric service since 1998. While there is evidence that supports an increase in weather and precipitation severity, the incidence of ice storms remains fairly spaced out. The town expects to have another ice storm but unlike rain and snow events, the occurrence of a major ice storm is not expected every year. (*1998 data: https://www.fema.gov/disaster/1201)*

3.2.2. High Winds and Lightning

Ridgeline and hilltop homes as well as homes located in the midst of mature forests are the most vulnerable to damage from falling trees and tree limbs. High tension lines are maintained very well by the electric service providers and the Vermont Agency of Transportation works to keep limbs trimmed on state highways. As with many Vermont communities characterized by natural terrain, the issue of downed trees creating power loss and property damage is more common compared to urban areas. Historically, these instances are short in duration and have not posed a serious risk for the town or its residents.

3.3 Previous FEMA-Declared Natural Disasters and Non-Declared Disasters

While Barton and its Villages has had a history of flooding, losses to public infrastructure have intensified in recent years. The summer of 2002 resulted in the greatest financial impact to infrastructure, namely destruction of a bridge. The town has been fortunate that its buildings and residential property has remained unaffected by recent disasters. Barton and its Villages have received public assistance funding from FEMA for the following natural disasters:

Table 3-1: KEY:

DR	Date	Type
1307	11/10/1999	TS Floyd
1428	07/12/2002	Severe Storm(s)
1559	9/23/2004	Severe Storms, and Flooding
1995	06/15/2011	Severe Storm(s)
3167	04/10/2001	Snow
4022	09/01/2011	Hurricane
4140	08/02/2013	Severe Storm(s)
4066	06/22/2012	Severe Storms, Tornado and Flooding
4163	01/29/2014	Severe Winter Storm

Table 1-2: FEMA-declared disasters and snow emergencies, 2005-Current:

Disaster Number	PW #	Application Title	Applicant ID	Damage Category Code	Project Amount	Federal Share Obligated	Total Obligated
3167	21	EMERGENCY PROTECTIVE MEASURES (SNOW REMOVAL ASSISTANCE)	019-03550-00	B - Protective Measures	$0.00	$0.00	$16.07
3167	30	EMERGENCY PROTECTIVE MEASURES (SNOW REMOVAL ASSISTANCE)	019-03475-00	B - Protective Measures	$2,060.96	$1,545.72	$1,639.70
3167	128	EMERGENCY PROTECTIVE MEASURES (SNOW REMOVAL ASSISTANCE)	019-03550-00	B - Protective Measures	$6,695.11	$5,021.33	$5,326.63
4022	19	NCORLBAR roaring brook 1	019-03550-00	C - Roads & Bridges	$4,800.00	$4,320.00	$4,320.00
4022	20	NCORLBAR roaring brook 3	019-03550-00	C - Roads & Bridges	$1,000.00	$900.00	$900.00
4022	21	NCORLBAR roaring brook 2	019-03550-00	C - Roads & Bridges	$1,200.00	$1,080.00	$1,080.00

4022	634	NCBAcatC1 roaring brook	019-U5H52-00	C - Roads & Bridges	$9,633.35	$8,670.01	$8,670.01
4022	641	NCBAcatC2 lake street	019-U5H52-00	C - Roads & Bridges	$4,320.15	$3,888.13	$3,888.13
4022	750	NCBAcatF03 electric utility	019-U5H52-00	B - Protective Measures	$1,571.70	$1,414.54	$1,414.54
4022	839	NCBAcatF04 pine crest utility pole	019-U5H52-00	F - Public Utilities	$2,269.50	$2,042.56	$2,042.56
4066	1	JCBAC1 - Stevens Road	019-03550-00	C - Roads & Bridges	$4,973.77	$3,730.33	$3,730.33
4140	25	RMBTC01 TH 48 and TH 2	019-03550-00	C - Roads & Bridges	$27,083.05	$20,312.29	$20,312.29
4140	183	Duck Pond Rd (VAOT undesignated) Emergency Protective M	019-U5H52-00	B - Protective Measures	$2,855.25	$2,141.44	$2,141.44
4140	184	Duck Pond Rd (VAOT undesignated) Lake St (TH #1) Debris	019-U5H52-00	A - Debris Removal	$2,722.95	$2,042.21	$2,042.21
4140	187	Duck Pond Rd (VAOT undesignated)	019-U5H52-00	C - Roads & Bridges	$49,348.96	$37,011.72	$37,011.72
4163	21	BARTA01 Townwide Debris Pickup	019-03550-00	A - Debris Removal	$12,639.57	$9,479.68	$9,479.68
4163	35	BARVF01 Barton Village	019-U5H52-00	F - Public Utilities	$48,841.98	$36,631.49	$36,631.49
1307	37	DEBRIS REMOVAL	019-03550-00	A - Debris Removal	$5,991.02	$4,493.27	$4,766.46
1428	1	ROADS AND BRIDGES	019-03550-00	C - Roads & Bridges	$282,886.05	$212,164.54	$221,244.84
1428	2	ROAD AND CULVERT REPAIR	019-03550-00	C - Roads & Bridges	$22,550.00	$16,912.50	$17,940.78
1428	3	ROAD REPAIR	019-03550-00	C - Roads & Bridges	$3,870.00	$2,902.50	$3,109.16
1428	87	BRIDGE REPAIR	019-03475-00	C - Roads & Bridges	$44,634.12	$33,475.60	$35,349.95
1428	141	WASTE-WATER TREATMENT PLANT	019-U3KEZ-00	F - Public Utilities	$2,342.36	$1,756.77	$1,863.59
1559	169	RETAINING WALL REPAIR	019-03550-00	C - Roads & Bridges	$19,800.00	$14,850.00	$15,752.88
1995	296	NCORL BAR leblanc	019-03550-00	C - Roads & Bridges	$4,765.51	$3,574.13	$3,574.13
1995	297	NCORL BAR baird	019-03550-00	C - Roads & Bridges	$3,513.54	$2,635.16	$2,635.16
1995	300	NCORL BAR lake region	019-03550-00	C - Roads & Bridges	$4,520.26	$3,390.20	$3,390.20
1995	301	NCORL BAR hollow	019-03550-00	C - Roads & Bridges	$12,558.22	$9,418.67	$9,418.67
1995	356	NCORL BAR office	019-03550-00	E - Public Buildings	$500.00	$375.00	$375.00
4163	33	OEDF1 Orleans Electrical Dept.	019-53575-00	F - Public Utilities	$51,751.39	$38,813.54	$38,813.54

Sources: FEMA Opensource

Non-declared disasters (e.g. snow and rain storms) have not resulted in damage above and beyond normal maintenance. Extreme, long-lasting cold temperatures during winter months do

pose a concern for the town as in many communities where the price of heating fuel often exceeds resident's ability to pay. Coupled with high unemployment, there is an increased risk for the town's residents to not meet the financial requirements for adequate heat, especially during long periods of extremely cold temperatures. Without adequate provisions, 48 hours of extremely cold temperatures could create a serious health hazard.

3.3 Hazard Assessment and Risk Analysis

Although estimating the risk of future events is far from an exact science, the Planning Team used best available data and best professional judgment to conduct an updated Hazards Risk Estimate analysis. This analysis assigns numerical values to a hazard's affected area, expected consequences, and probability and supports the inclusion of all profiled hazards in this plan. This quantification allows direct comparison of very different kinds of hazards and their effect on the town and serves as a method of identifying which hazards hold the greatest risk based on prior experience and best available data. While there are some differences in risk associated with each jurisdiction, there is a single estimation matrix and when appropriate, subsequent narratives will describe the differences in risk. The following scoring system was used in this assessment:

Area Impacted: scored from 0-4, rates how much of the municipality's developed area would be impacted.

Consequences: consists of the sum of estimated damages or severity for four items, each of which are scored on a scale of 0-3:

- Health and Safety Consequences
- Property Damage
- Environmental Damage
- Economic Disruption

Probability of Occurrence: (scored 1-5) estimates an anticipated frequency of occurrence based on prior experience and current information.

To arrive at the Overall Risk Value, the sum of the Area and Consequence ratings was multiplied by the Probability rating. The highest possible risk score is 80.

3.3.1. Natural Hazards

According to the updated Hazard and Risk Estimation for Barton, the following natural hazards received the highest risk ratings out of a possible high score of 80:

- Severe Winter/Ice Storm (30)
- Flooding (40)
- Extreme Cold (40)
- Hazardous Materials Incident (20)

Flood-related disasters have had the greatest financial impact on the town. While no deaths or injuries have been recorded for declared or non-declared disasters, the potential for health and safety risk during a severe winter storm and extreme cold events are considered higher than that posed by a flooding event. With the Ethan Allan plant, rail, pipeline and fuel storage operations in town, hazardous materials incident risk level is associated with the number of opportunities for an issue and the town feels that the combination of the aforementioned facilities does pose a level of risk that requires effort to mitigate.

Table 3-2 Natural hazards risk estimation matrix

Barton, VT Hazard & Risk Analysis: NATURAL HAZARDS with Hazardous Material Incident		Drought	Flooding	High Winds	Fluvial Erosion	Landslide	Lightning	Multi-Structure Urban Fire	Hazardous Materials Incident	Winter Storm	Extreme Cold
Area Impacted											
Key:	0 = No developed area impacted										
	1 = Less than 25% of developed area impacted										
	2 = Less than 50% of developed area impacted										
	3 = Less than 75% of developed area impacted										
	4 = Over 75% of developed area impacted	2	3	4	1	1	1	1	1	4	4
Consequences											
Health & Safety Consequences											
Key:	0 = No health and safety impact										
	1 = Few injuries or illnesses										
	2 = Few fatalities or illnesses										
	3 = Numerous fatalities	0	1	1	0	0	1	2	2	1	1
Property Damage											
Key:	0 = No property damage										
	1 = Few properties destroyed or damaged										
	2 = Few destroyed but many damaged										
	3 = Few damaged but many destroyed										
	4 = Many properties destroyed and damaged	0	1	1	1	1	1	2	1	1	1
Environmental Damage											
Key:	0 = Little or no environmental damage										
	1 = Resources damaged with short-term recovery										
	2 = Resources damaged with long-term recovery										
	3 = Resource damaged beyond recovery	2	2	1	1	1	1	1	2	0	2
Economic Disruption											
Key:	0 = No economic impact										
	1 = Low direct and/or indirect costs										
	2 = High direct and low indirect costs										
	2 = Low direct and high indirect costs										
	3 = High direct and high indirect costs	1	3	1	1	1	1	3	1	3	2
Sum of Area & Consequence Scores		5	10	8	4	4	5	9	7	9	10
Probability of Occurrence											
Key:	1 = Unknown but rare occurrence										
	2 = Unknown but anticipate an occurrence										
	3 = 100 years or less occurrence										
	4 = 25 years or less occurrence										
	5 = Once a year or more occurrence	1	4	2	2	1	2	1	1	3	4
TOTAL RISK RATING											
	Total Risk Rating =	**5**	**40**	**16**	**8**	**4**	**10**	**9**	**7**	**27**	**40**
	Sum of Area & Consequence Scores										
	x Probability of Occurrence										

3.4 Hazard Summary

According to the risk estimation analysis, the highest rated hazards for Barton are:

1. Flooding
2. Severe Winter Storm/Ice
3. Extreme Cold
4. Hazardous Materials Incident

It should be noted that two natural hazards on the list; severe winter storm and flooding, could be the cause of the highest-rated technological hazards: power loss and fuel supply interruption. Flooding is the highest rated hazard for Barton due to previous damage events and subsequent costs to repair. Within each of the highest rated hazards, there exists the potential for the secondary, but no less important, consequence of increased financial demand on residents as a result of an event. While winters in Vermont are characterized by cold weather, recent increases in extreme weather events, including extremely cold temperatures increases the costs of heating energy and this is a challenge that the state and local communities are being forced to address.

SECTION 4: VULNERABILITY ASSESSMENT AND LAND USE

Vulnerability refers to the potential impact of a specific loss related to an identified risk. While the loss of any one facility would cause a disruption in town services and operations, the overall vulnerability is low. There are roads, bridges and culverts vulnerable to flooding and those are identified below. Loss of equipment function for the highway department is a vulnerability for the town but the risk is not due or predicted to be a result of a disaster, merely, the required maintenance expected of highway-related machinery. For this section of the plan, the planning team looked at prior history and worst-case scenarios. All three jurisdictions have, essentially, the same vulnerability with two main exceptions: 1; The Villages are more vulnerable to hazardous materials incident due to location of the facility/chemical storage and 2; Barton Town is more vulnerable to road erosion and wash-outs because of its higher percentage of dirt roads (the Villages are nearly 100% paved). These differences will be further addressed in this section and Section 5. Despite any minor variance in vulnerabilities in the three jurisdictions, the primary vulnerability for the three jurisdictions is transportation-related infrastructure damage due to flooding.

Of the profiled hazards, the following vulnerability rating (high, moderate, low) is given below. This vulnerability rating is based on the disaster case history for the town and when the greatest financial impact was seen due to the disaster. The specific vulnerability to the population as a whole or any specific sub-population (e.g. elderly) is subjective because there is no historical data to rank vulnerability to health and safety of residents, workers or travelers.

Severe winter/ice storm: Moderate
Summary: While all structures are vulnerable to major snow loads, there is little evidence to support concern over structure failure due to snow loads on roofs, ice on gutters, etc. Town snow removal equipment is vulnerable to damage with greater use, especially during emergency situations as well as road damage from plowing. Populations caught outdoors, commuting or working outside during a serve winter storm are more vulnerable to cold-related injury and/or snow related accidents but winter comes every year and residents and the town are accustomed to making intelligent decisions regarding safety and protection of infrastructure. Special populations (e.g. aging, disabled, etc.) are more vulnerable in terms of mitigating structure loads, hazardous travel and relocating to safety.

Extreme Cold: Moderate
Summary: Recent evidence shows that greater extremes in temperature and overall weather fluctuation are occurring with increased frequency. A long-duration cold snap can cause significant damage to structures due to bursting pipes and the residential health and safety considerations include factors related to financial resources, fuel supply, sheltering, provisions and employment.

Flooding: High
Summary: The town is flooding and this is specific to transportation routes and infrastructure more-so than buildings and people in Orleans Village and Barton Town but Barton Village does have the greatest number of structures in the floodplain at 19. However slight in terms of probability, a dam failure would have catastrophic implications on homes, buildings, people and equipment. The magnitude of financial resources devoted to flood-related damage in the town equates to high vulnerability. Flooding impacts the planning area by inundation damage to structures, which are considered well-below the FEMA flood hazard elevation and roadway drainage structures. One area subject to repetitive damage is the Glover Road in Barton Village. Between Elm Street and south along Route 16 to the Interstate 91 interchange there are approximately 30 structures in the Special Flood Hazard Area. Loss of property due to bank erosion during flooding events is a concern in Orleans Village. The bank of the Barton River across from the Ethan Allen site is a particular area of concern. Home sites there are losing property and the bank is receding with a frequency that could cause damage to the structures themselves. Other infrastructure at risk in Orleans Village includes the well for the village drinking water supply. The well casing is located in a field in the floodplain which is subject to flooding and ice jams. The well casing has been inundated in the past. Future flooding and ice jams threaten to cause damage that disrupts water service or contaminates the water supply. Both Barton Town and Barton Village experience damage from storm water runoff during heavy rainfall & flooding events. Orleans Village roadways are laid out on relatively flat land, and erosive storm water flows are not a major issue. Most of the damage is to road surfaces, drainage structures (culverts, ditching) and driveways. Roadways are also an issue for municipal road crews in each jurisdiction when they become inundated and cut off traffic.

Hazardous Materials Incident: Moderate
Summary: With a past derailment that resulted in an ammonia release and the magnitude of fuel presence, transportation and manufacturing, there is a definite risk. Orleans Village is most vulnerable due to being the region where the high-risk locations are present.

Table 4-1: Vulnerability Summary Table

Hazard	Vulnerability	Extent (Storm Data from most severe event)	Impact (economic/health and safety consequence)	Probability
Flood	Culverts, bridges, road infrastructure. There are 19 structures in the Barton Village floodplain, 6 in Orleans Village and 12 in Barton Town. There is a 45-unit mobile-home park out of the floodplain	The greatest 24-hour rainfall record for immediate region occurred in late August 2011 at 4.01''. The greatest level of precipitation in any month occurred in August 2011 at 11.12'' No detailed data was available for fluvial erosion damage in town in terms of numbers of acres lost during each event.	DR 1428 (7/2002) resulted in greatest financial impact and damage to roads and bridges with over $350,000 in total project costs. No extent data as available for this event	High
Extreme Cold/ Snow/Ice Storm	The entire Town is vulnerable, including road infrastructure, town and privately-owned buildings, utility infrastructure	Snowfall has varied, from a few inches to over a foot or more. Heavy snow and wind may down trees and power lines. Snow/ice contributes to hazardous driving conditions.	For roof collapse: monetary damages will depend on each structure but, collapse of barn roof is often a total loss. This does not include the loss of livestock. Collapse of a house roof may be at a 50% loss. For car crashes due to poor driving conditions: minimal damage to vehicle to totaled vehicle and operator injury. Health impacts could vary significantly. Loss of	High

			energy or communication capabilities may occur and impede recovery.	
Hazardous Materials Incident	Facilities, residential structures and people within proximity of event (dependent on characteristic and state of chemical).	Train derailment which caused release of ammonia gas. Amounts of release not known. Potentially lethal gas could have killed many.	Any chemical spill can be hazardous but given prior event, mass fatalities is a possible consequence.	Moderate

4.1 Water, Wastewater and Electric Power Service

Each of the Villages provides municipal water, wastewater, electric. The Town of Barton is served by the Village electric departments. Vermont Electric Coop serves the rest of the community that is not served by either village electric department. Loss of revenue would be greatest during a disruption of electric service and monthly loss estimates for all services for each Village are given below:

One-month loss of revenue for Orleans Village:

Water: $11,000.00
Sewer: $18,000.00
Electric: $156,000.00

For Barton Village:

Water: $4,500
Sewer: 6,480
Electric: $27,000 plus addition Efficiency VT loss of $2,250.
Note: Commercial water and sewer equates to an additional $1980/month

4.2 Estimating Potential Losses in Designated Hazard Areas

With 37 structures, including portions of town roads and bridges within the 100-year floodplain, there are only a total of 5 repetitive loss properties in town (with an additional 2 BCX claims). The town and villages do not believe that even during a flooding event similar to the worst experienced in the last 20 years that there would be substantial damage to buildings or residential housing that exceeded 1%. However, given the magnitude of damage to town bridges, the potential for costs exceeding $300,000 dollars to repair exists because it has happened in the last 20 years. However, the repairs and upgraded resilience of these locations associated with these prior expenses greatly reduces the potential for a recurrence and the disaster funding history supports the fact that the town and villages have not had to spend nearly as much on repairs following a declared disaster compared to many other towns in the region.

4.3 Proposed Land Use and Development Trends Related to Mitigation

The Town of Barton reflects stream valley development of roads and railroads along the Barton River, Crystal Lake and southeasterly along the Willoughby Brook, which currently defines U.S. Highway 5 and the route of the Northern Vermont Railroad (formerly Canadian Pacific Railroad). Currently used agricultural land is spread out generally throughout the Town, although conversion of some farm land to residential uses has substantially increased over the last decade. The ongoing trend of dairy farm consolidation continues to decrease the number of farming units while at the same time average farm size has increased. The number of dairy farms in Orleans County has steadily decreased from 649 in 1997 to 583 in 2002. During the same time period, the number dairy cows has also declined decreasing from 24,349 head in 1997 to 22,794 head in 2002. Likewise the number of dairy operations within the Town has decreased from 23 in 1990 to just 14 in 2000.

Residential units are clustered in single, two and multi-family structures primarily within the two village areas. The vast majority of these units are of older construction varying in age between 50 to 150 years old. Single family residential units, interspersed with farming operations, are strung out along local town roads, State Highway 16 and U.S. Highway 5, with some of these units being seasonal in nature.

Crystal Lake has been developed for recreational uses in the form of seasonal units along the north, eastern and western shores, a State and local park to the north and recreational oriented accommodations, (year-round and seasonal) units along U.S. Highway 5. The State's Vermont Vacation Home Survey for 1968 reported sixty vacation homes within the Town, forty-two of which were owned by out of state residents. Current information on file with the Town of Barton Listers Office indicates that there are now approximately 160 vacation homes in the Town of Barton.

Current industrial Land Use is concentrated in the Orleans Village area. Current industry in this area is limited to Orleans Manufacturing which is a division of Ethan Allen, Inc.

Development in flood hazard areas can be regulated but not prohibited unless the development is to be located within the floodway itself. Unregulated development in these areas can be

hazardous and detrimental to all property owners and to the floodplain areas as well. In addition, unless the Barton Zoning Bylaw contains flood hazard area regulations, owners of existing and proposed structures will be unable to obtain flood insurance for their property. Consequently, in 1996, flood hazard area regulations, modeled after the regulations prepared by the Vermont Department of Water Resources, were added to the Bylaw." (2008 Barton Town Plan).

The 2006 Joint Zoning Bylaw for the Town of Barton, Barton Village and Orleans Village details the regulations for development in the floodplain. The bylaws hold to the recommended practices under the NFIP and all continued compliance and participatory requirements are managed by the Joint Planning Commission through enforcement of the flood hazard regulations, which are integrated with the town's zoning regulations. The Administrative Officer receives, and reviews permit applications and forwards for board review as appropriate. In accordance with FEMA requirements, the Administrative Officer maintains records of all permits issued for development in areas of special flood hazard; elevations, in relation to mean sea level, of the lowest floor, including basement, of all new or substantially improved buildings; elevations, in relation to mean sea level, to which buildings have been flood proofed; flood proofing certifications; and all variance actions, including justification for their issuance. Actions were considered for each repetitive loss (5 total) but not feasible for buy-outs or structural modification. Two of the five properties are listed on FEMA's Non-mitigated repetitive loss list. These properties sustain flooded basements during major flood events. None of the locations pose a significant risk to health and safety or financial loss but the town remains poised to propose and follow through on buyout applications if feasible and property owners are interested. The effective flood maps are used by all jurisdictions to support flood hazard area regulations and are assessed for necessary changes as part of the NFIP continued compliance. Since the last approved mitigation plan in 2005, there has not been significant development in the town or villages. NFIP compliance is met, in part by the following regulations:

- "*All development including fill, excavation, grading, erection or placement of structures, substantial improvement of existing structures and storage of equipment and material prescribed by the Town of Barton zoning bylaw are permitted within an area of special flood hazard only upon the granting of a conditional use permit by the Board of Adjustment"*
- *"All development and structures shall be:*
  1. Designed to minimize flood damage to the proposed development and to public facilities and utilities, and;2. Designed to provide adequate drainage to reduce exposure to flood hazards."
- *"No development shall occur within 50 feet of the seasonal high water-mark of any stream or river shown on the official zoning maps. If such stream or river is within a designated flood plain area."*

4.3.1. Land Use Goals

As stated in the 2008 Town Plan, it is the goal of the town to:

- "*Promote compatible land uses within the various districts of town and to protect the value and integrity of existing land uses and natural resources including water bodies, significant wildlife and fish habitat; but with extra caution given to those structures and*

uses which by their nature may have an adverse negative impact on the scenic character of some of these areas."

- *Allow all reasonable land uses with minimal regulatory delay.*
- *Maintain the current Town character, yet encourage the economic and cultural growth of the community.*
- *Provide fair and equitable guidelines for promoting town goals and to treat all citizens equally in the administration of its by-laws.*
- *Provide a mechanism for flexibility when strict compliance with adopted standards does not promote the overall goals of the town*

4.3.2. Land Use Strategies

The town will continue to encourage stewardship of its natural resources through information and education and promote viability of resources through Current Use, Vermont Land Trust and Local Vermont products.

4.3.4 Future Development and Housing

Despite the advantages of attracting new businesses and housing, the town does not foresee major development occurring in the next five-year planning cycle. Other than individual real-estate transactions, there is little anticipated business development projected and therefore no perceived change in vulnerability. The Planning Commission believes that adequate rental unit numbers are currently available without additional planning. In addition, the numbers of conventional homes have increased which further indicates that there is no need for minimal or special growth planning to respond to increased rental housing needs. In 2005, as part of the State required Chapter 117 revisions, the Town adopted special treatment for multi-family housing a part of the Joint Zoning Bylaw (2008 Town Plan).

SECTION 5: MITIGATION STRATEGIES

In understanding that a requirement for this update is to explain what the town has accomplished in relation to the actions identified in the 2005 plan, the town must address this requirement by explaining that there was very little adherence or attention to the 2005 plan and the actions established in it were general. The greatest advancement in mitigation planning the town has achieved since 2005 has come from the direct experiences in responding to, and recovering from, the major disasters that have impacted the town in the last decade. These disasters, have, to a very large extent, redefined how the entire state views and addresses mitigation. The work of state agencies, including those devoted to transportation, planning and emergency management have also changed the way towns go about their day-to-day operations and planning, both in emergency situations and out. It is because of this that the town views this update as the new standard in their mitigation planning efforts. This plan allows for the systematic documentation of efforts in the next planning cycle in formats that the town will continue to use. There has not been a formula for ongoing, documented, mitigation efforts prior to this update. While the town has learned a great deal, and put much of the knowledge to practice in its highway department

and planning efforts, these have not come as a result of the 2005 plan. We feel that the implementation matrix captures specific progress in certain areas but more importantly, gives the town a guide from which all future action and updates can be based on.

5.1 Town and Village Goals and Policies that support Hazard Mitigation

5.1.1. Community Goals

a. Continue municipal water/sewer and electric supply systems

b. Take advantage of the UVM/ACCD mobile home park preparedness programs to support resiliency of this disproportionally impacted population during disasters.

c. Consider implementation of special population tracking within the community where-by residents unable to drive or that have no one to depend on can self-identify for inclusion in a maintained data-base so that rescue personal and emergency managers can account for this demographic.

d. Encourage the elimination of existing and potential pollution sources. This is important for all lakes and ponds and is of critical importance for bodies of water which serve as municipal water supply sources

e. The Selectboard, Village Trustees and Joint Planning Commission shall pursue grant funding for shelter emergency generators as-needed.

f. Existing developed property owners in specified districts should be encouraged to eliminate existing pollution or to upgrading existing inadequate environmental facilities.

5.1.2. Capital Improvement Goals

a. Provide services and facilities deemed necessary for the orderly and rational development of the Town.

b. Gravel roads should be paved as traffic volumes dictate. Approval of new projects which have immediate impact on unpaved connector roads should include reasonable cost sharing between the Town and the two Villages for paving and other upgrading expense in some reasonable proportions without unduly discouraging or jeopardizing otherwise reasonable development

5.1.3. Public Participation Goals

a. Continue to solicit input regarding planning issues from town residents and from other entities which can help to offer solutions and insight into the problems the Town faces both now and in the future via formal meetings and advertised opportunities for input.

b. Utilize the LEPC and NVDA to increase awareness, enhance planning and engage in exercises that address needs in the community.

5.1.4. Regulatory Devices Goals

a. Continue to use the Joint Zoning Bylaw. The bylaws have been established to conform to, and be in harmony with, the Vermont Municipal and Regional Planning

and Development Act. Any conflicts that are identified between the two documents will defer to Title 24 VSA, Chapter 117 as the prevailing authority

b. Maintain and continue a Capital Expense Budget and Program for the purpose of ensuring that the rate of growth does not outstrip the town's ability to pay for the associated necessary services such as roads, schools, police and fire protection, solid waste, etc.

c. Develop and maintain a "No Adverse Impact" (NAI) approach to flood hazard management by institutionalizing the best practices set forth by the ASFPM.

d. Utilize best practices in flood-plain management for farm-related development in town.

5.1.5. Land Use

a. Work to develop a Flood Hazard Area Overlay District to include all designated flood hazard areas. The purpose of the Flood Hazard Area Overlay District is to (1) protect public health, safety, and welfare by preventing or minimizing hazards to life and property due to flooding, and (2) to ensure that private property owners within designated flood hazard areas are eligible for flood insurance under the National Flood Insurance Program (NFIP).

b. All other Land Use goals are stated in the 2008 Town Plan

5.1.6 Natural Resources

a. Ensure that the existing health ordinance is enforced to maintain protection of both surface and groundwater supplies.

b. Ensure that permits issued for development near sensitive areas, such as steep slopes, high elevations, wetlands, scenic vistas and wildlife habitats, contain conditions assuring conformance to the goals set forth by the state of Vermont and when applicable and feasible, those defined as best practices by floodplain management organizations such as the ASFPM as well as those set forth in this plan and the most recent town plan.

c. The town should work with the NVDA and ACCD to continue the process of identifying the Town's land conservation priorities, and to the degree possible, link them to broader regional conservation work.

d. In line with the VTrans mission statement regarding climate change, the town remains committed to:

- Ensure that there are viable alternative routes around vulnerable infrastructure such as bridges and roadways
- Make safety a critical component in the development, implementation, operation and maintenance of the transportation system
- Develop contingency plans for a wide-variety of climate impacts to be implemented as data/information becomes available
- Utilize information technology to inform stakeholders during times of emergency

- Educate of the public and other stakeholders on the threats posed by climate change and fluvial erosion hazards
- Increase inspection of infrastructure if warranted by climate change indicators
- Apply a decision-making framework to incorporate cost-benefit analyses into adaptive plans and policy
- Work to protect essential ecosystem functions that mitigate the risks associated with climate change
- Educate individuals within the agency to use best-practices during recovery periods to avoid ecological damage that may further exacerbate risk
- Recognize the interconnected nature of our built environment with ecological processes
- Protect the state's investment in its transportation system and adapting transportation infrastructure to the future impacts of climate change

e. In line with DEC's best practices regarding fluvial erosion, the town will work to:

- Slowing, Spreading, and Infiltrating Runoff (The State Surface Water Management Strategy is found at http://www.watershedmanagement.vt.gov/swms.html and http://www.watershedmanagement.vt.gov/stormwater.htm)
- Avoiding and Removing Encroachments. http://www.watershedmanagement.vt.gov/rivers/htm/rv_floodhazard.htm http://www.watershedmanagement.vt.gov/rivers/docs/rv_RiverCorridorEasementGuide.pdf
- River and Riparian Management: DEC has prepared a compendium of *Standard River Management Principles and Practices* to support more effective flood recovery implementation; improve the practice of river management; and codify best river management practices in Vermont. The document compiles the most current river management practices based on the best available science and engineering methods to create consistent practice and language for risk reduction while maintaining river and floodplain function. Best practices are established to address common flood damages, including:
    - Erosion of banks adjacent to houses and infrastructure
    - Erosion of road embankments
    - Channel movement across the river corridor
    - River bed down-cutting that destabilizes banks, undermines structure foundations, exposes utility crossings, and vertically disconnects rivers from adjacent floodplains
    - Bridge and culvert failure

    Source: http://www.watershedmanagement.vt.gov/permits/htm/pm_streamcrossing.htm

5.1.7. Policies

a. Through both town, village and state-level management, the town and villages will work to:

- Encourage and maintain naturally vegetated shorelines, buffers and setbacks for all rivers, ponds and streams
- Allow higher density or cluster development in existing and designated settlement areas and low-density development in the remaining areas
- Reduce flood hazard and repetitive road and driveway washout through continued updates and adherence to priorities in road, bridge and culvert improvement projects
- Identify and manage pollution, flooding and fluvial erosion hazards along rivers and streams as they arise

5.1.8. Transportation Plan

In adjunct to town/village-specific planning, the town and its villages are committed to continually subscribing to all current state standards related to:

a. Maintaining safe operating conditions on the present system of town roads through design and modification to keep traffic at appropriate speeds and to assure the safest possible driving conditions, including consideration of additional paving (though only on portions of roads prone to damage) should state funding become available.

b. Protection of existing town roads from flood damage and uncontrolled storm water runoff.

c. Preserving the capacity of town roads and maintain adequate traffic flows and safety.

d. Support the road maintenance crew through Town-provided training sessions. This includes ICS training along with the Road Commission (Selectboard).

e. Support policies and procedures that ensure longevity of essential town-equipment and develop and maintain MOU's with neighboring towns related to equipment use during emergencies.

f. Continue long term access opportunities to gravel and sand deposits for future road maintenance use.

g. Consider developing a standard operating procedure (SOP) based on ICS principles for highway department response events were coordination, communication and support are at a heightened level.

5.1.9. Utilities and Facilities Goals

a. Develop policies and procedure that ensures equipment longevity to the greatest extent possible.

b. Develop a retention plan for highway department personnel to help avoid high turnover and preserve institutional memory.

c. Promote high-speed internet access in the Village to encourage local businesses to reside in Barton.

d. Ensure adequate provision of water sources for fire suppression by requiring dry hydrants, fire ponds, water storage, or other measures where appropriate. The Planning Commission will work with developers and property owners on this task.

5.1.9.1. Educational Goals

a. The School Board should work with the Selectboard, village trustees and the American Red Cross and Fire Department to ensure that the necessary equipment exists at the school for its use as an emergency shelter.

b. Increase emergency planning cohesion between school and town EOPs through mutual participation and presentation at scheduled LEPC meetings and town and/or school meetings.

c. Continue collaboration with the Vermont Chapter of the American Red Cross on their sheltering initiative program to further readiness with training and supplies related to sheltering operations.

5.2 Existing Town of Barton, Village of Barton and Orleans Actions that Support Hazard Mitigation

The town and villages have done an excellent job at monitoring and addressing transportation issues, engaging in a documented and systematic approach to mitigation actions. The joint planning commission has successfully pursued funding to address needs. Exampled by Better Back Roads, Structures Grants and FEMA funding, the town has been able to enhance its resilience and overall preparedness. The town has addressed its current and future needs and by and large, road improvement projects remain the primary focus for the town and the areas identified were selected based on the condition of culverts and ditches and primarily focused on runoff issues particularly as the incidence of heavy storms has increased. In many cases, culverts properly sized for normal rain events are overwhelmed by the severe ones. The town will seek local, state and federal funds to address the sites identified as priorities. Barton will earmark the funds necessary to complete one major project each year for the next 5 years and will keep its culvert inventory current to improve its institutional memory. The town has also adopted municipal road and bridge standards that meet or exceed the 2013 standards and has an approved and adopted Local Emergency Operations Plan, Town Plan and Joint Zoning Bylaws. In Orleans Village, the Village Manager has the expertise to coordinate mitigation activities. His duties and schedule will allow pursuit of one or two significant hazard mitigation projects annually. The most significant capacity the municipalities have for expanding mitigation activities is likely through its consultants and in areas where regional and state-level organizations provide support. Although the municipal budget is limited to that which will be approved by voters, consultants are able to facilitate utilization of outside funding sources such as grant and loan programs. Regional and state organizations also have existing programs devoted to mitigation activities that could be leveraged. These three jurisdictions, which cooperate already on some municipal functions, are already in an advantageous position to share resources. With this, all references to authorities, policies, programs and resources such as expertise, equipment, unutilized space or information have the potential to be shared at no cost or at a favorable fee, including the ability to expand and improve on them shall be considered the same for all jurisdictions. The highway

crews coordinate regularly with the Vermont Agency of Transportation.

5.2.1. Flood Resilience Goals:

- Mitigate flood hazards in the most cost-effective manner possible
- Minimize the risk exposure and associated expense to Barton tax payers
- Ensure the Town and its facilities are prepared to meet the demands of the next flood
- Ensure the Town can receive the maximum outside assistance in the event of the next Federally declared disaster

5.2.2. Flood Resilience Strategies:

- Identify and protect natural flood protection assets, including floodplains, river corridors, other lands adjacent to streams, wetlands, and upland forested cover
- Adopt flood hazard regulations that at a minimum, protect property from known risks
- Review and evaluate statewide river corridor information, when it becomes available
- Consider adopting regulations that will protect erosion prone areas for additional Development and encroachment
- Maintain and regularly update the Local Emergency Operations Plan.
- Continue to meet the VTrans Road and Bridge standards. Participate in regional Road Foreman trainings and Transportation Advisory Committee meetings to stay abreast of flood resilience measures for the Town's roads and bridges
- Continue to update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool
- Upgrade undersized and failing culverts
- Keep the Multi-Jurisdictional Hazard Mitigation Plan updated every 5 years
- Assure all emergency shelters are adequate and with a generator

5.3 All-Hazards Mitigation Goals

The following goals were developed by the planning team, vetted during a warned community meeting and approved during the development of this plan:

- Reduce at a minimum, and prevent to the maximum extent possible, the loss of life and injury resulting from all hazards.
- Mitigate financial losses and environmental degradation incurred by municipal, educational, residential, commercial, industrial and agricultural establishments due to various hazards.
- Maintain and increase awareness amongst the town's residents and businesses of the damages caused by previous and potential future hazard events as identified specifically in this Local All-Hazards Mitigation Plan.
- Recognize the linkages between the relative frequency and severity of disaster events and the design, development, use and maintenance of infrastructure such as roads, utilities and storm water management and the planning and development of various land uses.
- Maintain existing municipal plans, programs and ordinances that directly or indirectly support hazard mitigation.

- Develop a mechanism for formal incorporation of this Local All-Hazards Mitigation Plan into the multi-jurisdictional municipal comprehensive plan as described in 24 VSA, Section 4403(5). This mechanism will be developed by the Joint Planning Commission, Selectboard, Village Trustees and NVDA and integrate the strategies into the existing town plan as annexes until the next formal update occurs, where a section devoted to mitigation planning will be integrated into the plan.
- Develop a mechanism for formal incorporation of this Local All-Hazards Mitigation Plan, particularly the recommended mitigation actions, into the multi-jurisdictional municipal and village operating and capital plans & programs as they relate to public facilities and infrastructure within political and budgetary feasibility. The Joint Planning Commission will review the plan and use language/actions from it to inform the integration and update process. Town Meeting Day will serve as the formal time that mitigation strategy budgetary considerations will be approved and incorporated into the town and village budgets.

5.4 Mitigation Actions

In following FEMA guidance, the following mitigation action categories form the basis of the town's future mitigation actions. The planning team, after considering the basic and generalized format of the 2005 plan, decided to adopt this approach for this update and all future mitigation work. For each mitigation action to follow, an indication of group will be given with the abbreviations listed below:

Mitigation Action Groups:

(P) Prevention: Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.

(PP) Property Protection: Actions that involve the modification of existing buildings or infrastructure to protect them from a hazard, or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, flood proofing, storm shutters, and shatter-resistant glass.

(PEA) Public Education & Awareness: Actions to inform and educate citizens, elected officials, and property owners about potential risks from hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

(NRP) Natural Resource Protection: Actions that, in addition to minimizing hazard losses also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

(SP) Structural Projects: Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include storm water controls (e.g., culverts), floodwalls, seawalls, retaining walls, and safe rooms

5.4.1. Current Capabilities, Progress since 2005 and Need for Mitigation Actions

The Town Plan's goals and policies that support hazard mitigation and the existing mitigation actions demonstrate the variety of policies and actions forming the foundation of this All Hazards Mitigation Plan. As with most towns in the state, mitigating flood-prone areas is a continuous effort that sees increased attention following a major event. The town and its villages remain aware and diligent in keeping up with mitigation actions for all municipal systems. As a tri-governmental area, there exists a collaborative spirit that not only is highly-valued but serves to enhance efficiency of action in essentially, what needs to be done. The Town regards its current hazard mitigation efforts carried out by the road departments as adequate to address winter storm impacts to local roads, however temporary road closure due to winter storms may isolate parts of town. Winter storms are often the cause of the power loss and telecommunications failure. Tree trimming and vegetation management, coupled with maintaining adequate repair vehicles and personnel are the primary means of mitigation. However, the town can incorporate the use of public information to support community resilience during a power outage. As part of the strategies defined in this plan, the town will develop a plan for mass communication and, if telecommunication lines are down, a method for alerting residents of the alternate means of information dissemination and/or protocol (e.g. shelter logistics). Major infrastructure that has seen repeated damage due to flooding is a concern for the town and they are active in identifying priorities, working with State Transportation and Natural Resource Agencies as means to increasing infrastructure resilience.

Progress in Mitigation Efforts

Since the development of Barton, Orleans' and Barton Village's first hazard mitigation plan in 2005, the jurisdictions have completed nearly all of the mitigation projects and actions identified. A few projects are no longer relevant due to changes in FEMA regulations or information that became available after the plan was developed. Two projects are currently underway. The following table describes the status of each hazard mitigation action pursued since 2005. Specific priorities have changed since 2005 by the nature of time that has passed. Many infrastructure issues in 2005 have been addressed in the natural progression of maintenance but also in response to the declared disasters since 2005. The table below summarizes the status of actions that the town set forth to accomplish since 2005. Priority categories (e.g. flood resilience) have, however, essentially remained the same since 2005.

Table 5: Progress since 2005

2005 Existing Hazard Mitigation Programs, Projects and Activities	**Status**
1. The Town has adopted a zoning ordinance that includes the designation of a Flood Hazard Area and associated regulations. The Town of Barton and Barton and	Completed/Ongoing

2. Driveway permits are required for new development in the Town of Barton	Completed/Ongoing
3. A Rapid Response Plan has been updated and adopted as of August 9, 2004.	No longer relevant. Replaced by LEOP.
4. An Emergency Management Operations Plan under a separate Homeland Security Grant is being updated in 2005.	Complete & updated annually
5a. All culverts are being upgraded to meet the State Highway Standards.	Orleans Village does not have culverts. Barton Village has very few, which are replaced as they fail or are compromised. Barton Town replaces culverts as they fail or are compromised.
5b. The State Highway Standards policy has been adopted for all new construction.	Complete. All jurisdictions recertify Standards annually.
Sc. A Driveway and Culvert policy is in effect for private driveway access.	Orleans & Barton Villages do not have written policies, however established practice is to request certain standards prior to construction. Barton Town policy included in Zoning Bylaw & Access Permit Requirements.
6. Some downtown buildings have installed sprinkler systems. Older buildings are at risk and are upgrading to sprinkler	
7. Several projects have been identified as suitable for mitigation. The Village of Barton is pursuing grant funds and technical assistance to address these	Unclear which projects referenced, unless referencing three Priority Projects below
2005 Priority Projects for Barton	**Completed?** No longer relevant/in updated plan?
Lakefront Lane Upgrade in Barton Village - Replace undersized culverts that are frequently flooded	Not Completed. This project is no longer relevant. Road is private R.O.W. Determined that private R.O.W. not eligible for public funding & Private owner did not want to convert to public R.O.W.

Elm St. Bridge in Barton Village - Major replac bridge due to flood damage. Currently closed,	Elm St. Bridge in Barton Village - Majo bridge due to flood damage. Currently c
Roaring Brook Bridge in Barton Village – Major replacement of bridge due to flood damage.	Roaring Brook Bridge in Barton Village replacement of bridge due to flood dam

5.4.2. Specific Mitigation Actions

The following actions define the mitigation measures to be taken by the town in the next five years:

Action #1: Improve road infrastructure and municipal systems protection programs
Action #2: Improve resilience to severe winter storms
Action #3: Reduce impact of extreme cold durations
Action #4: Raise public awareness of hazards and hazard mitigation actions
Action #5: Continue fluvial geomorphology assessments in collaboration with DEC and develop strategies and regulatory actions in response to identified
Action 6: Reduce risk and impact of hazardous materials incident

Below, each of the seven actions listed above are explained below regarding progress, project leads and partner agencies and specific action steps:

Action #1: Improve road infrastructure and municipal systems protection programs
Group: SP, NRP, PP
Lead Responsible Entity: Town of Barton and its Villages Road Forman, Selectboard and trustees
Potential Partner Entities: Vermont Agency of Natural Resources; Vermont Agency of Transportation; NVDA, DEMHS, FEMA and the Agency of Commerce and Community Development
Timeframe: 2016 – 2021
Funding Requirements and Sources: FEMA or other hazard mitigation grants; FHWA grants; VAOT grants; Municipal Operating and Capital budgets.
Progress: The Road Foreman continually monitors road and storm water management capabilities. In 2015, the University of Vermont released Scour research and opportunities for scour sensors. Maintenance and improvement of municipal water, sewer and electric power supply systems is established and ongoing will continue to function as a means of protection. Emergency generators at all wastewater facilities.

Specific Identified Tasks:

1) Infrastructure Assessment for Storm Water Vulnerability – Funding and staff resources permitting, assess the vulnerability and operational capability of municipal-owned roads, culverts and other storm water management infrastructure to predicted storm water and snowmelt in areas with a documented history of recurring problems. The infrastructure will be evaluated regularly prior to replacement or upgrades of the existing infrastructure.
2) Assessment for Fluvial Erosion/Landslide Vulnerability – Identify streambanks that have high risk of fluvial erosion that could benefit from riparian plantings or Better Roads grant. Riparian buffers prevent erosion, restore river floodplain, and help reduce the intensity of flood events; therefore, protecting town infrastructure and human health.
3) Culvert Upgrades - Develop a schedule and program to replace undersized culverts. Appropriately sized culverts effectively handle the hydraulic capacity of streams and therefore protect town infrastructure from flooding damage.
4) Continued Monitoring of Vulnerable Infrastructure - Inventory bridges to document future damage from flooding. A constantly updated inventory will allow Barton to keep track of frequently damaged infrastructure and will guide planning to avoid future infrastructure damage.
5) Road Improvements - Within political and financial restraints, consider re-engineering certain sections of roads to lower overall maintenance costs, improving snow plowing speeds and improve overall capability of roads to handle current and projected traffic volumes. Utilize the Vermont Stream Alteration Permit process when replacing or installing new culverts and bridges as required by State Statute.

Specific projects include:

Orleans Village
Problem Statement: Slope (10-15%), Lack of adequate drainage capacity, age of pipes. Risk increases as storm events peak intensity increases. Major village threats are not related to inundation flood plans that have been mapped. Those areas see basement flooding or slow-moving river bank erosion. Areas impacted include: High St., Lincoln Ave, Harrison Ave, Hubbard, West St., Duck Pond Road, Pageant Park Rd.

Box culvert needed to replace current undersized system.

Bridge 10 needs to be replaced due to position and history of damage. This is scheduled to occur in year two of planning cycle

Proposed Solution: Replace storm drain networks that are VC Pipe or corrugated metal pipes eroding from years of salt application, blast ledge that impacts ability to provide roadside ditches, install catch basin inlets that are properly designed for slopes greater than 6% (stop using square catch basin grates on slopes that greater than 6%, cost is double to purchase correctly designed catch basin inlets). Blast trenches on High St. and Pageant Park Road. Install new larger diameter storm drains on other streets. Replace CGMP on Lincoln Ave.

Barton Village

Problem Statement: Highest flood risk is at end of maple street by Blanchard oil where all development is in the floodplain (Orleans). BV risk of flooding is in the mapped flood plain along Glover St./Intersections of Roaring Brook Road Intersection of Elm St. (18 properties in Village). Has a 42-unit MHP (mobile home park), out of flood plain. 20-day water supply in village. Storm Drain issues and need for road reconstruction specifically on streets with slopes between 10-15%, Many storm drains are antiquated vitrified clay (VC) pipes without sealed joints or easy access (formerly sewer system pre-1978. Roaring Brook Bridge 58: Stone Pillar removed from middle of the bridge to decrease water flow impediment (Bridge reconstructed by VTrans to an elevation to pass a 10-yr. storm only, no improvement on inundation storms. Cast Iron water lines are, in some areas too shallow increasing risk of damage, freezing.

Solution: Removing and lowering lines. Remaining Cast Iron Water Mains susceptible to cracking and many are within frost zones: Main St. (400'), Porter Lane (550'), Lincoln Ave (600'), Highland Ave (200'), High St. (800'), Forty road (600')., Roaring Brook Rd (400'), Lane Front Lane (1000'). 11% of total water system.

Barton Town

Ditching and stoning work needed on Route 5 as it follows the Barton River and Pagent Park Road

6) Increase Awareness of Funding Opportunities - Increase understanding of FEMA's HMGP program so that this potential funding source can be utilized.
7) ICS Training and Emergency Operations (SOP) Plan Development – Enhance knowledge of the principles of ICS and develop a Standard Operating Procedures that details the relationship, roles and responsibilities of the Highway Department and Road Commission during major events.
8) Perform maintenance and upgrades of the Shadow lake Dam as recommended by the Dam Safety Engineers of the Vermont department of Environmental Conservation.
9) Review and update the Emergency Action Plan for Shadow Lake Dam annually
10) Documenting – Develop a methodology that serves to efficiently capture work and expenditures on sites and keep this information at the town office.

Rationale / Cost-Benefit Review: Conducting vulnerability assessments facilitates a targeted and effective approach to road and storm water management infrastructure. This will prove useful in the development and implementation of municipal capital and operating plans as well as the development and implementation of grant-funded mitigation projects. Some areas suffer low-level but consistent damage during heavy rains and snowmelt. Mitigating against these problems would reduce short and long-term maintenance costs and improve the flow of traffic for personal and commercial purposes during flooding events. Tracking road work and understanding the HMGP program can open funding streams into the town and can make the application process much easier when required information is already available. A basis understanding of ICS will serve the town and at little or no cost. As a requirement for an approved LEOP, municipal ICS-awareness is seen as necessary state-wide. During an emergency event when the Highway Department personnel are required to work beyond normal capacity, increased communication and collaboration between the Highway Department and local entities can be enhanced with a

basic SOP. An SOP can also serve to increase institutional memory when there are staff changes at every level as well as provide a template from which tabletops and drills can be based off of.

Action #2: Maintain and improve resilience to severe winter storms
Group: SP, PP, PEA
Primary Responsible Entities: Town of Barton and its Villages Selectboard/Trustees, Planning Commission and Emergency Management director;
Potential Partner Entities: LEPC, Barton Fire Chief, ARC's Sheltering Initiative Program
Timeframe: 2016 – 2021
Funding Requirements and Sources: DEMHS or FEMA hazard mitigation funding; existing programs, contingent on available resources and funding.
Progress: Roads are monitored and altered, when necessary so that plowing can occur without damage to trucks and/or road. All designated shelters have a back-up power. Snow clearing equipment is regularly serviced and the town maintains an adequate supply of salt.
Specific Identified Tasks:

1) Maintain Existing Shelter Capability: Maintain and improve capabilities of existing shelters. Notification procedures and shelter staffing is a priority for the town and intends to move forward on planning and public involvement. More formalized training is required and the ARC's "Shelter Initiative Program" can be used at no cost to the town to enhance both shelter management knowledge and sheltering supply cache.
2) Reduce risk of power failure due to ice storms: Enhance collaboration between town/village and private electric company as means of increasing efficiency of mitigation efforts and restoration when systems are down. Maintain function of generators.
3) Notification: Develop a notification/communication plan that conveys essential sheltering information using school phone system and back-up methodology (email, text, etc.)
4) Residential Programs: Provide guidance and communication to residents on the structural and mechanical actions that can occur to reduce risk to severe winter storms (e.g. weather-proofing, anchoring, alternative heating sources, tree trimming, financial programs, etc.)
5) Monitor roads for safe and effective plowing: Efficient snow removal is the foundation to winter storm (snow) events, assuring roads are plowable before winter remains an important facet of highway department functions. Increase communication with rail as deemed necessary to assure safe train travel during heavy snow/ice events.
6) Increase awareness of ICS structure and recommended practices: The town can mitigate the effects of a severe winter by understanding how a large-scale storm is managed when the State EOC is operational. Additional awareness of local-level roles and responsibilities during statewide event is a mitigation action.

Rationale / Cost-Benefit Review:
This mitigation action serves to reduce the economic impact and risk to both human and animal (livestock and pet) health and safety during severe winter storm events by reducing risk and enhancing the mechanisms of winter storm mitigation in the long term. More formalized policy formation in both staffing and notification procedures, especially pertaining to vulnerable populations where transportation and special needs are a concern could potentially significantly reduce the physical, psychological and social impacts of a disaster.

Action #3: Reduce impact of extreme cold durations
Group: PEA, PP, SP

Risk or Hazard Addressed: Risk to infrastructure, livestock and residents
Primary Responsible Entities: Town of Barton Selectboard and planning commission, NVDA, Barton School, local/regional assistance organizations.
Potential Partner Entities: Vermont DMEHS, LEPC
Funding Requirements and Sources: Financial factors may produce barriers to change. Strategic planning and understanding of the total scope of needs and potential for change is logical first-step.
Specific Identified Tasks:

1) Economic Resilience: Establish program for assistance in paying heating bills during crisis situations, if not already required by state law. Develop and sustain a program that serves to connect resource organizations with residents in need of support services.

2) Maintain Existing Shelter Capability: Maintain and improve capabilities of existing shelters. Notification procedures and shelter staffing is a priority for the city and intends to move forward on planning and public involvement. More formalized training is required and the ARC's "Shelter Initiative Program" can be used at no cost to the town to enhance both shelter management knowledge and sheltering supply cache.

3) Assess Vulnerable Population— Develop an awareness of the most at-risk community members during an evacuation and/or sheltering event. Focusing on those that lack resources or capability to reach facilities when in need and create plans, including outreach protocol on how to address this potential hurdle.

4) Notification and Education – Investigate and develop a notification/communication plan that conveys essential sheltering information. Educating citizens regarding the dangers of extreme cold and the steps they can take to protect themselves when extreme temperatures occur by sustaining a process that serves to disseminate educational resources for homeowners and builders on how to protect pipes, including locating water pipes on the inside of building insulation or keeping them out of attics, crawl spaces, and vulnerable outside walls. Inform homeowners that letting a faucet drip during extreme cold weather can prevent the buildup of excessive pressure in the pipeline and avoid bursting through a yearly public service campaign.

Rationale / Cost-Benefit Review:

With an increase in extreme weather, including cold, there is a need to protect property and the population. Given the magnitude of population dependence on social services, indicating economic and other social vulnerabilities, effective outreach, education and collaboration with resources supports this mitigation action category.

Action #4: Raise public awareness of hazards and hazard mitigation actions
Group: PEA
Risk or Hazard Addressed: Risk to property, residents
Lead Responsible Entities: Town of Barton, Fire Chief, LEPC, NVDA
Potential Partner Entities: Vermont state agencies and regional organizations

Funding Requirements and Sources: Majority of information is available and both state agencies and organizations can provide materials for outreach
Progress: As mitigation planning continues to integrate into normal, day-to-day operations, the town has an opportunity to engage its residents with information that will serve to mitigate several risks. The LEPC meets regularly and covers a host of topics related to emergency preparedness and raises awareness in the community about what organizations are doing around emergency response planning and chemical safety. Town meeting day can serve as an annual update and outreach opportunity as well.

Specific Identified Tasks:

1) Hazard Resilience for Property Owners- Develop and maintain education materials to inform property owners on how to protect their homes and businesses through accepted hazard resilience actions (e.g. securing their structures from high winds, elevating their electrical equipment/furnaces in basements, protecting from lightning strikes by grounding electrical outlets, etc.).
2) HMGP Awareness: Attend informational sessions on the HMGP funding opportunities for acquisition, elevation and flood-proofing projects. Work with NVDA to develop an information brochure for residents.
3) School Programs – Assure the school is structurally ready to handle natural hazard risks to the greatest extent possible. Continue school programs to raise student awareness of hazards, safety, preparedness and prevention. Explore establishing the school emergency notification system as the primary methodology for all emergency notification procedures and build in the contact information accordingly.
4) Family Programs – Continue family programs, such as car safety seat and bike safety programs, to raise family awareness of hazards, safety, preparedness and prevention.
5) Fire Prevention Programs – Continue National Fire Prevention Week and other programs to raise public awareness of fire hazards, safety, preparedness and prevention.
6) Other hazard awareness programs – Develop public awareness programs, based on all-hazards needs. Programs to address pandemic hazards, preparedness and mitigation may be appropriate as directed by the state department of health and its jurisdictional offices of local health

Rationale / Cost-Benefit Review: Improved public awareness could potentially significantly reduce the loss of life and property damage through ongoing, formal, ongoing, public information campaigns that address property protection actions (flood proofing, elevation, anchoring mobile homes/propane tanks, electric and water system elevation, electric grounding, etc.) Improved awareness would also build understanding and public support for municipal mitigation actions to reduce potential infrastructure and liability costs.

Action #5: Continue fluvial geomorphology assessments in collaboration with DEC and develop strategies and regulatory actions in response to identified risks
Group: P, NRP, PEA, PP

Risk or Hazard Addressed: Risk to infrastructure, residents
Primary Responsible Entities: Department of Environmental Conservation, NVDA, Agency of Natural Resources (VT ANR), Town of Barton.
Potential Partner Entities: Nonprofits, other Town of Barton officials, and other appropriate entities.
Funding Requirements and Sources DEC has completed assessments for Basin ID 15 (Passumpsic). NVDA can assist in enhanced mapping of the floodplain (if and when these are developed) within the town and has provided the town with updated River Corridor Maps.
Specific Identified Tasks

1) Fluvial Geomorphic Assessments – The town will work with DEC through coordinated meetings, workshops and communication to increase understanding of current findings and develop an applicable framework to help guide decisions related to priority infrastructure work and vulnerability.

2) Fluvial Erosion Hazard Mapping – Develop a fluvial erosion hazard map for the waterways, using the GIS extension known as SGAT (or Stream Geomorphic Assessment Tool) for assessed stream reaches. As assessments are completed, a map of all assessed waterways in the town will be created.

3) River Corridor Management Plans – Using the River Corridor Maps, the town will develop an outreach strategy to residents/structures in or near the defined corridor. This communication should focus on flood resilience measures and opportunities. With the lack of repetitive loss properties in the town, the likelihood of viable HMGP acquisition projects is low but increasing awareness of this program can serve the town well.

4) Fluvial Erosion Hazard Mitigation Implementation - The town will draft strategies to avoid or mitigate losses from the identified fluvial erosion hazards. These strategies may include the adoption and implementation of programs, mechanisms or regulations to prevent endangerment of persons and property in riparian corridor areas from fluvial adjustment processes. Efforts could range from a relatively simple, public information campaign about the map to the adoption of a municipal ordinance or by-law that restricts development in such hazard areas.

Rationale / Cost-Benefit Review:
Continuing this project will require a sustained succession of grants, state appropriations and other funding to complete assessments in Barton. Successful completion will provide municipal and regional benefits. The municipality's fluvial erosion areas would be adequately and electronically mapped. This will enable the municipality to make residents and businesses aware of fluvial erosion hazards and potentially lead to municipally-directed programs, mechanisms and regulations that further mitigate against this hazard, protecting existing structures and infrastructure. Identifying fluvial erosion hazard areas could also help the municipality restrict future development in hazardous areas, if that should be an advantage to the town in the future. More accurate knowledge of fluvial geomorphology will enable the community to have a better understanding of hazard areas and what mitigation measures might most effectively address those concerns. Flooding is the most common and most significant hazard that can trigger a Federal disaster declaration in Barton. Along with the creation of flood hazard area maps,

identifying the fluvial erosion hazard areas provides improved opportunities for the community to mitigate potential losses and gauge future development initiatives.

Action 6: Reduce risk and impact of hazardous materials incident
Group: PEA, PP, SP

Risk or Hazard Addressed: Risk to infrastructure, environment, livestock and residents
Primary Responsible Entities: Town of Barton Selectboard and planning commission, NVDA, Ethan Allen, Blanchard Oil, D&C Transport, local/regional assistance organizations.
Potential Partner Entities: Vermont DMEHS, LEPC
Funding Requirements and Sources: Financial factors may produce barriers to change. Strategic planning and understanding of the total scope of needs and potential for change is logical first-step. Using HMEP funding to better understand scope will be explored through LEPC.
Specific Identified Tasks:

1) Work with facility leads on understanding risk factors and what can be done to mitigate and enhance training and skills for response to major highway accidents
2) Develop understanding of likely chemical characteristics and what area would be impacted under likely scenarios involving discharge/spill
3) Explore using HMEP funding to increase awareness, knowledge and collaboration a means to developing future mitigation actions
4) Explore using Homeland Security exercise planners to develop tabletop exercise based on likely scenarios

5.4.3. Prioritization of Mitigation Strategies

Because of the difficulties in quantifying benefits and costs, it was necessary to utilize a simple "*Action Evaluation and Prioritization Matrix*" in order to affect a simple prioritization of the mitigation actions identified by the town. This method is in line with FEMA's STAPLEE method. The following list identifies the questions (criteria) considered in the matrix so as to establish an order of priority. Each of the following criteria was rated according to a numeric score of "1" (indicating poor), "2" (indicating below average or unknown), "3" (indicating good), "4" (indicating above average), or "5" (excellent).

- Does the action respond to a significant (i.e. likely or high risk) hazard?
- What is the likelihood of securing funding for the action?
- Does the action protect threatened infrastructure?
- Can the action be implemented quickly?
- Is the action socially and politically acceptable?
- Is the action technically feasible?
- Is the action administratively realistic given capabilities of responsible parties?
- Does the action offer reasonable benefit compared to its cost of implementation?
- Is the action environmentally sound and/or improve ecological functions?

Table 5-2: Barton Action Evaluation and Prioritization Matrix

Rank	Mitigation Action	Responds to high hazard	Funding potential	Protection value	Time to implement	Social and Political acceptance[1]	Technical feasibility	Admin feasibility	Benefit to Cost	Environmental advantage	TOTAL
2	Improve road infrastructure and municipal systems protection programs	5	4	5	2	5	4	4	5	4	38
3	Improve resilience to severe winter storms	2	5	5	4	5	5	4	5	2	37
4	Reduce impact of extreme cold durations	3	2	4	2	3	2	2	3	3	24
5	Reduce vulnerability to telecommunications failure	3	4	5	2	5	3	3	5	1	27
1	Raise public awareness of hazards, hazard mitigation and disaster preparedness	4	5	5	5	5	5	5	5	3	43
6	Continue fluvial geomorphology (in coordination with state recommendations and protocol) assessments and develop strategies in response to any identified risk	3	2	4	2	2	2	2	3	3	23

The ranking of these criteria is largely based on best available information and best judgment of project leads. For example, all road improvement projects were initially identified by Road Foreman and approved for inclusion in this plan by the road commission. It is anticipated that, as the town begins to implement the goals and actions of their Mitigation Strategies, they will undertake their own analysis in order to determine whether or not the benefits justify the cost of the project. Also, most proposed FEMA HMGP mitigation projects will undergo a benefit-cost analysis using a FEMA BCA template and approved methodology.

[1] *All mitigation actions outlined in this plan are, and will continue to be, consistently assessed for feasibility related to the social, political and financial factors that are inherent to town and village operations.*

5.5 Implementation and Monitoring of Mitigation Strategies

5.5.1. Public Involvement Following Plan Approval

After adoption, the town will continue to maintain web-presence of the mitigation plan with an opportunity for community input available on its website. Additionally, the town will hold an annual public meeting after performing the annual progress report for the mitigation plan to discuss achievements and the following year's implementation plan. At town meeting, the town will present mitigation information and provide the public an opportunity to increase understanding and involvement with planning efforts. The LEPC will also host an annual mitigation plan presentation where response/state agencies, neighboring communities and other stakeholders can provide input. The town will also notify its neighboring municipalities of the availability of information for review and any significant risks and/or mitigation actions that have an impact on surrounding towns.

5.5.2. Project Lead and Monitoring Process

The town's selectboard and Village chairs are the project leads and will work in conjunction with the selectboard, village trustees, town clerk and NVDA to complete the yearly progress report included in the plan. The town will create a mitigation action collection system that will be used as the source of future updates following the annual evaluation that will occur in conjunction with the progress report using the Plan Implementation Matrix provided below. While mitigation actions are, by default, often addressed at monthly Selectboard meetings, the town will schedule one meeting annually to formally assess the plan and adopt updates following the annual progress report and community meeting regarding the LHMP. Once the plan is approved by FEMA, the calendar will begin for annual review. The town will take the following implementation matrix and add actions to it each year, modifying tasks and/or needs as required so that the next LHMP update will be populated with the specific actions related to each mitigation strategy by year.

5.5.3 Plan Evaluation and Update Process

The town's Selectboard chair will lead the plan evaluation process as part of the annual progress report. Prior to town meeting and in preparation for the annual town report, a mitigation section will be included that provides an executive summary for the public that addresses the following topics:

- Status of recommended mitigation actions for the five-year planning period
- Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk
- Identification of a lead person to take ownership of, and champion the plan if different from Selectboard and Village Chairs
- An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.)
- Discussion of how changing conditions and opportunities could impact community resilience in the long term
- Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience

By engaging in the annual evaluation, the town will have a viable method for capturing the facets of efficacy and areas needing revision and improvement in its mitigation plan. The town is committed to "institutionalizing" mitigation into its normal operating procedures and with approval of this plan, embarks on the formal incorporation of mitigation actions and discussion, maintaining an awareness that involves not only the Selectboard, Village Trustees, Town Clerk and Road Foreman but also the community at large, including the organizations represented by the current planning team. Along these lines, the town will maintain a contact list of the current planning team and make revisions as required, including the team on the evaluation process each year. Through this consistent attention resulting from the evaluation process, progress reports and communication in the annual town report, the town will achieve the consistency required to enhance resilience through planning, assessment and actions devoted to mitigation.

5.5.4. Plan Update Process

The Plan update will be led by the Selectboard and Village Chairs. Depending on funding availability, the town may elect to acquire the assistance of NVDA and/or a consultant to update the plan following a declared disaster and/or the next five-year planning cycle. To assure that the Plan does not expire, the town will begin the update process within no less than six months of the current Plan's expiration date. Following a disaster and during the recovery phase, the town will use the experience to assess the current Plan's ability to address the impact of the most recent disaster and edit the plan accordingly. Using the annual progress reports and evaluation narratives as a guide, along with perceived changes in risk or vulnerabilities supported by data and/or observation, strategies will be captured in accordance with FEMA guidelines, which includes reconvening the planning team during the update process. The town will establish a "Mitigation File" that documents all evaluations and progress reports, along with actions, especially related to infrastructure improvement projects. While the progress reports are designed to capture the specific actions, the town has accomplished related to implementation, keeping a narrative list with dates on all actions relatable to mitigation (e.g. school drills, LEOP updates, Fire Safety Awareness, meetings, etc.), will provide the town the bulk of information required in the update process.

5.5.5. Implementation Matrix for Annual Review of Progress

The following table is intended to aid municipal officials in implementing the mitigation actions for Barton Town, Barton Village and Orleans Village and to facilitate the annual monitoring and progress reporting. Progress has been included as a guide to future updates. Each year, the town will reserve a Joint Planning Commission meeting to review and update the Implementation Matrix as means to establishing an accurate evaluation of the plan's efficacy and the information required for the succeeding update to the plan. Each Jurisdiction will fill in the implementation matrix specific to work accomplished relevant to the actions outlined, especially as it pertains to outreach, municipal system actions and road improvement projects.

Table 5-3 Implementation Matrix for Annual Review

					Annual Progress: 2017
Action	**Primary Responsible Entity**	**Timeline**	**Task**	**Brief Description**	**Progress**
Continue fluvial geomorphology assessments and develop strategies in response to identified risk.	VT DEC, NVDA, VT ANR, Orleans Village in conjunction with JPC	Spring 2018- Fall 2022	Fluvial Geomorphic Assessments and assessment-based mapping/action	Continue Phase I and Phase II fluvial geomorphic assessments on streams and waterways in **Barton**.	DEC has a comprehensive and interactive database for the Basin and Dam preparedness has done some of this work in the past that the town can build from.
	NVDA, VT ANR, Orleans Village in conjunction with JPC	Fall 2019- Fall 2022	Fluvial Erosion Hazard Mapping	Rate the fluvial erosion hazard for each assessed reach and develop a fluvial erosion hazard map for the waterway using SGAT. Create map of all assessed reaches. Submit to VT ANR for QA/QC.	
	NVDA, Joint Planning Commission (JPC	Fall 2019- Fall 2022	River Corridor Management Plans	Where Phase I and II assessments are complete, develop a River Corridor Management Plan.	Zoning in place to limit/restrict dev. In know flood hazard areas
	JPC	Fall 2017- Fall 2022	Fluvial Erosion Hazard Mitigation Implementation	Develop strategies to mitigate losses from identified fluvial erosion hazards.	Major infrastructure enhancement has occurred as result of flooding with FEH-specific projects planning in current planning cycle
	JPC	Spring 2020- Spring 2021	Flood Insurance Rating Map Updates	Review draft FIRM data. Update floodplain regulations/zoning.	There have been 3 (BT), 1(BV), 2(OV) LOMCS according to FEMA database

Action	Primary Responsible Entity	Timeline	Task	Brief Description	Progress
Improve road infrastructure and municipal systems protection programs	Town and Both Village Road Foreman, JPC and Vtrans	Fall 2017-Fall 2018	Infrastructure Assessment for Storm Water Vulnerability	Assess the vulnerability and operational capability of municipal roads, culverts and storm water infrastructure.	Town has identified projects with problem, priority and estimated budget. With great institutional memory of town infrastructure, the highway department is well-equipped to assess, monitor and prioritize needs.
	Town and Both Village Road Foreman, JPC and ANR	Fall 2018-Fall 2019	Infrastructure Assessment for Fluvial Erosion Vulnerability	Assess the vulnerability and operational capability of municipal roads, culverts, bridges and systems infrastructure to fluvial erosion.	Road and Bridge Standards adopted and meet or exceed 2013 standards.
	Town and Both Village Road Foreman, JPC and Vtrans	Fall 2017-Fall 2022	Culvert Upsizing	Upsize culverts and ditching along roads to mitigate against repeated damages from storm water or spring snowmelt.	VTCULVERTS.ORG Culvert and Bridge Inventory has been populated.
	Town and Both Village Road Foreman, JPC and Vtrans	Spring 2019	Continued Monitoring of Vulnerable Infrastructure	Inventory bridges to document future damage from flooding. A constantly updated inventory will allow Barton to keep track of frequently damaged infrastructure and will guide planning to avoid future infrastructure damage.	Bridge replacement scheduled for 2019
	Town and Both Village Road Foreman, JPC and Vtrans	Fall 2017-Fall 2022	Road Improvements	Within political and financial restraints, consider re-engineering certain sections of roads to lower overall maintenance costs, improving snow plowing speeds and improve overall capability of roads to handle current and projected traffic volumes.	Projects named and scoped. Each annual update will list accomplished projects here: PROJECTS ACCOMPLISHED:

Action	Primary Responsible Entity	Timeline	Task	Brief Description	Progress
continued	JPC	Fall 2018-Sprng 2019	Develop SOP for emergency events based on any identified need and political/financial restraints. ICS training for municipal staff	Building on current Emergency Operations Plans for the Highway Department and Road Commission, and SOP can help clearly define expectations, roles and responsibilities. Develop understanding of eligibility criteria for HMGP projects.	Communication between Highway Department and Road Commission is ongoing. ICS required for LEOP approval.
	JPC	Fall 2017-Winter 2022	Increase Awareness of Funding Opportunities	Increase understanding of FEMA's HMGP program so that this potential funding source can be utilized.	New
	JPC	Summer 2018- Fall 2022	Perform maintenance and upgrades of the Shadow lake Dam as recommended by the Dam Safety Engineers of the Vermont department of Environmental Conservation.	Review and update the Emergency Action Plan for Shadow Lake Dam annually	New
	Town and Both Village Road Foreman, JPC and Clerks	Summer 2018- Fall 2022	Documenting	Develop a methodology that serves to efficiently capture work and expenditures on sites and keep this information at the town office as time and financial constraints allow	Improve current system could enhance efficiency of proving prior damage

Action	Primary Responsible Entity	Timeline	Task	Brief Description	Progress
Maintain and improve resilience to severe winter storms	Emergency Management Director (EMD), NVDA and JPC	Fall 2017-Winter 2018	Improve Existing Shelter Capability/ Investigate Alternate Shelters	Maintain and improve on capabilities of existing emergency shelter capability, including emergency generator functionality. Investigate capabilities of other buildings sufficient to serve as smaller shelters.	All shelters have a generator. Explore Lake Region as additional shelter and secure funding for emergency power if required.
	Emergency Management Director (EMD), electric service management in conjunction with JPC	Fall 2017-Winter 2018	Reduce risk of power failure due to ice storms:	Enhance collaboration between town/village and private electric company as means of increasing efficiency of mitigation efforts and restoration when systems are down. Maintain function of generators.	Current communication and operations are working well but room for improvement possible within financial and political restraints.
	JPC, shelter facility leads	Fall 2018-Winter 2019	Notification	Develop a notification/communication plan that conveys essential sheltering information using school phone system and back-up methodology (email, text, etc.)	New
	NVDA EMC in conjunction with JPC	Fall 2017-Winter 2022	Residential Programs	Provide guidance and communication to residents on the structural and mechanical actions that can occur to reduce risk to severe winter storms (e.g. weather-proofing, anchoring alternative heating sources, tree trimming, financial programs, etc.)	FEMA, DEMHS and other state agencies publish annual materials that can be obtained and distributed

	Town and Both Village Road Foreman, JPC and Vtrans	Winter 2017-Winter 2022	Monitor roads for safe and effective plowing	Efficient snow removal is the foundation to winter storm (snow) events, assuring roads are plowable before winter remains an important facet of highway department functions. Increase communication with rail as deemed necessary to assure safe train travel during heavy snow/ice events.	Ongoing
	Town and Both Village Road Foreman, JPC and Vtrans	Winter 2017-Winter 2022	Increase awareness of ICS structure and recommended practice	The town can mitigate the effects of a severe winter by understanding how a large-scale storm is managed when the State EOC is operational. Additional awareness of local-level roles and responsibilities during statewide event is a mitigation action	ICS required but enhanced understand may benefit

Action	Primary Responsible Entity	Timeline	Task	Brief Description	Progress
Reduce impact of extreme cold durations	JPC, NVDA, relevant state agencies and non-profits	Winter 2017-2018	Economic Resilience	Within political and financial restraints, establish program for assistance in paying heating bills during crisis situations, if not already required by state law. Develop and sustain a program that serves to connect resource organizations with residents in need of support services	New
	JPC. EMD	Fall 2017-Winter 2018	Maintain Existing Shelter Capability:	Maintain and improve capabilities of existing shelters. Notification procedures and shelter staffing is a priority for the city and intends to move forward on planning and public involvement. More formalized training is required and the ARC's "Shelter Initiative Program" can be used at no cost to the town to enhance both shelter management knowledge and sheltering supply cache.	Ongoing with improvements planned
	JPC, Rescue services, Fire Departments, EMD	Winter 2018-Winter 2022	Assess Vulnerable Population	Develop an awareness of the most at-risk community members during an evacuation and/or sheltering event. Focusing on those that lack resources or capability to reach facilities when in need and create plans, including outreach protocol on how to address this potential hurdle.	New

JPC, Fire Departments, EMD, Health Officer (suggested)	Winter 2018-Winter 2022	Notification and Education	Investigate and develop a notification/communication plan that conveys essential sheltering information. Educating citizens regarding the dangers of extreme cold and the steps they can take to protect themselves when extreme temperatures occur by sustaining a process that serves to disseminate educational resources for homeowners and builders on how to protect pipes, including locating water pipes on the inside of building insulation or keeping them out of attics, crawl spaces, and vulnerable outside walls. Inform homeowners that letting a faucet drip during extreme cold weather can prevent the buildup of excessive pressure in the pipeline and – avoid bursting through a yearly public service campaign.	New

Action	Primary Responsible Entity	Timeline	Task	Brief Description	Progress
Reduce risk and impact of hazardous materials incident	JPC, Fire Department, facility leads	Spring 2017-Winter 2022	Work with facility leads on understanding risk factors and what can be done to mitigate and enhance training and skills for response to major highway accidents	HMEP funds through LEPC can facilitate this work by LEPC members or via consultant	New
	LEPC, EMD, Fire Chiefs	Spring 2019-Spring 2020	Develop understanding of likely chemical characteristics and what area would be impacted under likely scenarios involving discharge/spill	See above	New
	LEPC, NVDA, EMD, Fire Chiefs	Winter 2019-Winter 2021	Explore using HMEP funding to increase awareness, knowledge and collaboration a means to developing future mitigation actions	See above	New
	NVDA and JPC, EMD, LEPC	Fall 2019-Fall 2021	Explore using Homeland Security exercise planners to develop tabletop exercise based on likely scenarios	Planners will develop exercise to test response and manage from start to finish is funding permits	New

Action	Primary Responsible Entity	Timeline	Task	Brief Description	Progress
Raise public awareness of hazards, hazard mitigation and disaster preparedness.	EMD, Fire Chiefs, Rescue Services	Fall 2017-Fall 2022	Residential Programs	Develop and maintain education materials to inform property owners on how to protect their homes and businesses through accepted hazard resilience actions (e.g. securing their structures from high winds, elevating their electrical equipment/furnaces in basements, protecting from lightning strikes by grounding electrical outlets, etc.).	New
	EMD, Fire Chiefs	Fall 2017-Fall 2022	Family Programs	Continue family programs, such as car safety seat and bike safety programs, to raise family awareness of hazards, safety, preparedness and prevention.	Ongoing
	Fire Chiefs	Fall 2017-Fall 2022	Fire Prevention Programs	Continue National Fire Prevention Week and other programs to raise public awareness of fire hazards, safety, preparedness and prevention.	Ongoing
	LEPC, Fire Chief	Fall 2017-Fall 2022	Other hazard awareness programs	Develop public awareness programs, based on all-hazards needs.	Ongoing
	JPC	Fall 2019-Fall 2020	Dam Preparedness	Work with partners and use inundation maps to develop emergency notification procedures based on likely breach scenarios by	New

Additional Actions	Primary Responsible Entity	Timeline	Task	Brief Description	Progress

APPENDICES

NOTE: Appendices A-D not included with State submission or for FEMA review)

Appendix A: Community Reports: Barton (Flood Ready Vermont)

Appendix B: Culvert Locator: (VTrans)

Appendix C: No Adverse Impact Floodplain Management Fact Sheet (ASFPM)

Appendix D: Farm Structures in Designated Flood Hazard Area Planning Checklist (VAAFM)

Appendix E: Community Outreach Form

Town of Barton Multi-Jurisdictional Hazard Mitigation Plan
Community Outreach Form

Introduction: Hazard Mitigation Planning works to protect a community and is a mandatory requirement before any FEMA funding can be awarded to a town to repair infrastructure or acquire critical equipment. By developing an approved plan, the town can earn a greater percentage of state funding during recovery from a disaster and be better prepared to handle a future event. Your input is crucial to the planning process and the information you provide will help produce a plan that will serve the town for years to come. Please take the time to share your thoughts on the questions below. Thank you!

Please return form to: Barton Town Clerks Office via:

- In-person or by mail: 34 Main St.
  Barton, VT 05822
- Email: bartontown@comcast.net

Resident, Employee or **Business Owner** (please circle all that apply)

Community Concerns:

1. **What are your general concerns about emergency events in the town?**

2. **What do you think the community should plan to accomplish to be better prepared for the next emergency event?**

3. **What other thoughts or concerns do you have about emergencies, hazards and emergency response in the town?**