

*Adopted by the Town of Walden Select Board on
March 14, 2017*

**Town of Walden, Vermont
All-Hazards Mitigation Plan
Update**

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**Prepared by
Town of Walden, Vermont**

CERTIFICATE OF LOCAL ADOPTION

Town of Walden, Vermont

A Resolution Adopting the All-Hazards Mitigation Plan Update

WHEREAS, the Town of Walden has worked with its residents and stakeholders to identify its hazards and vulnerabilities, analyze past and potential future losses due to natural and human-caused hazards, and identify strategies for mitigating future losses; and ...

WHEREAS, the Town of Walden All-Hazards Mitigation Plan contains recommendations, potential actions and future projects to mitigate damage from disasters in Walden; and

WHEREAS, the Town of Walden and the respective officials will pursue implementation of the strategy and follow the maintenance process described in this plan to assure that the plan stays up to date and compliant; and...

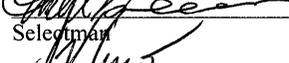
WHEREAS, a meeting was held by the Town of Walden Selectboard to formally approve and adopt the Town of Walden All Hazards Mitigation Plan Update.

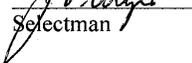
NOW, THEREFORE BE IT RESOLVED that the Town of Walden adopts this All-Hazards Mitigation Plan Update for the town.

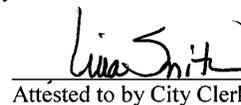
Date 3/14/2017


Select Board Chair


Selectman


Selectman


Selectman


Attested to by City Clerk

Executive Summary

In December of 2015, the Town of Walden began to update the Town of Walden’s Local All-Hazard Mitigation Plan (LHMP) which was adopted by the town as an annex to the 2005 Multi-jurisdictional Hazard Mitigation Plan submitted by the Northeast Vermont Development Association. The results of this work are contained herein and represent the collaborative efforts of the Town of Walden Hazard Mitigation Planning Team, neighboring towns, Northeast Vermont Development Association (NVDA) and various state agencies that contribute resources and knowledge to community mitigation planning and resilience. 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 reimbursement 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 a means to establishing strong partnerships with regional support agencies and associations, state government and FEMA. As the town moves towards formally adopting this Local All-Hazards Mitigation Plan, the purpose of this plan is to:

- Identify specific natural, technological and societal hazards that impact the town of Walden
- 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 Walden and describes the planning process used to develop this plan.

Section 2: Hazard Identification expands on the hazards identified by the Town of Walden and from a historical perspective 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 as a means 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. The most significant identified hazards for Walden are broken down in the grid below:

Severe winter/Ice storm	Flooding/fluvial erosion
High winds	Extreme Cold

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 utilizes the town's 2015 Road Erosion Site Inventory to formulate and support actions that address the identified hazards. An analysis of existing municipal actions that support hazard mitigation, such as planning and emergency services is also included. The town's 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) Formation of a formal plan and policy platform to address mitigation in the town
- 7) Provision of detailed information and mitigation actions that will be used in the town operating and capital plans & programs as they relate to public facilities and infrastructure.
- 8) Support long-term solutions over short-term fixes to community needs and problems
- 9) Promote collaboration and cooperation through working partnerships between governments, non-profits, institutions, and businesses

Section 5 identifies and provides a detailed discussion of the following Mitigation Actions:

Action #1: Improve capabilities of existing road and storm water management infrastructure.

Action #2: Improve resilience to severe winter storms

Action #3: Reduce risk and impact of extreme cold

Action #4: Reduce vulnerability to telecommunications failure

Action #5: Increase resilience of mobile homes through accepted structural modifications and resident awareness of programs and opportunities

Action #6: Raise public awareness of hazards and hazard mitigation actions

Action #7: Continue fluvial geomorphology (in coordination with state recommendations and protocol) assessments and develop strategies in response to any identified risk

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 Walden Planning Commission and Selectboard

Table of Contents

Executive Summary	i
SECTION 1: INTRODUCTION AND PURPOSE	1
1.1 Purpose and Scope of this Plan.....	1
1.2 Hazard Mitigation	1
1.3 Hazard Mitigation Planning Required by the Disaster Mitigation Act of 2000	1
1.4 Benefits	2
1.5 All-Hazards Mitigation Plan Goals.....	2
1.6 Town of Walden: Population and Housing Characteristics	3
1.6.3. Income and Employment	4
1.6.4. Hospitals and medical centers near Walden	4
1.7 Summary of Planning Process	5
SECTION 2: HAZARD IDENTIFICATION.....	7
Table 2-1: Summary of Vermont Emergency Declarations.....	8
Table 2-2: Summary of Vermont Major Disaster Declarations since 1998 (Caledonia County in Bold with events that resulted in PA funding for the town with an “**”).....	8
High Winds	10
Severe Winter Storm.....	11
Table 2-5: NOAA’s Regional Snowfall Index (RSI).....	12
Table 2-6: Walden Snowfall vs. US Average	12
Extreme Cold	13
Table 2-7: 24-Hour Rainfall Depths (inches) for Common Recurrence Intervals (ANR, 2002)	14
Table: 2-8: Caledonia County Rainfall-Intensity Range (in. /hr.)	14
Fluvial Erosion.....	15
Major Fire – Urban	16
Major Fire –non-developed.....	16
Table 2-6: Vermont Fires: Size and Causes.....	17
SECTION 3: RISK ASSESSMENT.....	17
3.1 Designated Hazard Areas.....	17
3.1.1 Flood Hazard Areas	17
3.1.2. Fluvial Erosion Hazard Areas	17
3.2 Non-designated Hazard Areas	18
3.2.1. 1998 Ice Storm Damage.....	18

3.2.2. High Winds and Lightning.....	18
3.3 Previous FEMA-Declared and Non-declared Natural Disasters	18
Table 3-1: Town of Walden, FEMA-declared disaster Summary, 2002-2015.....	18
Table 4-2: Town of Walden, FEMA-declared disasters and snow emergencies, 2004-2015.....	18
3.4 Future Events	20
3.4.1. Natural Hazards	21
Table 3-3: Natural hazards risk estimation matrix.....	22
SECTION 4: VULNERABILITY ASSESSMENT.....	23
Flood Vulnerability.....	23
Critical Facilities.....	25
Table 4-1: Critical facilities in the Town of Walden	25
4.2 Infrastructure.....	26
4.2.1. Town Highways	26
Table 4-3: Town highway mileage by class, Town of Walden	26
4.2.2. Bridges, Culverts, and Dams	26
Bridges:.....	26
Culverts:.....	27
Dams:	27
4.3 Estimating Potential Losses in Designated Hazard Areas	27
4.4 Land Use and Development Trends Related to Mitigation	28
4.4.1. Future Development and Housing	28
4.4.2. Housing.....	28
4.4.3. Roads.....	28
SECTION 5: MITIGATION STRATEGIES	28
5.1 Walden Town Goals and Policies that support Hazard Mitigation	29
5.1.1. Flood Resilience Goals:	29
5.1.2. Capital Improvement Goals	29
5.1.3. Public Participation Goals.....	30
5.1.4. Regulatory Devices Goals.....	30
5.1.5. Land Use	30
5.1.6. Policies	31
5.1.7. Transportation	32
5.1.8. Utilities and Facilities Goals	32
5.2 Existing Town of Walden Actions that Support Hazard Mitigation.....	33

Table 5-1: Existing municipal actions that support hazard mitigation	33
5.3 Town of Walden All-Hazards Mitigation Goals.....	34
5.4 Mitigation Actions	35
5.4.1. Current Capabilities and Need for Mitigation Actions	36
5.4.2. Prioritization of Mitigation Strategies	37
Table 5-2: Walden Action Evaluation and Prioritization Matrix.....	38
5.4.3. Specific Mitigation Actions	39
5.5 Implementation and Monitoring of Mitigation Strategies	46
5.5.1. Public Involvement Following Plan Approval.....	46
5.5.2. Project Lead and Monitoring Process	47
5.5.4. Plan Update Process.....	47
5.5.5. Implementation Matrix for Annual Review of Progress.....	48
5.5.6. Integration of Plan into Other Planning Mechanisms	48
Table 5-3: Walden All-Hazards Mitigation Plan Implementation Matrix	49
APPENDICES	56
Appendix A: Community Reports (Flood Ready Vermont).....	56
Appendix B: No Adverse Impact Floodplain Management Fact Sheet (ASFPM).....	56

SECTION 1: INTRODUCTION AND PURPOSE

1.1 Purpose and Scope of this Plan

The purpose of this Local All-Hazards Mitigation Plan Update is to assist the municipality in identifying all hazards facing their community and in identifying strategies to begin to reduce the impacts of those hazards. The plan update also serves to better integrate and consolidate efforts of this municipality as well as those of NVDA, relevant state agencies, including the Vermont 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. This document constitutes an All-Hazards Mitigation Plan Update for the Town of Walden with a goal to provide hazard mitigation strategies to aid in increasing the overall resilience of the Town, Caledonia County and the state as a whole.

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 five goals accomplished as a State since 2010 and as referenced in Section Five of the State’s 2013 Hazard Mitigation Plan and as part of Vermont’s Emergency Relief Assistance Funding (ERAF) requirements. With enhanced emphasis on community resilience, 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. According to 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 in order 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 LHMP
- 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 in order 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 LHMP 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
- Ease the receipt of post-disaster state and federal funding because the list of mitigation initiatives is already identified and action can be taken prior to the next event
- 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 as a whole and its 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 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. Formation of a formal plan and policy platform to address mitigation in the town
7. Provision of detailed information and mitigation actions that will be used in the town operating and capital plans & programs as they relate to public facilities and infrastructure.
8. Support long-term solutions over short-term fixes to community needs and problems
9. Promote collaboration and cooperation through working partnerships between governments, non-profits, institutions, and businesses

1.6 Town of Walden: Population and Housing Characteristics

Chartered: November 8th, 1780
 Coordinates: 44°28'48"N 72°14'46"W
 Altitude ASL: 1,683'

The Town of Walden is a small rural community in north-central Vermont. This Caledonia county community is part of an area known as the Northeast Kingdom and covers 39 square miles with .3 of that as water.

1.6.1. Population

Table 1-1: Town of Walden, selected population characteristics, 2010 Census

Category	Number	%
Total Population	935	100
Median Age	41.6	--
Population age 60 years and over	176.7	18.9
Population under 20 years old	280.5	30.
Population between 20 and 40	163.6	17.5
Population between 40 and 60	314.2	33.6

1.6.2. Housing and Demographics

Since the last approved plan in 2005, there has been no known increase in repetitive flood damaged structures. Because the town has no zoning, there is not a mechanism in place to determine the increase, if any, in development in the flood hazard areas.

The average family size is 2.95 and the average household size is 2.5. The main source of household heating energy is fuel oil (49%), then wood (31%), bottled, tank, or LP gas (19%), electricity (1%). The following shows the types of housing within Walden

Table 1-2: Town of Walden, selected housing unit data, 2010 Census Block Group 2

Category	Number	%
Total Housing Units	597	--
Occupied housing units	374	62.6

Vacant housing units	223	37.4
Owner-Occupied	331	88.5
Renter Occupied	43	11.5
Population in Renter-occupied	104	--
Households with individual over 65	124	23.8
Householders living alone over 65	26	7

1.6.3. Income and Employment

The Walden unemployment rate is 1.9% compared to the state average of 3.7%. Most common employment sectors are:

- Agriculture, forestry, fishing and hunting (20%)
- Construction (18%)
- Public administration (4%)
- Building material and garden equipment and supplies dealers (3%)
- Educational services (3%)
- Health care (3%)
- Food (3%)

The most common occupations are:

- Fishing and hunting, and forest and logging workers (10%)
- Carpenters (8%)
- Metal workers and plastic workers (6%)
- Vehicle and mobile equipment mechanics, installers, and repairers (5%)
- Other sales and related workers including supervisors (4%)
- Farmers and farm managers (4%)
- Other management occupations except farmers and farm managers (4%)

1.6.4. Hospitals and medical centers near Walden

- Northeastern Vermont Regional Hospital: Critical Access Hospital (about 12 miles away; St. Johnsbury, VT)
- St. Johnsbury, VT Health and Rehab (Nursing Home, about 12 miles away; St. Johnsbury, VT)
- FMC OF ST. Johnsbury Dialysis (St. Johnsbury, VT, 12 miles away)
- Caledonia Home Health Care (about 12 miles away; St. Johnsbury, VT)
- Pines Rehab and Health Center (Nursing Home, about 13 miles away; Lyndonville, VT)

1.7 Summary of Planning Process

In December of 2015, the town contracted with OPH Consulting Services (OPHC) to update the plan. The last approved plan for the town was in 2005. This approval came after formal adoption of the Walden 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 its mitigation efforts since 2005, these enhancements were not a direct result of the 2005 plan. With this in mind, 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 state partners as best as possible. The kick-off meeting was convened in December, 2015. The planning team discussed the planning process and facts related to the town. 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. The survey and final planning team roster were approved and adopted by the select board in January, 2016. All towns bordering Walden were sent notification of the plan's development and subsequent drafts and were given an opportunity to provide input. Monthly updates on plan development were included in each Selectboard meeting and an overview of hazards and disaster history was given at both the September Selectboard and Planning Commission meetings, where a discussion to incorporate pertinent facets of the LHMP into town operations was discussed. Following FEMA guidance in Local Mitigation Plan Review Tool Regulation Checklist, the plan was written using data sources that included:

- Surveys collecting public comment (issues raised were addressed in the plan and the public meeting)
- 2013 Vermont State Hazard Mitigation Plan (provided key guidance language and definitions throughout the plan)
- ACCD Mobile Home Resilience Plan: Provides resources for planners and residents with clearly defined recommendations for mitigating risk
- 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 P-956: Living with Dams (provides clear guidance on planning and considerations for municipalities with dams).
- FEMA NFIP “Bureau.Net” database (provided detailed information on repetitive loss properties and associated flood insurance claims).

Based on information obtained and input from town officials, the planning team, state plans and federal data bases, local associations and NVDA, OPHC drafted the plan. Building on new data, town information and community input, OPHC engaged in outreach with the following town staff and community organizations to provide an inclusive and strategic mitigation plan and planning team:

Bruce Melendy, NVDA
 Richard Fisher, Chair LEPC 9
 Shauna Clifford, VTrans District Rep
 Jeff Pierpont, selectboard
 George Gattone, selectboard
 Martha Bissell, selectboard
 Dia Michaud, planning commission
 Lina Smith, Walden Town Clerk
 Richard DeGreenia, selectboard
 Liz Benoit, Walden School Principal
 Martin Greaves, EMC
 Bob Bell, Road Foreman
 Paul Grieves, Fire Chief and Rescue

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, its history and its residents. From this, the specific risks, vulnerabilities and mitigation strategies were developed. 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 to Walden (Hardwick, Stannard, Danville, Greensboro, Cabot and Woodbury) were contacted via email through the town clerk with planning objectives and a request to inform the selectboard via an agenda item to provide input via the community survey in addition to receiving a draft plan with an invitation to comment via email or phone to the planning team. The input received focused of wildfire risk, a profiled hazard in 2005. Without a history of occurrence of wildfires in town, fire has been omitted from full profiling but the town will commit effort in the next planning cycle to identify vulnerabilities and consider prevention initiatives based on determined, high-risk areas. 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 October 5th, 2016, the town held a warned public meeting to review the defined hazards and associated mitigation strategies. The revised draft was then 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. All neighboring town offices were sent the draft for review and comment as well. 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 prioritized the following hazards (bold indicates continued inclusion in this update). With many of the prioritized hazards in 2005 being vulnerabilities, this update has re-prioritized the town's profiling of hazards requiring mitigation efforts and by doing so, reduce vulnerabilities associated with those hazards:

- **Flooding**
- Hazardous Materials
- Power Failure
- **Severe Winter Storm**
- Highway Incidents
- Fire: Urban and Wildfires/Forest Fires
- School Safety Issues

For this update, the planning team considered the continued inclusion or deletion of the 2005 hazards profiled by developing and researching three distinct hazard categories 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.

- **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

2.1 Profiled Hazards:

The highest risk hazards have been profiled to provide the basis of future mitigation strategies. However, lower risk natural hazards (drought, tornado, extreme heat, hail, landslide, earthquake, naturally-occurring radiation, ice jams and fire hazards) are omitted from profiling due to a lack of evidence to substantiate mitigation efforts at this time. Profiled hazards include:

- **Severe winter storm (including ice storms)**
- **Extreme cold**
- **Flooding (including fluvial erosion)**
- **High winds**

The number of natural disasters in Caledonia County since 1998 (12) is at the US average (12). There have been 12 major disasters (Presidential) declared and 3 Emergencies declared. The causes of 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). Walden was impacted by three of the disaster (noted below with the name of the town and an asterisk by the disaster number). The following discussion on natural hazards is based upon information from several sources. General descriptions are based upon the *2013 Vermont State Hazard Mitigation Plan*. According to NOAA Storm data, there were over 500 severe weather events from 1995-2015 in Caledonia County. While Walden experienced some these, there a several specific to Walden: 7/17/98 Hail Storm; 6/23/02 Thunderstorm, 6/28/02 Lightning; 6/27/07 Thunderstorm. Hurricanes and severe thunderstorms are not profiled hazards due to low frequency of occurrence and low risk to the town, respectively. While flooding relating to previous hurricane events did produce significant damage, the town believes that the flood and high wind mitigation efforts outlined in this plan address the town’s needs.

Source:

https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=ALL&beginDate_mm=12&beginDate_dd=01&beginDate_yy=1995&endDate_mm=12&endDate_dd=31&endDate_yyyy=2015&county=CALEDONIA%3A5&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=50%2CVERMONT

Table 2-1: Summary of Vermont Emergency Declarations

Number	Year	Type
3338	2011	Tropical Storm Irene
3167	2001	Snowstorm
3053	1977	Drought

Source: FEMA

Table 2-2: Summary of Vermont Major Disaster Declarations since 1998 (Caledonia County in Bold with events that resulted in PA funding for the town with an “”)*

4207	2015	Severe Winter Storm
4178	2014	Severe Storms and Flooding
4232	2015	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

Source: FEMA

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. However, recent winters have proved to be very cold. An increase in the size and frequency of storms is also predicted. As a result, climate change in the next century will likely increase the likelihood of the above 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 in the near future. 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 conjunction with the ANR report, the primary goal of a VTrans climate change adaptation policy

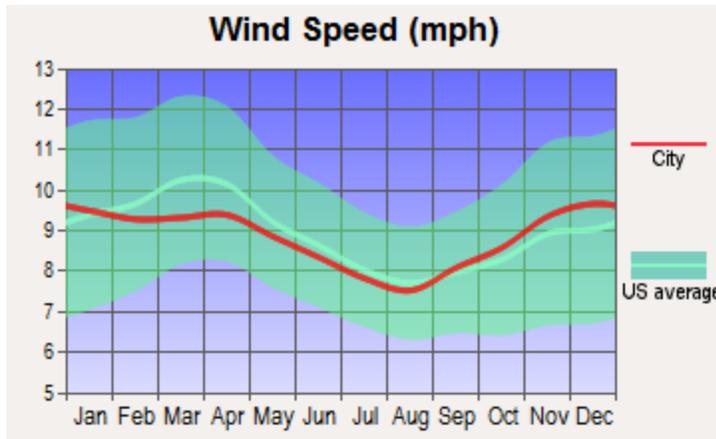
is to minimize long-term societal and economic costs stemming from climate change impacts on transportation infrastructure.

High Winds

High wind events do occasionally cause damage for the town, normally in downed power lines. The last recorded high wind event as tracked by the National Weather Service was recorded on 17-18 January 2012. An 81-mph wind gust was measured atop Vermont's highest peak Mount Mansfield. During this event, Caledonia County had wind speeds of 30-40 mph. Specific data for Walden was not available but town officials recall the 2012 event as being the most severe in memory and the town expects high wind events that may reach category 2 speeds but it is unlikely, based on previous events, that a category 3 event will occur in the region. The following table describes the Beaufort Scale.

Table 2-4: Beaufort Scale and Walden Windspeed vs. U.S. Average

Beaufort*	Avg Miles per Hour	Knots	Surroundings
0 calm		0-1	Smoke rises vertically and the sea is mirror smooth
1 light air	1.2 - 3.0	1 - 3	Smoke moves slightly with breeze and shows direction of wind
2 light breeze	3.7 - 7.5	4 - 6	You can feel the breeze on your face and hear the leaves start to rustle
3 gentle breeze	8.0 - 12.5	7 - 10	Smoke will move horizontally and small branches start to sway. Wind extends a light flag
4 moderate	13.0 - 18.6	11 - 16	Loose dust or sand on the ground will move and larger branches will sway, loose paper blows
5 fresh breeze	19.3 - 25.0	17 - 21	Surface waves form of water and small trees sway
6 strong breeze	25.5 - 31.0	22 - 27	Trees begin to bend with the force of the wind and causes whistling in telephone wires. Some spray on the sea surface
7 moderate gale	32.0 - 38.0	28 - 33	Large trees sway. Moderate sea spray
8 fresh gale	39.0 - 46.0	34 - 40	Twigs break from trees, and long streaks of foam appear on the ocean
9 strong gale	47.0 - 55.0	41 - 47	Branches break from trees
10 whole gale	56.0 - 64.0	48 - 55	Trees are uprooted and the sea takes on a white appearance
11 storm	65.0 - 74.0	56 - 63	Widespread damage
12 hurricane	75+	64 +	Structural damage on land, and storm waves at sea



Severe Winter Storm

Winter storm frequency and distribution varies from year to year depending on the climatological patterns. The entire town is vulnerable to winter storms. Because such storms are expected during a Vermont winter, the town is well-equipped to deal with snow removal and traffic incidents. However, during extreme events, town capabilities can be overwhelmed. The most damaging types of snowstorms are ice-storms caused by heavy wet snow or rain followed by freezing temperatures. This leads to widespread and numerous power and telephone outages as lines either collapse due to the ice weight or are brought down by falling trees and branches. 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.”

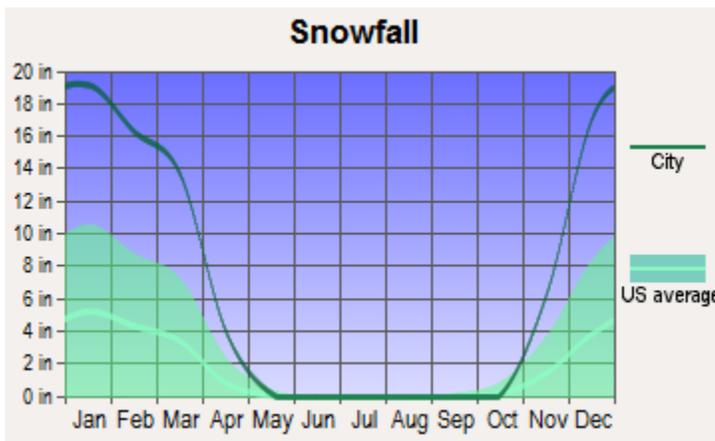
The winter of 2010-2011 was the third-snowiest on record with a total of 124.3 inches. The record of 145.4 inches was set in 1970-1971. The potential for a major snowstorm that exceeds the capabilities of town exists every year but with the recent increase in snow fall totals and cold temperature duration, the town realizes the further consideration are 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. New storms are added operationally. 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. 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. Despite having considerably more snow than the U.S. average, Walden has had no major PA funding related to damage from snow events.

Table 2-5: NOAA’s Regional Snowfall Index (RSI)

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

Table 2-6: Walden Snowfall vs. US Average



While declared snow storm disaster have been declared for the county, Walden has not received PA funding for these events. Because such storms are expected during a Vermont winter, the town is well-equipped to deal with snow removal and traffic incidents. The most damaging types of snowstorms are ice-storms caused by heavy wet snow or rain followed by freezing temperatures. This leads to widespread and numerous power and telephone outages as lines either collapse due to the ice weight or are brought down by falling trees and branches. The winters of 1969-72 produced record snowfalls, and greater than normal precipitation was

recorded in 8 of the 11 years during 1969-79 for the region, however, no data specific to Walden was available.

Ice Storm:

Ice storms are less frequent but they impact the entire town. Major Ice Storms occurred in January, 1998 and again in December, 2013. Walden received the most significant damage to forest stands in recorded history and power was disrupted for over seven days. 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. Walden received .5 to 1 inch of ice. On December 13th, 2013, another ice storm hit portions of Caledonia County, including Walden but the extent of this storm is unknown. 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. In the records available to the town regarding power outage, the longest duration outage was in January, 2015 when a major ice storm disrupted power for up to six days for some customers.

Extreme Cold

While there is no historical evidence to support a concern over the consequences of extremely hot temperatures on human health and safety in Walden, recent extremes in cold temperatures is a concern and the impact is town-wide. 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. 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. Maintaining a safe living environment for livestock during extreme temperatures, especially cold extremes, is a real concern for Walden and the rest of the state. Walden's winter of 2015 was the coldest anyone could remember with a mean temperature of 7.8 degrees Fahrenheit. However, the January of 1970 had a mean temperature of 6.6 degrees Fahrenheit which is the coldest mean temperature for the county and January is the statistically coldest month in all of Vermont. Since 1900, January produced temperatures in the negative 20's and 30's consistently for Caledonia County with record cold temperatures occurring in 1914 (-38). 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. Maintaining a safe living environment for livestock during extreme temperatures, especially cold extremes, is a real concern for farmers in Walden and the rest of the state and while the temperatures for the town remain within averages seen in the last 85 years, the town expects dangerously cold temperatures 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.

Flooding and Fluvial Erosion

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. Walden received 7 to 8 inches of rain in June but flooding did not result. This amount is high but not highest for the region. 9.65” fell in 1973 in Saint Johnsbury and the greatest 24-hour rainfall records for the town occurred in May 30th, 2011 at 6.23”. Tropical Storm Irene resulted in the worst Vermont flooding in 83 years. During Irene (August 28th-29th, 2011), the county, including Walden, received 4.8”-5.5” of rain (NOAA) in a 24-hour period. The county as a whole received 118% of its 100-year storm expected rainfall total, which was second highest in the state. With the increase in severe weather events related to rainfall, the town expects greater rainfall events, should they be a result of a tropical storm or smaller storms.

Source: http://www.uvm.edu/~transctr/research/trc_reports/UVM-TRC-14-016.pdf54348

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 2-7: 24-Hour Rainfall Depths (inches) for Common Recurrence Intervals (ANR, 2002)

County: Caledonia
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 measureable 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: 2-8: Caledonia County Rainfall-Intensity Range (in. /hr.)

County: Caledonia
$x \leq 0.01$: 22.5%

0.01 < x ≤ 0.05: 25.6%
0.05 < x ≤ 0.10: 38%
0.10 < x ≤ 0.15: 3.2%
0.15 < x ≤ 0.20: 5.9%
0.2 < x ≤ 0.25: .8%
0.25 < x: 4.7%

Fluvial Erosion

Despite a lack of extent data for the town, 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 feet or longer owned by a municipality or the state. The scour critical rating is based on the structure itself, and does not take into account 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, however, the town does not have a municipal water supply. 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 for all towns in the state. Walden remains committed to enhancing awareness and incorporating recommendations in future planning and mitigation work.

Non-profiled Hazard: *Fire Hazards*

Because concern over fires has arisen in the planning process outreach, the town has included fire in this plan a placeholder for further consideration. There is no extent data for fires but further investigation is planned for in the next planning cycle.

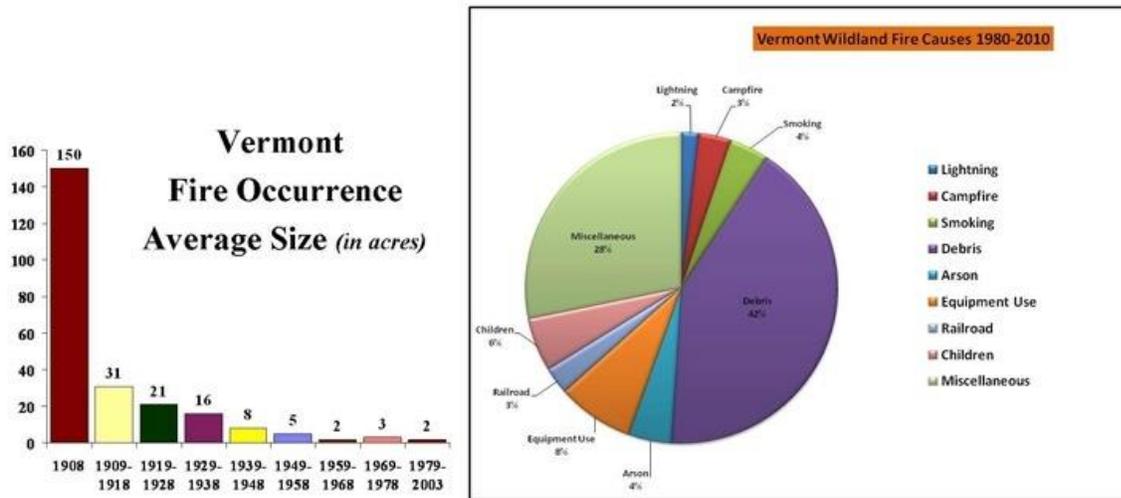
Major Fire – Urban

While structure fires have been removed from the 2013 *Vermont State All-Hazards Mitigation Plan*, the impact on the most urban area in Walden to a fire is substantial as all buildings are in close proximity to another and a fire in one is likely to spread to the next. Vermont has one of the highest per capita death rates from fire in the nation. This is the deadliest form of disaster throughout the state. In 2000, there were 831 structural fires in the state, 12 of which resulted in 22 civilian deaths. 20 of those deaths occurred at residences. Although there have been requirements for smoke detectors in rental housing for over 20 years, and requirements for smoke detectors in single family dwellings since 1994, only one building involved in the fatal fires in 2000 had working smoke alarms. For some remote locations, access to water for emergency vehicles has been a factor in controlling an outbreak of fire. Additional risk for the town is having the required funding to supply equipment to its Fire Department. Slightly over 6% of all fire calls in 2014 were for building fires in Walden.

Major Fire –non-developed

Due to its climate and primary vegetation types, Vermont is not considered to be at serious risk for large-scale wildfires. Despite not having had a major wildfire in the last 50 years, fire suppression systems are in place at the local level. These involve burn permits, burn restrictions, prevention, and detection of fires. Isolated homes with single access roads are more vulnerable to wildfires than more heavily populated areas, and the threat is increased during dry periods, especially in the late summer and fall. The primary forms of ‘wildfire’ fire in Walden are brush and grass fires accidentally started by persons burning trash, leaves or brush. The town has not seen a significant fire to the extent that data has been captured in terms of duration or acreage.

Table 2-6: Vermont Fires: Size and Causes



The town is concerned about its risk to fire and will invest time in developing potential mitigation actions during this planning period.

SECTION 3: RISK ASSESSMENT

3.1 Designated Hazard Areas

3.1.1 Flood Hazard Areas

The town of Walden has not been mapped for the special flood hazard area. However, the southeast portion of the town, below and east of Chase Brook to the border of Danville is most susceptible to flooding. The major risk for the town is road, bridge and culvert damage which can then have a secondary risk associated with resident’s being isolated due to impassable roads. The state tracks and rates bridges and culverts for each town.

3.1.2. Fluvial Erosion Hazard Areas

In light of the potential for more severe weather events, the town remains cautious and realizes that the situation can change quickly but there is currently little information related to fluvial erosion in Walden. However, Stannard Mtn. Road experienced significant damage and a major washout due to erosion of the corner but this was due to run-off more than waterway erosion. In support of this issue, Vermont has seen a dramatic increase in agency collaboration in recent years. The results of this enhanced cohesion has resulted in several published resources for all

towns to use to guide mitigation efforts and enhance resiliency. With the recent emphasis on climate change and subsequent weather-related disasters, the town remains committed to aligning with all applicable and logistically feasible recommendations and considerations resulting from the work of State agencies.

Repetitive Loss Properties:

The town has no repetitive loss claims or properties according to the FEMA Repetitive Losses / BCX Claims spreadsheet for Vermont.

3.2 Non-designated Hazard Areas

3.2.1. 1998 Ice Storm Damage

Impacts of the January 1998 ice storm in Walden were minimal in comparison to other areas of the state.

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 line runs along major routes and the Vermont Agency of Transportation along with utility providers work to keep limbs trimmed.

3.3 Previous FEMA-Declared and Non-declared Natural Disasters

Since 2004, the town has had \$479,000 in FEMA obligated road expenses resulting from washouts and flooding. Walden has received public assistance funding from FEMA for the following natural disasters:

Table 3-1: Town of Walden, FEMA-declared disaster Summary, 2002-2015

Disaster #	Date	Type
1428	07/12/2002	Severe Storm(s)
1559	09/23/2004	Severe Storm(s)
1698	05/04/2007	Severe Storm(s)
1715	08/03/2007	Severe Storm(s)
1790	09/12/2008	Severe Storm(s)
4001	07/08/2011	Severe Storm(s)
4002	09/01/2011	Severe Storm(s)

Table 4-2: Town of Walden, FEMA-declared disasters and snow emergencies, 2004-2015

Disaster Number	PW #	Application Title	Applicant ID	Damage Category Code	Project Size	Project Amount	Federal Share Obligated	Total Obligated
1428	68	ROAD REPAIR	005-75700-00	C - Roads & Bridges	Small	\$1,575.24	\$1,181.43	\$1,265.55

1428	69	ROADS	005-75700-00	C - Roads & Bridges	Small	\$2,124.46	\$1,593.35	\$1,706.80
1428	70	GRAVEL ROAD REPAIR	005-75700-00	C - Roads & Bridges	Small	\$1,738.78	\$1,304.09	\$1,396.93
1428	71	ROADS	005-75700-00	C - Roads & Bridges	Small	\$4,356.38	\$3,267.29	\$3,499.93
1428	72	ROADS	005-75700-00	C - Roads & Bridges	Small	\$2,008.97	\$1,506.73	\$1,614.00
1428	73	GRAVEL ROAD REPAIR	005-75700-00	C - Roads & Bridges	Small	\$1,106.18	\$829.64	\$888.72
1559	32	GRAVEL ROAD EROSION	005-75700-00	C - Roads & Bridges	Small	\$9,220.86	\$6,915.65	\$7,336.12
1559	33	GRAVEL ROAD AND DITCH EROSION	005-75700-00	C - Roads & Bridges	Small	\$8,029.52	\$6,022.14	\$6,388.28
1559	34	GRAVEL ROAD EROSION	005-75700-00	C - Roads & Bridges	Small	\$12,807.68	\$9,605.76	\$10,189.79
1559	35	GRAVEL ROAD AND DITCH EROSION	005-75700-00	C - Roads & Bridges	Small	\$27,191.92	\$20,393.94	\$21,633.90
1559	36	GRAVEL ROAD AND DITCH EROSION	005-75700-00	C - Roads & Bridges	Small	\$10,892.00	\$8,169.00	\$8,665.67
1698	35	DEBRIS PICKUP	005-75700-00	A - Debris Removal	Small	\$2,481.23	\$1,860.92	\$1,974.07
1715	10	ORTON ROAD	005-75700-00	C - Roads & Bridges	Small	\$15,020.00	\$11,265.00	\$12,067.06
1790	195	Walden VT - Bayley Hazen Rd. TH12	005-75700-00	C - Roads & Bridges	Small	\$32,950.27	\$24,712.70	\$24,712.70
1790	204	1790 - Walden Cahoon Road	005-75700-00	C - Roads & Bridges	Small	\$16,578.46	\$12,433.85	\$12,433.85
1790	205	Walden VT - Houston Hill Rd. TH 38	005-75700-00	C - Roads & Bridges	Small	\$6,688.50	\$5,016.38	\$5,016.38
4001	23	WEM Walden - Davidson Dr - TH48	005-75700-00	C - Roads & Bridges	Small	\$8,887.84	\$6,665.88	\$6,665.88
4001	37	WEM - Rock Road - TH18	005-75700-00	C - Roads & Bridges	Small	\$8,477.68	\$6,358.26	\$6,358.26
4001	41	WEM - Old Duke Road TH16 - Class 4	005-75700-00	C - Roads & Bridges	Small	\$1,581.50	\$1,186.13	\$1,186.13

4022	46	MOWAC1 TH-2	005- 75700-00	C - Roads & Bridges	Small	\$4,018.3 2	\$3,616.49	\$3,616.49
4022	47	MOWAC2 TH-35	005- 75700-00	C - Roads & Bridges	Small	\$3,097.1 8	\$2,787.47	\$2,787.47
4022	48	MOWAC3 TH-4	005- 75700-00	C - Roads & Bridges	Small	\$24,505. 93	\$22,055.34	\$22,055.34
4022	49	MOWAC4 TH-18	005- 75700-00	C - Roads & Bridges	Small	\$14,969. 66	\$13,472.70	\$13,472.70
4022	50	MOWAC5 TH-28	005- 75700-00	C - Roads & Bridges	Small	\$1,476.7 4	\$1,329.07	\$1,329.07
4022	55	MOWAC6T H-37	005- 75700-00	C - Roads & Bridges	Small	\$1,253.8 1	\$1,128.43	\$1,128.43
4022	703	MOWAC7 Br-19 on Coles Pond Road (Th 49, Class 4)	005- 75700-00	C - Roads & Bridges	Large	\$238,544 .48	\$214,690.0 3	\$214,690.03
4022	707	MOWAC8 Br-21	005- 75700-00	C - Roads & Bridges	Large	\$100,949 .00	\$90,854.10	\$90,854.10

Sources: Town Records, Project Worksheets, financial report forms and award letters.

Non-Declared Disaster Summary:

As with any municipality, maintaining transportation routes through road, bridge and culvert repair and replacement is ongoing and requires fiscal, environmental, communication and engineering planning to be successful. The work accomplished in Walden since 2005 was not directly related the goals of the previously approved plan but as result of both the normal operations of the town and its experience in assessing and maintaining safe transportation routes.

3.4 Future Events

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, which was subsequently reviewed and revised by town officials in the fall 2015. This analysis assigns numerical values to a hazard's affected area, expected consequences and probability. 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. 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:

1. Health and Safety Consequences

2. Property Damage
3. Environmental Damage
4. Economic Disruption

Probability of Occurrence: Scored from 1-5, estimates the anticipated frequency of occurrence.

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.

3.4.1. Natural Hazards

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

- Severe Winter Storm (32)
- Flooding (30)
- High Winds (18)
- Extreme Cold (16)

Flooding remains the most likely event to incur the most cost for the town based on historical analysis and disaster declaration-related funding since 2004 has all been a result of severe rain storms. Given the magnitude of damage to such few areas during DR 4001, the realization that a major flooding event can result in major expense is evident, lending support that that flooding is likely to have a significant impact over a smaller area while a severe winter storm tends to affect the entire town. As with most Vermont towns, there is almost an inherent resilience to winter weather events because they are expected. However, as severity increases and consequences mount (e.g. power outage, road closures, etc.), the risk for health and safety also increases. High wind and lightning events happen and have the potential to disrupt functionality of the town but the town is not at any increased risk in comparison to other areas of the state but the sum area impacted and probability of occurrence raise these two events in the hazard analysis methodology.

Table 3-3: Natural hazards risk estimation matrix

Walden, VT Hazard & Risk Analysis: NATURAL HAZARDS		Drought	Flooding	High Winds	Fluvial Erosion	Landslide	Lightning	Multi-Structure Urban Fire	Wildfire	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	3	3	2	0	0	1	1	4	4	3
Consequences											
<i>Health & Safety Consequences</i>											
Key:	0 = No health and safety impact										
	1 = Few injuries or illnesses										
	2 = Few fatalities or illnesses										
	3 = Numerous fatalities	1	1	1	1	1	1	1	1	1	1
<i>Property Damage</i>											
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	4	1	2	2
<i>Environmental Damage</i>											
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	0	0	0	1	2	0	0
<i>Economic Disruption</i>											
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	2	1	1	2
Sum of Area & Consequence Scores		7	10	6	3	3	4	9	9	8	8
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	3	3	1	1	2	1	1	4	2
TOTAL RISK RATING											
	Total Risk Rating =										
	Sum of Area & Consequence Scores	7	30	18	3	3	8	9	9	32	16
	x Probability of Occurrence										

Hazard Summary

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

1. Flooding
2. Severe Winter Storm
3. High Winds
4. Extreme Cold

It should be noted that the natural hazards listed above could be the cause of power loss and a major transportation incident, where-by making these vulnerabilities additional considerations. Regardless of causation, power loss and a major transportation incident pose risk to the town and will be considered potential hazards despite their potential association with other hazards. Flooding and a severe winter storm are the highest rated hazards for Walden, due in large part to their widespread nature and frequent occurrence. A severe winter storm is expected and while the town is well-equipped to handle winter storms, the resilience of its residents is dependent on effective town emergency planning when intervention strategies are required.

SECTION 4: VULNERABILITY ASSESSMENT

Vulnerability refers to the potential impact of a specific loss related to an identified risk. Walden is a small town with very few buildings aside from residential. While the loss of any one facility would cause a disruption in town services and operations, the vulnerability is low. There are roads, bridges and culverts vulnerable to flooding and those are identified below.

Flood Vulnerability

Flooding is the most common recurring hazard event in the state of Vermont and Walden is at risk of flooding with the most susceptible area in the southeast corner of the town and two of its bridges (BR-19 and 21) were destroyed during DR 4022. 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 Walden. 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 to Walden 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 downtown 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 records for the town occurred in May 30th, 2011 at 6.47”. The following chart provides the history of recent PA funding related to flooding events in Walden. While this

does not reflect the total impact of flooding on the town, PA funding history does provide a reference for vulnerable areas in the town and those areas will be addressed.

Table 4.1: Bulk PA Funding as a Result of Flooding in Walden since 2002

Disaster Number	Declaration Date	Incident Type	State	Applicant Name	Number of Projects	Federal Share Obligated
1428	07/12/2002	Severe Storm(s)	Vermont	WALDEN (TOWN OF)	6	\$9,682.53
1559	09/23/2004	Severe Storm(s)	Vermont	WALDEN (TOWN OF)	5	\$51,106.49
1698	05/04/2007	Severe Storm(s)	Vermont	WALDEN (TOWN OF)	1	\$1,860.92
1715	08/03/2007	Severe Storm(s)	Vermont	WALDEN (TOWN OF)	1	\$11,265.00
1790	09/12/2008	Severe Storm(s)	Vermont	WALDEN (TOWN OF)	3	\$42,162.93
4001	07/08/2011	Severe Storm(s)	Vermont	WALDEN (TOWN OF)	3	\$14,210.27
4022	09/01/2011	Hurricane	Vermont	WALDEN (TOWN OF)	8	\$349,933.63

Source: FEMA

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 Caledonia 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 28.2%, 69.2%, or 2.6%, respectively (*Source: A Risk-Based Flood-Planning Strategy for Vermont’s Roadway Network, 2015*).

Critical Facilities

The Center for Disaster Management and Humanitarian Assistance defines critical facilities as: “Those structures critical to the operation of a community and the key installations of the economic sector.” Table 4-1 identifies critical facilities in Walden, excluding critical facilities designated as hazardous materials storage sites.

Table 4-1: Critical facilities in the Town of Walden

Facility Type	Number of Facilities
----------------------	-----------------------------

Education Facility	1
Fire Station	1
Emergency Shelters	2
Emergency Operations Center	1
Government	1

The vulnerability of the town’s critical facilities is very low based on historical occurrence of damage.

4.2 Infrastructure

4.2.1. Town Highways

The following is a statistical overview of roads in the Town of Walden. These tables show the range of road types within the town, from highways to unpaved roads. The different road types have different hazard vulnerabilities. Unpaved roads are more vulnerable to being washed out in a flood or heavy storm, while traffic incidents are more likely to occur on large, arterial roads.

Table 4-3: Town highway mileage by class, Town of Walden

Class 1			Class 2	Class 3	Class 4	State Hwy	Fed Hwy	Interstate	Total 1, 2, 3, State Hwy
0			9.14	32.78	0	7.164	0	0	49.084

4.2.2. Bridges, Culverts, and Dams

Bridges:

Scour is by far the primary cause of bridge failures in the United States. Regionally, the vulnerability of bridges to flood damage became evident from the damage seen to Vermont bridges in the 2011 Tropical Storm Irene. Successfully mitigating scour-related problems associated with bridges depends on the ability to reliably estimate scour potential, design effective scour prevention and countermeasures, design safe and economical foundation elements accounting for scour potential, and design reliable and economically feasible monitoring systems. (*Scour Damage to Vermont Bridges and Scour Monitoring: UVM Transportation Research Center Report 15-002 June 10, 2015*).

There are seven bridges in the town:

1. Bayley Hazen Road
2. Orton Road #1
3. Orton Road #2
4. Stannard Road

5. Noyesville Road
6. Rock Bridge
7. Coles Pond Road

Unfortunately, information on the condition rating for these bridges was not available during the development of this plan. Bridges are expensive and DR4022 proved to impact town bridges with the greatest financial severity.

Culverts:

The latest culvert inventory for the town was completed in 2011 as part of a student project. That inventory reports 362 culverts in the town. While vtculverts.org is the main source for culvert and bridge inventories in the state, rating importance and condition, Walden has not updated with the state at the time of this plan. The town does, however, have its own Culvert Monitoring Program that averages 10-15 culvert upgrades per year and this program has resulted in enhanced infrastructure resilience for the town.

Dams:

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.” The town has no dams aside from some beaver dams that do not pose a significant risk for the town.

Water, Wastewater and Natural Gas Service Areas

The town currently has no water, wastewater or natural gas service areas. Water and sewer systems are the sole responsibility of the property owner and they are required to meet state and federal regulatory standards. Vulnerability is low for the town.

Electric Power Transmission Lines and Telecommunications Land Lines

High-tension electric transmission lines run through the town and although risk of failure is a hazard. Vulnerability for the town resides in its remote location and potential delay in power company crews arriving to repair during weather related outages. There has been significant outages, lasting six days for some customers.

4.3 Estimating Potential Losses in Designated Hazard Areas

Walden is not mapped and therefore it is not possible to make an estimation. In regards to town roads, losses can and have been substantial. With a dedicated federal obligation of \$350,000 to repair damages incurred during DR4022, the town’s entire yearly road budget could be exhausted with one event, especially one that impacts a bridge. Fortunately, the town has no repetitive loss properties.

4.4 Land Use and Development Trends Related to Mitigation

The town has no zoning regulations and does not intend to in the near future. It does stand to reason that the town is aware of higher risk areas and would certainly utilize this knowledge in any plan to develop or relocate its structures but this event is not foreseen in the near or distant future.

4.4.1. Future Development and Housing

The town welcomes future development but there have been no recorded increases in development since 2005, therefore, no perceived change in vulnerability. The town does not monitor or regulate development. While the town does not anticipate significant new buildings or infrastructure development in the next planning cycle, the town does not have the resources, political will or community support to limit new development in hazard areas. However, it will consider a “No Adverse Impact” methodology when opportunity arises to discuss the potential of new structure development.

4.4.2. Housing

Walden has a significant percentage of its housing stock in the form of mobile homes. Evidence supports that there is increased risk for damage or destruction for mobile homes during a natural disaster in comparison to other housing stock (*2012 ACCD Resilience Plan for Mobile Homes*). But without zoning regulations, the town can only serve as a conduit for mitigation-related resources for mobile home occupants.

4.4.3. Roads

The town has listed the following recommendations regarding future town road plans

- No new construction of roads is necessary
- The present classification system should remain as is, and there should not be any up grading of classifications

The town has identified the following sites as priority in its 2016 Road Erosion Site Inventory:

- Orton Bridge #1: Concrete Bridge with old guard rail giving way/culvert upgrade needed
- Noyesville and Maple Lane: Intersection has severe mud problem/road improvement needed
- Stevens Brook has one lane bridge with no room to pull off on roads leading to bridge/road needs widening and paving
- Richards Crossing: water backs up due to undersized culvert/requires culvert upsize
- Rock Road: water comes over road from brook/ditching and fill required
- Bayley Hazen at 15: 50 ft. of pavement required

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 Walden Town Goals and Policies that support Hazard Mitigation

5.1.1. Flood Resilience Goals:

- a. Continue supporting state standards with local, POS water/sewer sources.
- b. Take advantage of the UVM/ACCD mobile home park preparedness programs to support resiliency of this disproportionately impacted population during disasters.
- c. Consider implementation of special population tracking within the community whereby 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. Mitigate Walden's flood hazards in the most cost-effective manner possible.
- e. Ensure the Town and its facilities are prepared to meet the demands of the next flood.
- f. Ensure the Town can receive the maximum outside assistance in the event of the next Federally declared disaster.

5.1.2. Capital Improvement Goals

- a. Provide services and facilities deemed necessary for the orderly and rational development of the Town.
- b. Assure that the Highway Department has enough funding to fulfill the goals of the following year and in adjunct, increase awareness on eligibility requirements for infrastructure projects under the Hazard Mitigation Grant Program (HMGP).

- c. Continue to meet or exceed 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.
- d. Update the Town's transportation infrastructure information in the Vermont Online Bridge and Culvert Inventory Tool (vtculverts.org).
- e. Replace undersized and failing culverts.

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 LEPC meetings, drills and exercises to increase awareness, enhance planning and promote resilience in the community.

5.1.4. Regulatory Devices Goals

- a. The town has opted to not have zoning regulations and considers this in their best interest.

5.1.5. Land Use

- a. Follow recommendations associated with a "No Adverse Impact" methodology in land use decisions.
- b. Employ institutional awareness when considering development or relocation of town property.

5.1.6. Natural Resources

a. With recent FEMA guidance on Climate Resilient Mitigation Actions funded under the HMA program, the town will incorporate recommendations accordingly. 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 town 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

b. 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

5.1.6. Policies

a. Through both town and state-level management, work to:

- Encourage and maintain naturally vegetated shorelines, buffers and setbacks for all rivers, ponds and streams
- Reduce flood hazard and repetitive road and driveway washout through continued updates and adherence to the Culvert Monitoring Program and Road Erosion Site Inventory
- Identify and manage pollution, flooding and fluvial erosion hazards along rivers and streams as they arise

5.1.7. Transportation

In adjunct to town-specific planning, the town is 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 to keep traffic at appropriate speeds and timely maintenance, 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.
- e. Ensuring that owners and managers of recreational areas provide and maintain adequate and safe parking facilities.
- f. Continuing long term access opportunities to gravel and sand deposits for future road maintenance use.
- g. Continue to enhance understanding of the Incident Command Structure (ICS) as means to achieving enhanced communications during a response phase where significant increases in highway department responsibilities are required.
- h. Using ICS as a foundation, develop a Standard Operating Procedure for enhanced Highway Department activity (snow and/or flood related) that details the relationship and responsibilities of the Road Commission (Selectboard), Road Foreman and employees that is based on best practices and needs through a collaborative effort.

Additionally, the town will work towards implementation of a formal tracking mechanism by-which all infrastructure work is accounted for on a site-by-site basis. The purpose of this is to open funding possibilities under the HMGP.

5.1.8. Utilities and Facilities Goals

- a. Maintain current relationships with the Vermont State Police and rescue for police and emergency medical services, respectively.
- b. Identify effective locations for tanker truck access to water in portions of town that currently do not have adequate supplies.
- c. Promote high-speed internet access throughout town to assist and encourage local businesses to reside in Walden.
- d. Identify resources/grant programs that can serve to enhance the equipment resiliency of the fire department.

5.1.9.1 Educational Facilities

- a. 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.

5.2 Existing Town of Walden Actions that Support Hazard Mitigation

The town has done an excellent job at monitoring and addressing transportation issues, engaging in a documented and systematic approach to mitigation actions. The town has successfully pursued funding to address needs as evidenced by the Total Highway Fund Revenue for 2015 at \$543,047 (\$257,585.00 from taxes) and a proposed 2016 general highway maintenance fund of \$201,500, of which, \$63,000 is proposed for the Bayley Hazen culvert, Coles Pond Bridge and Rock Road Culvert projects. Using Better Back Roads, Structures Grants, FEMA funding streams and its own resources, the town has been able to enhance its transportation resilience and overall preparedness. By and large, road improvement projects remain the primary focus for the town and the areas identified in the 2016 Road Erosion Site Inventory were selected based on the condition of culverts and ditches and primarily focused on runoff and drainage issues particularly as the incidence of heavy storms has increased. For additional work, the town will seek local, state and federal resources to address these sites systematically and as new priorities arise in the next five years. Along these lines, the town has a certificate of compliance with Road and Bridge Standards that meet or exceed requirements (4/2015). The town has updated its Local Emergency Operations Plan. Table 5-1 further identifies existing mitigation actions with suggestions for next steps, when applicable.

Table 5-1: Existing municipal actions that support hazard mitigation

Type of Existing Protection	Description /Details/Comments	Issues or Concerns
Emergency Response		
Police Services	Vermont State Police/ Caledonia County Sherriff	None at this time
Fire Services	Walden VFD	None at this time
Fire Department Personnel	Walden VFD	Proper training to respond to major highway accidents that may involve hazardous substances.
Fire Department Mutual Aid Agreements	Northeast International Mutual Aid (19 participants)	None at this time
EMS Services	Walden fast squad	Consider outreach or a community advisory board to increase perceptions and scopes of service to residents. Continue coordination with State EMS recommendations and initiatives.
Other Municipal Services		
Highway Services	Town Highway Department	ICS training. Establish SOP with Road Commission in times of heightened response
Highway personnel	3 FTE field personnel	
Water / Sewer Department	None	None at this time
Planning and Zoning personnel	no	None at this time
Residential Building Code / Inspection	no	None at this time

Emergency Plans		
Local Emergency Operations Plan (LEOP)	2015	Assure sheltering plans and contact information are up to date and vulnerable populations addressed.
School Emergency/Evacuation Plan(s)	2015	Increased collaboration (with town staff, LEPC, NVDA), knowledge of roles and drills are next step. Investigate logistics of using school notification for all-hazard notification.
Municipal HAZMAT Plan	None	Not required but enhanced knowledge via HMEP funded transportation study through LEPC would benefit town and fire.
Shelter, Primary	Walden School	Work with ARC with Sheltering Initiative to obtain training and supplies. Include volunteer staff in planning communication and schedule drills to test efficacy.
Replacement Power, backup generator	Yes, installed	None at this time
Shelter, Secondary:	no	
Replacement Power, backup generator		
Municipal Plans		
Town / Municipal Comprehensive Plan	no	
Town of Walden Culvert Monitoring Program	2016	Update as required and track all work expenditures.
Hazard Specific Zoning (slope, wetland, conservation, industrial, etc.)	none	
Participation in National Flood Insurance Program (NFIP) and Floodplain/Flood Hazard Area Ordinance	no	Continue best practices and a no-adverse-impact policy approach to development.
Culvert and bridge Inventory	2011	VT Culverts site needs to be populated and up to date.

5.3 Town of Walden All-Hazards Mitigation Goals

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 other municipal operations and procedures as described in 24 VSA, Section 4403(5).
7. Develop a mechanism for formal incorporation of this Local All-Hazards Mitigation Plan particularly the recommended mitigation actions, into the town's operating and capital plans & programs as they relate to public facilities and infrastructure. Town Meeting Day will serve as the formal time that mitigation strategy budgetary considerations will be approved and incorporated into the town budget.
8. Support long-term solutions over short-term fixes to community needs and problems
9. Promote collaboration and cooperation through working partnerships between governments, non-profits, institutions, and businesses

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. While the town does not anticipate significant new buildings or infrastructure development in the next planning cycle, the town does not have the resources, political will or community support to limit new development in hazard areas. However, it will consider a "No Adverse Impact" methodology when opportunity arises to discuss the potential of new structure development. 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 and Need for Mitigation Actions

Generally, the Town considers its existing capabilities are adequate to address the identified priority hazards in this Plan.

Priority Hazard Narrative:

- 1) Severe Winter Storm – 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. An SOP in addition to current Winter Operations Emergency Plan could benefit the operational capacity of both the Road Commission and Highway Department in addition to building institutional awareness of the principles of ICS and adhering to this structure as deemed necessary in events exceeding normal operations.
- 2) Flooding – Major infrastructure that has seen repeated damage due to flooding is a concern. Highway Department functionality could benefit the operational capacity of both the Road Commission and Highway Department in addition to building institutional awareness of the principles of ICS and adhering to this structure as deemed necessary in events exceeding normal operations. Continuing the culvert monitoring program and road erosion site inventory will allow the town a formal path to planning for and revising infrastructure most at risk and/or most critical.
- 3) Extreme Cold – Recent cold snaps, coupled with social and technological vulnerabilities such as an aging community, unemployment and power failure are indicative of the need to address this hazard. Of all hazards, this poses the greatest potential threat to health and safety.
- 4) High Winds – High winds are common in the region and can cause major damage and disruptions in transportation and power/telecommunication lines. Readiness of highway department to triage a wide spread event becomes the best mitigation effort at this time.

Vulnerabilities:

- 1) Major Transportation Incidents – The town is concerned about a transportation-related chemical spill in addition to capabilities of fire department and rescue to adequately respond. With the availability of Hazardous Materials Emergency Preparedness (HMEP) funding available to the local LEPC, there is an opportunity to learn more about what types of chemicals are being transported through the town and what response mechanisms may need to be in place. Investigation of funding opportunities and training to support emergency services are needed.

- 2) Power Loss – The private service provider which owns and operates the electric utility is responsible for restoring service. Tree trimming and vegetation management, coupled with maintaining adequate repair vehicles and personnel are the primary means of mitigation.

5.4.2. Prioritization of Mitigation Strategies

Descriptions of specific projects, where available, are listed in Section 5.5.3 and in Table 5-2 below. Because of the difficulties in quantifying benefits and costs, it was necessary to utilize a simple “*Action Evaluation and Prioritization Matrix*” in order to effect a simple prioritization of the mitigation actions identified by the town. 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?

The ranking of these criteria is largely based on best available information and best judgment, as many projects are not fully scoped out at this time. The highest possible score is 45.

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.

Table 5-2: Walden Action Evaluation and Prioritization Matrix

Rank	Mitigation Action	Responds to high hazard	Funding potential	Protection value	Time to implement	Social and Political acceptance	Technical feasibility	Admin feasibility	Benefit to Cost	Environmental advantage	TOTAL
2	Improve highway, culvert and bridge programs and infrastructure.	5	4	5	3	5	5	4	5	4	40
3	Improve resilience to severe winter storms	4	4	5	4	5	3	3	5	2	39
7	Reduce risk and impact of extreme cold snaps	2	2	3	2	3	2	2	3	3	22
4	Increase resilience of mobile homes through accepted structural modifications and resident awareness of programs and opportunities	4	5	5	4	5	3	3	5	4	38
5	Mitigate high wind vulnerability	2	3	3	3	5	1	1	5	1	24
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

5.4.3. Specific Mitigation Actions

Action #1: Improve highway, culvert and bridge programs and infrastructure.

Group: SP, NRP, PP

Lead Responsible Entity: Town of Walden Road Foreman and Selectboard

Potential Partner Entities: Vermont Agency of Natural Resources; Vermont Agency of Transportation; NVDA, DEMHS, FEMA and the Agency of Commerce and Community Development

Timeframe: 2017-2022

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. The town has established a Culvert Monitoring Program and Road Erosion Site Inventory that serves to guide action by identifying areas of road erosion, estimated costs of repair and future needs.

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) Infrastructure Assessment for Fluvial Erosion/Landslide Vulnerability – Funding and staff resources permitting, assess the operational capability and vulnerability of municipal-owned roads, culverts, bridges and other infrastructure to fluvial erosion of varying severity as determined by Strategy #1 above.
- 3) Culvert Upgrades - Upgrade culverts and ditching along various roads to mitigate against repeated damages from storm water or spring snowmelt.
- 4) Continued Monitoring of Vulnerable Infrastructure - Monitor various bridges and culvert locations that have erosion and scouring concerns.
- 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. Specific projects include:
 - Orton Bridge #1: Concrete Bridge with old guard rail giving way/culvert upgrade needed
 - Noyesville and Maple Lane: Intersection has severe mud problem/road improvement needed

- Stevens Brook has one lane bridge with no room to pull off on roads leading to bridge/road needs widening and paving
 - Richards Crossing: water backs up due to undersized culvert/requires culvert upsize
 - Rock Road: water comes over road from brook/ditching and fill required
 - Bayley Hazen at 15: 50 ft. of pavement required
- 6) Documenting – Develop a methodology that serves to efficiently capture work and expenditures on sites and keep this information at the town office.
 - 7) Increase Awareness of Funding Opportunities - Increase understanding of FEMA’s HMGP program so that this potential funding source can be utilized.
 - 8) 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.

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 (e.g. clayboils). 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 Walden selectboard, planning commission and highway department

Potential Partner Entities: LEPC, Walden Fire Chief, ARC’s Sheltering Initiative Program, Trans

Timeframe: 2017-2022

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. Walden Elementary School has been identified as the primary emergency shelter. The school does have an emergency generator. 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 road foreman and electric company related to down-limbed induced power failure. 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) Continue to 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
- 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 risk and impact of extreme cold durations

Group: PEA, PP, SP

Risk or Hazard Addressed: Risk to infrastructure, livestock and residents

Primary Responsible Entities: Town of Walden Selectboard and planning commission, NVDA, Walden School, local/regional assistance organizations.

Potential Partner Entities: Vermont DMEHS, LEPC

Timeframe: 2017 – 2022

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 relationships with utility companies to offer special arrangements for paying heating bills, 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: Increase resilience of mobile homes through accepted structural modifications and resident awareness of programs and opportunities

Group: PP, PEA, SP

Primary Responsible Entities: Town of Walden, NVDA

Timeframe: 2017-2022

Funding Requirements and Sources: Implementation through existing programs, contingent on available resources and funding.

Specific Identified Tasks:

- 1) Collect recommendations from both UVM and ACCD programs devoted to MH resilience
- 2) Develop outreach mechanism that serves to address needs, resources and agencies that can assist the resident and/or owner of the MH. Develop and/or acquire informational brochure regarding accepted mitigation actions specific to mobile homes (e.g. anchoring home and fuel tanks, elevating electric and furnaces, etc.) and distribute to residents in most economical way. UVM program and ACCD have the recommendations and information to use
- 3) Work with NVDA to map all mobile homes in the town and use this map to assess flood risk, create risk ranking and gauge outreach accordingly

Rationale / Cost-Benefit Review:

Research in Vermont has proven that mobile homes are disproportionately impacted during disasters. The high percentage of mobile homes in the town provides requires efforts to protect these structures to the greatest degree possible. In doing so, the town is taking steps to protect its tax base as well as its residents.

Action #5: Raise public awareness of hazards and hazard mitigation actions

Group: PEA

Status: Ongoing

Lead Responsible Entities: Town of Walden, Walden Fire Chief, LEPC, NVDA.

Timeframe: 2017 –2022

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. In addition, the Fire Department annually conducts fire preparedness programs and school and family programs related to hazard awareness and disaster preparedness, including providing information at Town Meeting. 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 watersystem 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: Reduce vulnerability to high wind events with accepted best practices

Group:

Lead Responsible Entities: Walden Planning Commission, Fire Chief, NVDA.

Timeframe: 2017 –2022

Specific Identified Tasks:

1. Developing and maintaining a database to track community vulnerability to severe wind: Use GIS to map areas that are at risk to the wind hazard associated with different non-hurricane conditions and identify concentrations of at-risk structures. Create a severe wind scenario to estimate potential loss of life and injuries, the types of potential damage, and existing vulnerabilities within a community to develop severe wind mitigation priorities.
2. Establish standards for all utilities regarding tree pruning around line: Incorporate inspection and management of hazardous trees into the drainage system maintenance process. Support and suggest the testing of power line holes to determine if they are rotting. Support the inspection of utility poles to ensure they meet specifications and are wind resistant. When feasible, support burying power lines to provide uninterrupted power after severe winds. Avoid use of aerial extensions to water, sewer, and gas lines

when possible. Support use of designed-failure mode for power line design to allow lines to fall or fail in small sections rather than as a complete system to enable faster restoration.

3. **Public Outreach:** Ensure that school and hospital officials are aware of the best area of refuge in buildings and that their plans are viable in high wind mitigation events. Instruct property owners on how to properly install temporary window coverings before a storm. Support education to design professionals to include wind mitigation during building design/modification to an extent deemed necessary.

Rationale / Cost-Benefit Review:

High winds have impacted the city and do pose a risk for infrastructure, transportation and public safety. Many mitigation actions associated with high wind risk also address and reduce risk associated with other hazards affecting the city and maintaining the functionality of the city is not only important for the city and its residents but for the region as well.

Action #7: Continue fluvial geomorphology assessments in collaboration with DEC and develop strategies and regulatory actions in response to identified risks

Group: P, NRP, PEA, PP

Status: Ongoing

Primary Responsible Entities: Department of Environmental Conservation, NVDA, Agency of Natural Resources (VT ANR), Town of Walden.

Potential Partner Entities: Nonprofits, other Town of Walden officials, and other appropriate entities.

Timeframe: 2016–2021

Progress: 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 Walden. 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 Walden. 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.

5.5 Implementation and Monitoring of Mitigation Strategies

5.5.1. Public Involvement Following Plan Approval

After adoption, the town will continue to maintain presence of the mitigation plan with an opportunity for community input available on its website (Town site within NVDA’s site). 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 chair is the project lead and will work in conjunction with the Selectboard, 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 Chair
- 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, Town Clerk and Road Foreman but also the community at large. 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 Chair and Town Clerk. 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 Walden 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 Selectboard 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. The following table is intended to aid municipal officials in implementing the mitigation actions for Walden, and to facilitate the annual monitoring of the plan.

5.5.6. Integration of Plan into Other Planning Mechanisms

The previously approved mitigation plan did not see any integration into the town's operations or planning procedures. The town does not have a town plan and does not anticipate the creation of one during the next planning cycle. The most important integration process for the town is to include the defined infrastructure project costs into its formal budgeting process and the town will accomplish this by reserving mandatory consideration of all mitigation actions for each fiscal year of the planning cycle and budget accordingly. With town meeting serving as a formal planning mechanism, the town will formally incorporate mitigation efforts and reporting for its annual report. Additionally, the town will assure that school safety plans, and emergency operations plans include relevant integration on a yearly basis.

Table 5-3: Walden All-Hazards Mitigation Plan Implementation Matrix

Regarding the mitigation actions outlined in the previously approved plan, they town does not include them in the following matrix because they were too general and are either a reflection of normal operations for the town or are no longer considered acceptable mitigation activities (e.g. preparedness).

Instructions: At each annual update, the following chart should be edited to reflect the progress of that year so that when the next update is required, there will be 5 charts (2018, 2019, 2020, 2021, 2022), one for each annual update.

2017 Hazard Mitigation Action Implementation Matrix					
Action	Primary Responsible Entity	Timeframe	Task	Brief Description	Progress
Continue fluvial geomorphology assessments and develop strategies in response to identified risk.	VT DEC, TransCanada, NVDA, VT ANR	Spring 2019-Fall 2022	Fluvial Geomorphic Assessments and assessment-based mapping/action	Continue Phase I and Phase II fluvial geomorphic assessments on streams and waterways in Walden.	DEC has a comprehensive and interactive database for Basin 15 and TransCanada has done some of this work in the past that the town can build from.
	NVDA, VT ANR	Spring 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.	none
	Planning Commission and Selectboard	Spring -summer 2019	River Corridor Management Plans	Where Phase I and II assessments are complete, develop River Corridor Management awareness	The town opts for no zoning but understanding that river corridor mapping and planning is suggested

	Walden Planning Commission	January-October 2018	Fluvial Erosion Hazard Mitigation Implementation	Develop strategies to mitigate losses from identified fluvial erosion hazards.	Major infrastructure enhancement has occurred as result of DR4022
Evaluate capabilities of existing road and storm water management infrastructure. Continue and improve highway, culvert and bridge maintenance programs.	Road Foreman, Commission	January 2017- Winter 2022	Infrastructure Assessment for Storm water Vulnerability	Assess the vulnerability and operational capability of municipal roads, culverts and storm water infrastructure.	Town has developed a culvert monitoring program to address problems, priority and estimated budget. With great institutional memory of town infrastructure, the highway department is well-equipped to assess, monitor and prioritize needs.
	Road Foreman, Commission	Spring 2018- Fall 2019	Infrastructure Assessment for Fluvial Erosion/Landslide Vulnerability	Assess the vulnerability and operational capability of municipal roads, culverts, bridges and other infrastructure to fluvial erosion.	Road and Bridge Standards met as of 4/2015
	Road Foreman	Spring 2017- Fall 2022	Culvert Upgrades	Upgrade culverts and ditching along roads to mitigate against repeated damages from storm water or spring snowmelt.	VTCULVERTS.ORG Culvert and Bridge Inventory has not been populated. Town has a functioning culvert monitoring program that addresses problem, priority and estimated budget.

Action	Primary Responsible Entity	Timeframe	Task	Brief Description	Progress
continued	Selectboard, Road Foreman	Winter- spring 2018	Develop SOP for emergency events	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.
	Road Foreman	January 2018- Spring 2022	Road Improvements and tracking system	Consider re-engineering certain road sections to lower overall maintenance costs, improve snow plowing speeds and improve overall capability of roads to handle current and projected traffic volumes. Develop process by which all Highway Department actions and expenses are documented.	

	Road Foreman	Spring-fall 2018	Erosion/Landslide Mitigation	Undertake erosion or landslide mitigation projects where roads regularly incur damage from adjacent rivers/streams and hillsides.	
Maintain and improve resilience to severe winter storms and extreme cold durations	Emergency Management Director selectboard	Fall-winter 2018	Maintain and Improve Existing Shelter Capability	Maintain and improve on capabilities of existing emergency shelter capability, including emergency generator functionality	Explore other sheltering options and secure funding for emergency power if required. Use Red Cross sheltering initiative to acquire supplies and training
	Road Foreman	Spring 2018-Winter 2019	Assure optimal snow response and removal capabilities Reduce risk of power failure due to ice storms: Notification: Residential Programs: Continue to monitor roads for safe and effective plowing:	Through operational measures, work to improve response and efficiency with best practices in previous snow emergencies. Enhance collaboration between town road foreman and electric company related to down-limbed induced power failure. Maintain function of generators. Develop a notification/communication plan that conveys essential sheltering logistics pre-event 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.) 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	Current road foreman has been with town long enough to understand the subtle characteristics and logistics of responding to major snow/ice events.

Extreme Cold			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.	
	Planning commission and Selectboard	Spring 2018-Fall 2019	Economic Resilience Assess Vulnerable Population	Establish relationships with utility companies to offer special arrangements for paying heating bills, 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. 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.	

Action	Primary Responsible Entity	Timeline	Task	Brief Description	Progress
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Increase resilience of mobile homes through accepted structural modifications and resident awareness of programs and opportunities	Emergency Management Director, Walden Fire Chief	September 2018-September 2019	Outreach	Develop and/or acquire informational brochure regarding accepted mitigation actions specific to mobile homes (e.g. anchoring home and fuel tanks, elevating electric and furnaces, etc.) and distribute to residents in most economical way. UVM program and ACCD have the recommendations and information to use	new
	NVDA planners,	March – May 2018	Mapping	Work with NVDA to map all mobile homes in the town and use this map to assess flood risk, create risk ranking and gauge outreach accordingly	new
Reduce vulnerability to high wind events with accepted best practices	Selectboard and Road Foreman	June 2018-December 2022	<p>Developing and maintaining a database to track community vulnerability to severe wind:</p> <p>Create a severe wind scenario to estimate potential loss of life and injuries</p> <p>Establish standards for all utilities regarding tree pruning around line</p> <p>Support and suggest the testing</p>	<p>Use GIS to map areas that are at risk to the wind hazard associated with different non-hurricane conditions and identify concentrations of at-risk structures.</p> <p>Learn the types of potential damage, and existing vulnerabilities to develop severe wind mitigation priorities.</p> <p>Incorporate inspection and management of hazardous trees into the drainage system maintenance process.</p> <p>Avoid use of aerial extensions to water, sewer, and gas lines when</p>	new

			<p>of power line holes to determine if they are rotting. Support the inspection of utility poles to ensure they meet specifications and are wind resistant.</p> <p>Public Outreach:</p>	<p>possible. Support use of designed-failure mode for power line design to allow lines to fall or fail in small sections rather than as a complete system to enable faster restoration.</p> <p>Ensure that school and hospital officials are aware of the best area of refuge in buildings and that their plans are viable in high wind mitigation events. Instruct property owners on how to properly install temporary window coverings before a storm. Support education to design professionals to include wind mitigation during building design/modification to an extent deemed necessary</p>	
Raise public awareness of hazards, hazard mitigation and disaster preparedness.	Emergency Management Director; Walden Fire Chief	March 2018-December 2022	<p>Hazard Resilience for Property Owners</p> <p>HMGP Awareness:</p>	<p>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.).</p> <p>Attend informational sessions on the HMGP funding opportunities for acquisition, elevation and</p>	new

			<p>School Programs:</p> <p>Family Programs:</p> <p>Fire Prevention Programs:</p> <p>Other hazard awareness programs:</p>	<p>flood-proofing projects. Work with NVDA to develop an information brochure for residents.</p> <p>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.</p> <p>Continue family programs, such as car safety seat and bike safety programs, to raise family awareness of hazards, safety, preparedness and prevention.</p> <p>Continue National Fire Prevention Week and other programs to raise public awareness of fire hazards, safety, preparedness and prevention.</p> <p>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</p>	
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APPENDICES

Appendix A: Community Reports (Flood Ready Vermont)

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

Note: Appendices A, B not included in state submission or for FEMA review

