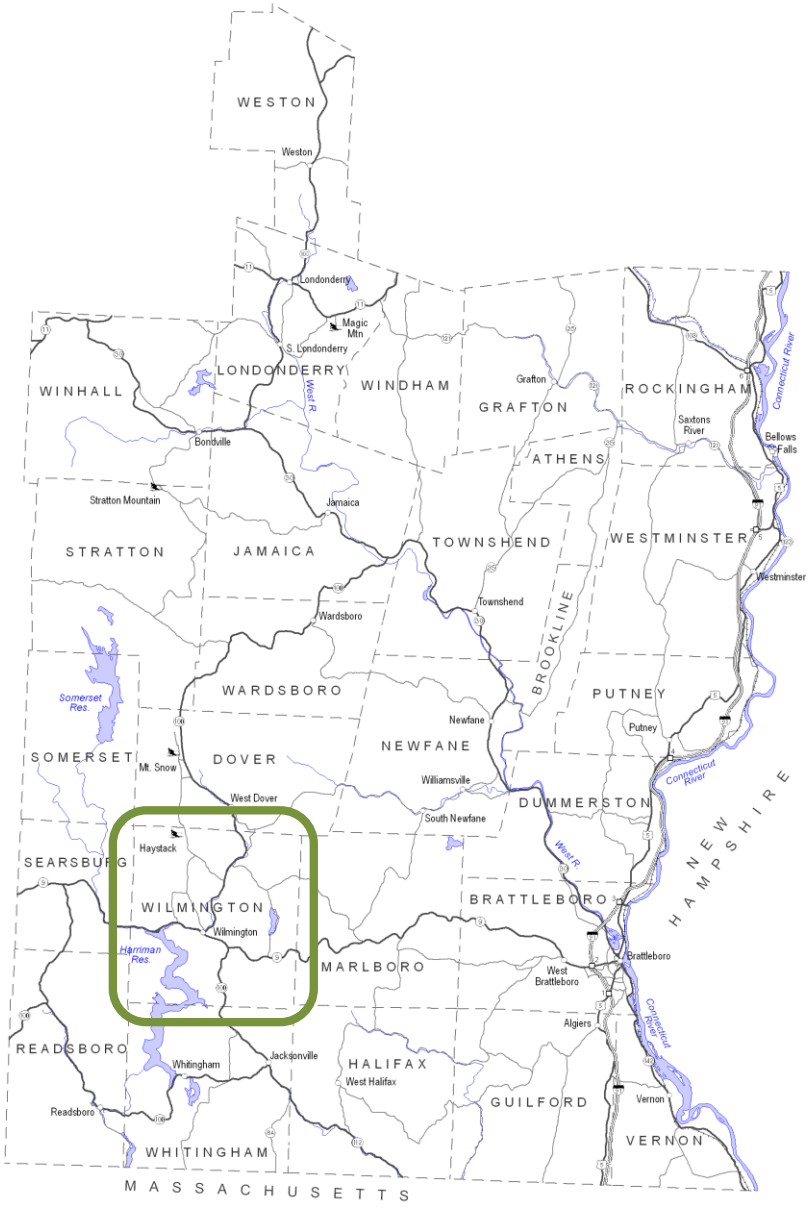
Town of Wilmington
Local Hazard Mitigation Plan



Town Adopted 7/21/2020
FEMA Final Approved 7/28/2020

Prepared for the Town of Wilmington
by the Windham Regional Commission

WINDHAM REGIONAL COMMISSION

Table of Contents

INTRODUCTION AND PURPOSE

This Single Jurisdiction Hazard Mitigation Plan is an UPDATE to a Plan approved by the Federal Emergency Management Agency (FEMA) effective January 23, 2015.

The purpose of this plan is to assist the Town of Wilmington in identifying all of the hazards facing the town and to identify new and continuing strategies to reduce long term risks from identified hazards.

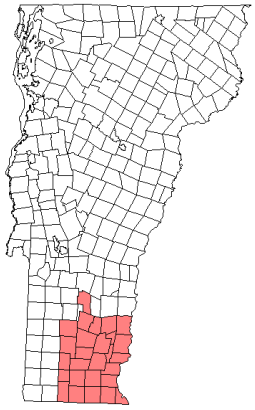
Hazard mitigation is any sustained action that reduces or eliminates risk to people and property from natural and human-caused hazards and their effects. Based on the results of previous project impact efforts, FEMA and state agencies have come to recognize that it is less expensive to prevent damage from disasters than to repeatedly repair damage after a disaster has struck. This plan recognizes that communities also 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 the hazards are most severe and identify what local actions can be taken to reduce the severity of hazard-related damage.

Hazard mitigation strategies and measures alter the hazard by: eliminating or reducing the frequency of occurrence; averting the hazard by redirecting the impact by means of a structure or land treatment; adapting to the hazard by modifying structures or standards; or avoiding the hazard by stopping or limiting development. Mitigation could include projects such as:

- Flood-proofing structures
- Tying down propane/fuel tanks in flood-prone areas
- Elevating furnaces and water heaters
- Identifying and modifying high traffic incident locations and routes
- Ensuring adequate water supply
- Elevating structures or utilities above flood levels
- Identifying and upgrading undersized culverts
- Planning for land use for floodplains and other flood-prone areas
- Proper road maintenance and construction
- Ensuring critical facilities are safely located
- Establishing and enforcing appropriate building codes
- Public information

WINDHAM REGION GEOGRAPHY

Situated in Vermont's southeastern corner, the Windham Region consists of 23 towns in Windham County, the neighboring towns of Readsboro, Searsburg, and Winhall in Bennington County, and Weston in Windsor County. The region is bordered by Massachusetts to the south and New Hampshire to the east. At over 920 square miles (590,000 acres), the region accounts for roughly 9.6% of the State's total land area. The Windham Region has several distinctive identities, largely defined by the diverse natural environment.

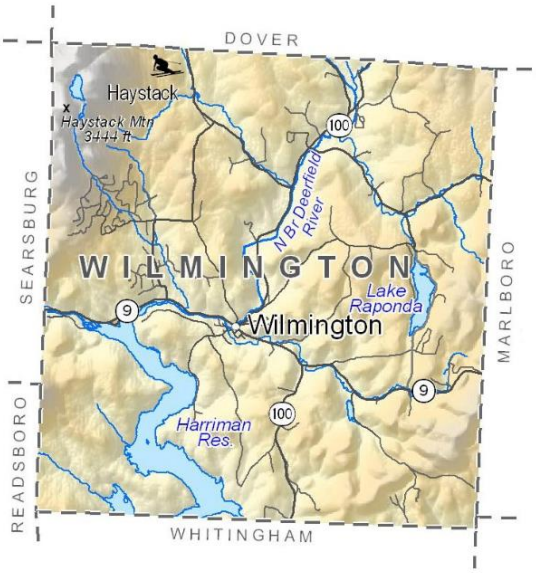


The Region's topography is relatively flat or gently rolling land in the Connecticut River valley in the east, while the western part of the region is characterized by the Green Mountain ridges and peaks with narrow

stream valleys. Stratton Mountain is the highest point in the region at 3,936 feet. The lowest point is along the Connecticut River in Vernon, at 200 feet.

In addition to the Connecticut, other major rivers of the region are the Deerfield, Green, North, Saxtons, West, and Williams, all tributaries of the Connecticut. There are two major flood control reservoirs on the West River, Ball Mountain and Townshend, and two major storage reservoirs for hydropower generation on the Deerfield River, Somerset and Harriman.

WILMINGTON GEOGRAPHY & TOWN PROFILE

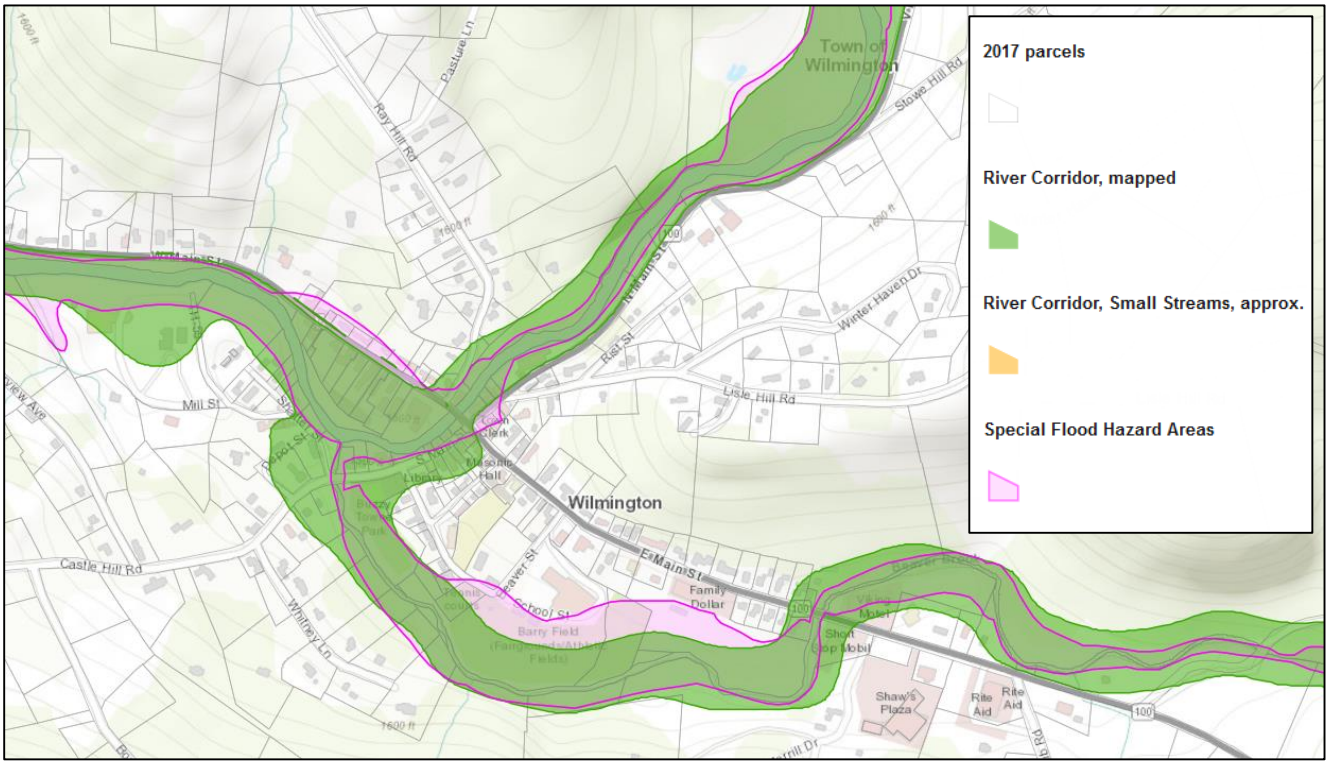


Wilmington has long been a tourist destination, with visitors drawn to the village and nearby ski resorts. It is located in the Deerfield Valley of the Green Mountains. The town is also home to Molly Stark State Park. The landscape of Wilmington is rolling and mountainous, with the highest elevations being located in the western portion of the Town. The highest and most visible feature of the landscape is the distinctive peak of Haystack Mountain, which has an elevation of 3,420 feet. Conversely, the lowest area is the surface of Harriman Reservoir whose variable level is at about 1,500 feet in elevation. The local vertical relief in Wilmington is about 1900 feet, much of which is quite steep with slopes greater than 15%. The Reservoir, which extends southward into Whitingham, is the result of the Harriman Dam, built in 1923 as part of a hydroelectric power project. Wilmington is 41.3 square miles in size, or 26,432 acres, and is primarily drained to the south by the North Branch of the Deerfield River and the Deerfield River/Harriman Reservoir.

Historically, the development and primary travel corridors in Wilmington have occurred in the valleys and along the stream and river corridors, which is typical in the region. As slopes increase, the buildability tends to become more difficult, especially historically, which along with access to water, is why development patterns tend to be in valleys and near streams. Much of the historic development patterns remains in southern Vermont, leading to vulnerabilities to flooding in some low lying areas and along certain travel corridors. It is the dominance of the Deerfield River, with its adjacent fertile floodplain, that allows the whole region to be known as “The Valley”. The Town of Wilmington is laced with many waterways, including the North Branch Deerfield River, Meadow Brook, Rose Brook, Haystack Brook, Hall Brook, Ellis Brook, Beaver Brook, Negus Brook and Wilder Brook, which divide the Town into a branching group of hills and ridges of considerable relief. The Village itself is situated at the confluence of the Beaver Brook, and its valley from the east, and the North Branch of the Deerfield River, with its Deerfield Valley from the north.

The center of Wilmington Village in Wilmington is a major crossroads of two state highways, Route 9 goes east to west and Route 100 goes north to south, following Route 9 for a distance until veering north in the center of the Village. The built environment constricts the tight intersection of the two highways leading to traffic congestion at certain times. This intersection is also the main route to the Mount Snow Ski Area, in Dover, for anyone traveling from the south.

A typical weekend in winter has traffic backed up for a mile from the east, and as far back as the Dover town line to the north. The bottleneck creates an emergency response problem for the Fire Department. Alternatives have been considered for traffic mitigation for the intersection, but so far none have been agreed upon or pursued. The Village functions as the center of Town government, public services, and community affairs. The Village is an area of clustered mixed land use containing residential, commercial, professional, institutional, municipal, recreational, and cultural uses and activities. There is a greater density of dwellings (including multifamily dwellings) found in Wilmington Village compared to outlying lands.



The map above shows not only the intersection in the center of the Village, but the floodplain and the river corridor in the Village area. One should note the proximity of the North Branch of the Deerfield River to Main Street/Route 100 North. According to the EMD/Fire Chief, flood protocol is declared for the Town on an average three times a year. Flood protocol entails closing flood doors to all buildings in the floodplain (or near the River), moving cars, moving dumpsters, and shutting down all propane tanks. During Tropical Storm Irene (August 28, 2011), the entire downtown Village area experienced inundation flooding from the North Branch of the Deerfield River.

Lands in public ownership consist of the Green Mountain National Forest, Molly Stark State Park, Wilmington Town Forest and Glebe land. Much of the remaining land provides important recreational and scenic resource in the Town, as it is commonly used for hunting and fishing, cross country skiing, snowmobiling, hiking, and other outdoor activities.

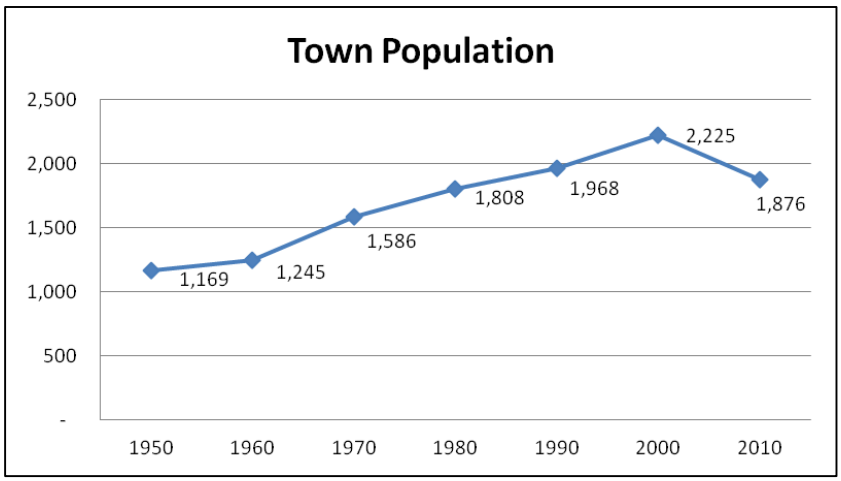
Residential land use occupies the outlying areas in the Town, is random in its settlement pattern, and is predominantly single-family dwellings. Many home occupations and cottage industries are associated with permanent residences. Seasonal dwellings account for 62% of the housing stock, and although many are concentrated at or near Haystack Resort, along the

shores of Lake Raponda, near Harriman Reservoir, or in the Chimney Hill development. There are lesser concentrations throughout the Town. Commercial and industrial land use is located in the Village and along Route 9 and Route 100 approaching the Village. A large concentration of commercial development is located along both sides of Route 100 from the intersection of Higley Hill Road north to the intersection of East Dover Road. A smaller concentration is located along Route 100 near the Deerfield Valley Elementary School.

The climate is generally temperate with moderately cool summers and cold winters, as in the rest of Vermont. The weather is unpredictable, and large variations in temperature, precipitation, and other conditions may occur both within and between seasons.

Development Trends

Wilmington's population rose gradually between 1950 and 2000, and then fell by 16% between 2000 and 2010, from 2,225 to 1,876 people. The 2020 census is currently underway. Wilmington's population dynamics are similar compared with most other surrounding towns, as shown on the table here.



Town	1990	2000	2010	% Change 1990-2000	% Change 2000-2010
Wilmington	1,968	2,225	1,876	13%	-16%
Readsboro	762	805	763	6%	-5%
Searsburg	85	96	109	13%	14%
Dover	994	1,410	1,124	42%	-20%
Marlboro	924	978	1,078	6%	10%
Whitingham	1,177	1,298	1,357	10%	5%

There is very little new development on an annual basis. Wilmington sees a few development permits per year, mostly for residential rebuilds or upgrades.

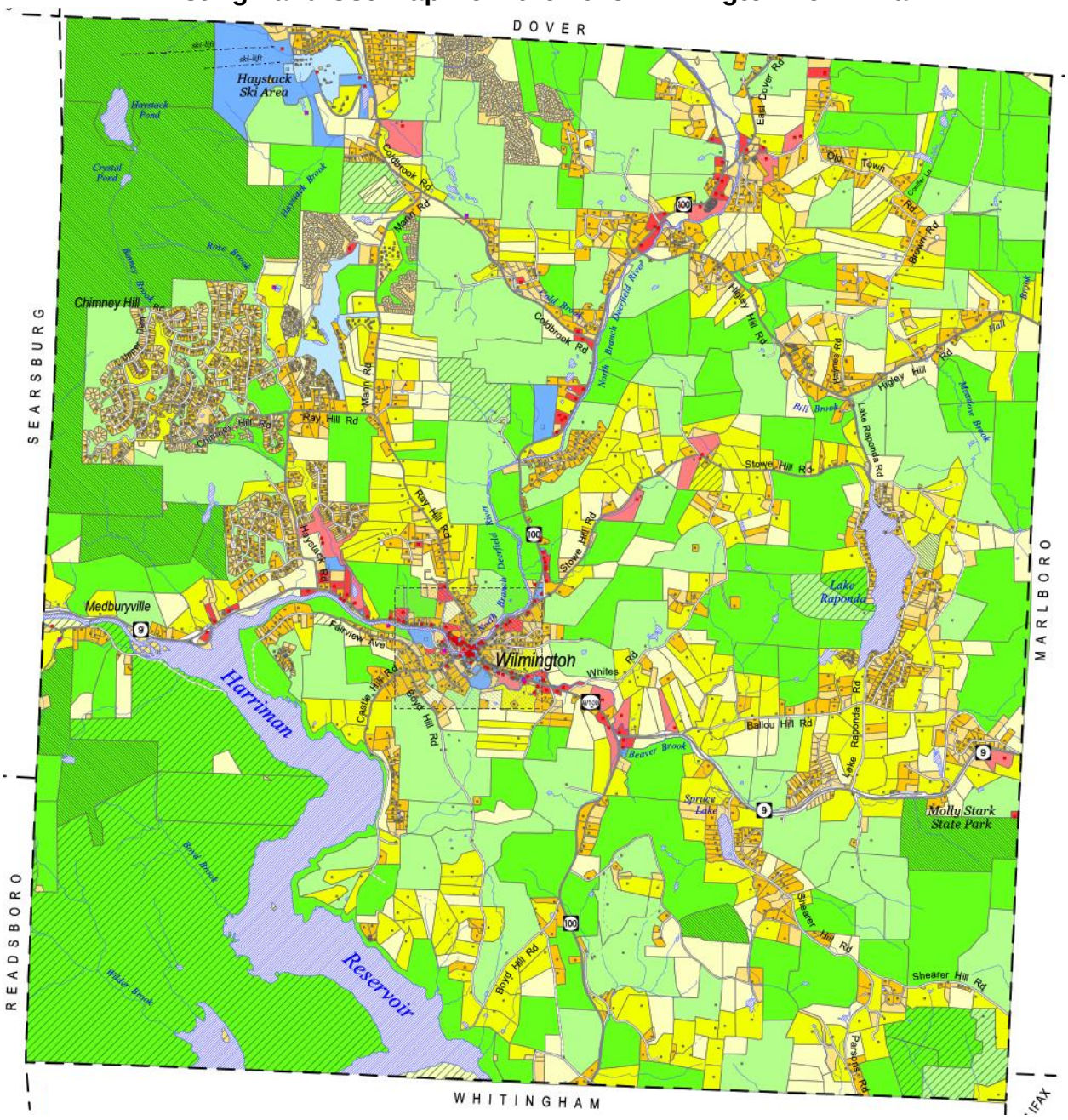
Emergency Services

The Emergency Management Director (EMD), who is appointed by the Selectboard, coordinates emergency preparedness and response for the Town. The EMD in Wilmington also happens to to be the Fire Chief. The Wilmington Volunteer Fire Department serves the Town and is composed of 30 firefighters, including the Chief. The Department serves the entire town and has mutual aid agreements with surrounding towns. There is a firehouse in the Village. Keene Mutual Aid serves as dispatch for the Department. As with many small town fire departments in Vermont, getting volunteer firefighters is difficult. The Wilmington Volunteer Fire Department makes all efforts to recruit volunteer fire-fighting personnel to protect Wilmington residents and visitors. Members attend training courses sponsored by Vermont Fire Academy and the various mutual aid associations. The Fire Department, Town Garage, Town Office, Road Crew and Police all have interoperable radios and are able to communicate within town vehicles to those out and about, but their handheld radios are on the same bandwidth. This presents an issue in areas, especially where cell coverage is spotty.

Emergency medical services are provided primarily by Deerfield Valley Rescue operating out of their Wilmington facility. Deerfield Valley Rescue is a non-profit organization funded through subscriptions and donations. Deerfield Valley Rescue provides numerous towns in the Deerfield Valley with ambulance service, medical care, transport to and from area hospitals and large regional hospitals. Wilmington has their own local police force for coverage, and they are aided by the Vermont State Police, as needed. The nearest hospital is either Bennington Hospital or Brattleboro Memorial Hospital depending where in town you are. Wilmington's primary designated emergency shelter is Wilmington Elementary School, which does not have a generator or a hookup. The secondary shelter at the Old School Enrichment Center does have a generator hookup and overnight sheltering capability. Twin Valley Elementary is the only school in the Town and also acts as the Local Emergency Operations Center when needed.

TS Irene underway in downtown Wilmington.
Photo courtesy of wilmingtonvtfloodrelief.com.

Existing Land Use Map from the 2018 Wilmington Town Plan



Parcel use:

size of parcel -	*small*	→ *large*	*small parcel size: < 6 acres*
intensity of use -	*high*	→ *low*	*large parcel size: > 27 acres*

commercial recreation

public services/cultural

industrial/utility

commercial (high density/small parcel) — commercial (low density/large parcel)

residential (higher density) — rural (very low density residential)

vacant residential — open land

PLANNING PROCESS

Town residents who took part in the planning process for developing the Local Hazard Mitigation Plan for Wilmington tend to be affiliated with more than one association for the town. In rural areas of Vermont, it is typical that people who are most interested in the safety, health and welfare of their community will participate on more than one board and may for example, hold the role of Fire Chief, or school teacher, or a small business owner, in addition to owning personal property in the town. Therefore, although the meeting may not have as many people in attendance as a more populated community would, those present at the meeting are representing not only a variety of roles, but many roles that would be held by numerous individuals in a more populated area.

Documentation of the Plan Update Process

This Single Jurisdiction Hazard Mitigation Plan is an UPDATE to a Plan approved by FEMA effective January 23, 2015.

The Town began the plan update process in November 2019. Alyssa Sabetto, Emergency Planner for the Windham Regional Commission met with a group of planning participants at two public meetings, as well as having separate conversations with the Zoning Administrator and the Road Foreman. The Hazard Mitigation Planning participants convened on November 29th and December 3rd of 2019 in Wilmington to provide input into the plan update. They met with Alyssa at the Wilmington Town Hall. The Zoning Administrator directly invited town officials and the general public was informed through the normal means the town uses to advertise all public meetings, which included an advertisement on the town website and at all normal posting locations in Town. Each meeting lasted for 2-3 hours. Over the course of the meetings the group completed and discussed:

- a review of the 2015 Hazard Mitigation Plan and discussion of progress made on identified actions, and progress made that was not a mitigation action in the 2015 Plan;
- review of hazard events and discussion of events that have occurred since 2015;
- Review of the 2015 hazard analysis and an update on what hazards the town would like this Plan to focus on. This involved completing the updated hazard analysis table as a group;
- Review of the mitigation goals of the Town set out in the 2015 Plan, and a discussion about update of those goals and any change in mitigation priorities in the Town;

- review of mapping of the town to note where hazard events are causing repeated or large scale damage;

- update of development changes in the Town since 2015, and how those changes impact vulnerability in the Town; and

- development of updated mitigation actions table, which includes maintaining of some of the incomplete mitigation actions from the 2015 Plan

Alyssa updated the plan to meet the current standards and guidelines of FEMA for hazard mitigation plans. She took the information from the public meetings, along with follow-up information gathered in conversations with the Emergency Management Director and the Zoning Administrator. Alyssa also reviewed and utilized the data sources noted and cited throughout this plan to gather further information. The draft was presented for internal town review by the Committee, town personnel, Planning Commission and Selectboard on May 18, 2020. This internal town review period was from May 18-June 1. Comments and corrections, were received back. Alyssa made the revisions and corrections to finalize the draft for public comment.

The revised draft plan was put out for public comment on June 4, 2020. This was done by posting an electronic copy on the town website[1] and providing a mailed hard copy of the plan available to those that can't access website. Flyers were posted around town advertising its availability for review and comment. No comments were received from the public during the two-week comment period. It was simultaneously distributed to the adjacent towns of: Marlboro, Whitingham, Dover, Readsboro, Searsburg, and Halifax, for comment via email.[2] No comments received back. The plan was finalized by Alyssa Sabetto for submittal to Vermont Emergency Management (VEM). This submittal allows VEM to make suggested revisions on the draft, and allows for any revisions to be made before the final draft is submitted to the Federal Emergency Management Agency Region 1 (FEMA) for review.

The following people were involved in the hazard mitigation planning process in one or more meetings:

Contributors	Affiliations	Home
Scott Tucker	Wilmington Town Manager	Works in Wilmington
Meg Staloff	Wilmington Planning Commission	Wilmington
John Lazelle	Wilmington Wastewater Works	Wilmington
John Lebron	Wilmington Planning Commission	Wilmington
Mike Tuller	Zoning Admin, Health Officer, WRC Commissioner	Works in Wilmington
Gretchen Havreluk	Economic Development Consultant for Wilmington	Whitingham
Heidi Taylor	Deerfield Valley Rescue	Wilmington
Angela Yakovleff	Wilmington Planning Commission	Wilmington

[1] See appendix 9.
[2] See appendix 2.

Sheldon Brassor	Wilmington Highway Department, Road Foreman	Wilmington
Cheryl LaFlamme	Wilmington Planning Commission, Chair Wilmington Development Review Board, Chair Wilmington Beautification Committee, Chair	Wilmington
Matt Murano	Wilmington Police Chief	Searsburg
Tom Fitzgerald	Wilmington Selectboard, Chair	Wilmington
Scott Moore	Wilmington Fire Chief and EMD	Wilmington
Erik Tjornhum, Jr.	Public	Wilmington
Alyssa Sabetto	Windham Regional Commission, Plan Developer	Brattleboro

Public Involvement and Input from Neighboring Communities

Making the Wilmington Hazard Mitigation Plan available for public comment included the following efforts:

- All of the meetings discussed in the above sections were advertised and open to the public.[3]
- The Hazard Mitigation Planning participants convened two times on October 29th and December 3rd for public meetings to provide input into the plan update.
- Alyssa had numerous follow-up calls with the Zoning Administrator, Road Foreman and the Emergency Management Director to gather details for the Plan.
- A draft of the plan was posted from June 4-18, 2020 on the town website for public comment.[4]
- Flyers were put up around town for public comment on the draft.[5]
- On June 4, 2019, an invitation was extended via email to neighboring towns to provide a means and opportunity to review and comment on the draft Wilmington Hazard Mitigation Plan.[6] No comments were received. Inter-town communication will repeat for future revisions of this Plan.

RISK ASSESSMENT

The risk assessment portion of a Hazard Mitigation Plan contributes to the decision-making process for allocating available resources to mitigation projects. 44 CFR Part 201.6(c)(2) of FEMA's mitigation planning regulations requires local municipalities to provide sufficient hazard and risk information from which to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

Methodology

A **vulnerability analysis** for each community begins with an inventory of possible hazards and an assessment of the risk that they pose. These are the questions to be answered. What hazards can affect your community? How bad can it get? What is the likelihood of future events

[3] See appendix 8.
[4] See appendix 3.
[5] See appendix 3.
[6] See appendix 2.

occurring? What areas of your town are most vulnerable to these hazards? How does climate change impact your town currently and what are you worried about for future impacts? Information collected from the core planning team went into this vulnerability assessment to identify the hazards the town feels most vulnerable to.

The following table is the scale used to rank each hazard that is analyzed:

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

Potential impact is considered and scored separately for impacts to infrastructure, life, economy and the environment. Additionally, seasonal patterns that may exist are considered, what areas are likely to be affected most, the probable duration of the hazard, the speed of onset (amount of warning time, considered with existing warning systems).

The combination of the impact scores for infrastructure, life, economy and environment, along with the probability (frequency of occurrence) score are used determine the hazard ranking score for each hazard. This score was used to determine which hazards the plan would address.

While all hazards were considered by the Hazard Mitigation Planning participants for inclusion in this plan, it is not feasible to study each in depth. For hazards that are not profiled in this plan, the reader is directed to the Vermont State Hazard Mitigation Plan. The rationale for not addressing all of the hazards is that Wilmington has a low level of risk associated with them and/or the town does not choose to mitigate for them at this time. This plan will only focus on the hazards that Wilmington has decided are pertinent to their community and they have chosen to mitigate for at this time which are Fluvial Erosion, Inundation Flooding and Invasive Species. The below table shows the hazards in terms of their hazard ranking score as determined by the Hazard Mitigation Planning participants.

HAZARD ASSESSMENT								
		Potential Impact						
Possible Hazard	**Probability**	Infrastructure	Life	Economy	Environment	**Average:**	**Score:**	**Most vulnerable facilities and populations**
Inundation Flooding	4	3	2	3	3	3	11	Ice jam flooding on the Deerfield River is a hazard for the downtown; Beaver Brook is also prone to ice jams; there is annual spring flooding that generally isn't severe, and there are the occasional large floods. TS Irene caused significant damage in the downtown.
Fluvial Erosion	4	3	2	2	2	2	9	Isolated concerns in specific areas discussed in this plan; inundation and fluvial flooding occur together in Wilmington. If they get one, they always get the other.
Invasive Species	4	2	1	2	2	1.75	7	Japanese knotweed is a big concern. Lake Raponda is at risk for invasives and is closely monitored. The town has received reports from residents about invasive plants in the town ROWs. Lake Harriman Reservoir study underway now to check for aquatic invasives.
Ice	2	3	2	2	2	2.25	5	Ice causing downed trees and power outages is the concern. December 2008 ice storm caused lot of damage and lengthy outage. Route 9 is susceptible to ice.

Possible Hazard	Probability	Infrastructure	Life	Economy	Environment	Average:	Score:	Most vulnerable facilities and populations
Cold	4	1	1	1	1	1	4	Power outages are the primary concern during cold weather.
Snow	3	1	2	1	1	1.25	4	The town is generally able to keep on top of snow events. Advance warnings are always there.
Wind	3	1	1	1	1	1	3	
Hail	2	1	2	1	1	1.25	3	Not much agriculture at risk from hail.
Drought	2	1	2	1	1	1.25	3	
Wildfire	2	1	1	1	1	1	2	Brush fires are very occasional.
Landslides	1	1	1	1	1	1	1	No significant concerns, some areas of minor impact.
Heat	1	1	1	1	1	1	1	
Infectious Disease Outbreak	1	1	1	1	1	1	1	Twin Valley Elementary School has a high vaccination rate.
Earthquake	1	1	1	1	1	1	1	

The above table shows vulnerability to some natural hazards that Wilmington, at this point in time, doesn't feel the risk posed by these hazards is high enough to justify the cost to further mitigate for them. The Town has chosen to focus this Plan on Fluvial Erosion, Inundation Flooding and Invasive Species. In the prior Wilmington Local Hazard Mitigation Plan, adopted in 2014, the Town focused on flooding, severe winter storms, high winds, landslides (which was considered only in terms of fluvial erosion and wildfires. These hazards were all considered as part of the hazard assessment for this current Plan. Though the Town feels somewhat vulnerable to Ice, they manage trees as much as is possible within their own power and jurisdiction to mitigate for and they have a local Green Mountain Power office to communicate with during power outages. Drought, landslides, and wildfire do pose some risk to Wilmington, but not enough that they feel the need to mitigate for these hazards at the current time. Fluvial erosion will address what the prior plan addressed under landslides. Wilmington is accustomed to Cold and Snow, along with the fact that their emergency shelter equips them to handle anyone who might lose power and need a warm place to get shelter. Heat, infectious disease outbreak, hail and earthquake are not hazards that Wilmington feels pose enough risk to consider mitigation. Current methods of handling most hazards are deemed adequate at this time, though the town may choose to address these hazards in the future.

Identifying and Profiling Hazards

The following sections include a narrative with a Description, Geographic Area of the Hazard, Impact, Extent, Probability, and discussion of Past Occurrences of three natural hazards affecting Wilmington.

Flooding and Fluvial Erosion

Flooding Description

Flooding is the most widespread and destructive hazard in the United States. Flooding has also been the most common and costly hazard to affect Wilmington. Flooding can occur anytime of the year as a result of heavy rains, thunderstorms, tropical storms, hurricanes or Nor'easters. It can result from the overflow of major rivers and their smaller tributaries, or inadequate local drainage. Historically, floods have been a factor in over 80 percent of all federally declared disasters. People living in close proximity to bodies of water such as rivers, lakes, and streams are at greater risk from flooding than those not living in the floodplain. There is a 26 percent chance of experiencing a flood during the life of a 30-year mortgage compared to a 4 percent chance of a fire. Wilmington has an NFIP compliant floodplain ordinance, which gives residents access to discount flood insurance and enables the Town to regulate development within the Special Flood Hazard Area (SFHA). SFHAs are subject to inundation by the 1% annual chance flood (100-year flood). Maps of these areas can be found at the Town Office or online at the FEMA Map Service Center.[7] The primary FEMA mapped SFHA runs along Route 9 for nearly the entire extent through Wilmington and Route 100 between the Village and the Dover town line.

2011 TS Irene inundation flooding at the Village center, building in center of photo is the Town Hall and Police Department. Photo taken by Amber Bartlett.

Fluvial Erosion Description

Much of the destruction from flooding in Wilmington is due to fluvial erosion rather than inundation, which is the type of flooding targeted in FEMA mapping. Fluvial erosion is the destruction of river banks caused by the movement of rivers and

[7] https://msc.fema.gov/portal

streams, when stream power overcomes resistance of bed and bank material. This can range from gradual bank erosion to catastrophic changes in river channel location and dimension during flood events. This occurs when the stream has more energy than is needed to transport its sediment load, due to channel alterations or runoff events that increase water speed in the channel, leading to erosion.

Fluvial erosion along a roadway in Wilmington after TS Irene in 2011. Photo courtesy of wilmingtonvtfloodrelief.com.

Gravity and water power are the forces driving fluvial erosion. Factors that allow the force of gravity to overcome the resistance of earth material to erosion include: saturation by water, steepening of slopes by erosion or construction, alternate freezing or thawing, removal of trees and other vegetation and earthquake shaking. Major erosion events are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompany these events. Associated issues in Wilmington are related to road cutting and bank erosion for the most part, areas where roads have been built between steep slopes on one side of the road, and slopes to a river or brook on the opposite side. Existing homes are dotted on the landscape along these roads which have existed for 200 years or more, so cannot be easily closed or relocated.

This shows the real connection of river and road during TS Irene, as the river reclaims its floodplain, edging in on the road. Photo courtesy of wilmingtonvtfloodrelief.com.

The historic road network of many Vermont towns and villages typically follows waterways. This historic settlement pattern creates vulnerability for the road network, infrastructure and development within and along what are called River Corridors. River Corridor mapping was released by the Vermont Agency of Natural Resources in

early December 2014; small stream mapping was released in January 2016. This mapping delineates fluvial erosion hazard areas and includes a 50-foot buffer beyond those designated areas. For small streams, a 50-foot buffer from top-of-bank on either side of the waterway constitutes the River Corridor. This mapping can assist municipalities in developing bylaws and effective mitigation strategies to regulate development within fluvial erosion hazard zones. Wilmington does not currently have a fluvial erosion bylaw.

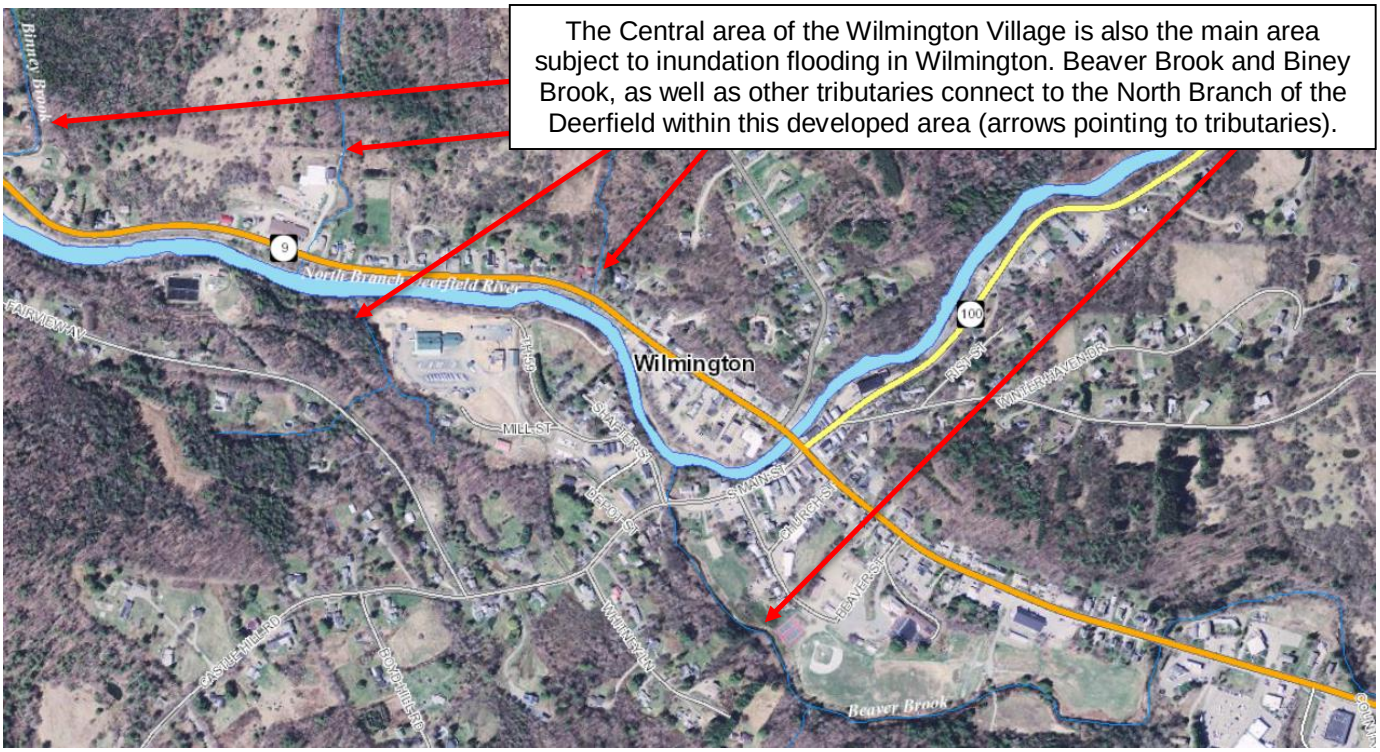
2011 Tropical Storm Irene caused fluvial erosion took out this bridge and caused extensive bank erosion here in Wilmington. Photo courtesy of wilmingtonvtfloodrelief.com.

Bends in the river are prone to movement as part of natural river processes, and their movements can be even more dramatic when manmade impacts and development upstream impinges on these natural stabilizing forces. The interaction of the natural and unnaturally dramatic forces of river movement, combined with the stationary location of the closely located roads is what leads to road damages during heavy weather events. Property owners outside of the FEMA floodplain can purchase flood insurance at a lesser expense, and it still covers damages resulting from fluvial erosion in events that damage multiple properties.

Impact of Flooding and Fluvial Erosion

The Village area as well as Route 100 along the North Branch of the Deerfield River have seen some of the most recent and severe damage from flooding and fluvial erosion. Due to their

proximity to the Deerfield River and the number of tributaries that converge in the downtown area, flash floods can potentially cause severe flood damage in this area.



The Central area of the Wilmington Village is also the main area subject to inundation flooding in Wilmington. Beaver Brook and Biney Brook, as well as other tributaries connect to the North Branch of the Deerfield within this developed area (arrows pointing to tributaries).

Due to the historic development patterns in Wilmington, with the main transportation routes following the waterway, much of the built environment is also located in this hazardous area or along tributaries to Beaver Brook or the North Branch of the Deerfield River. The tributaries are generally in mapped River Corridors, and because of the terrain, are more subject to fluvial erosion than rising and standing flooding such as is more common in wide lowlands. Wilmington was heavily impacted by the most recent large storm in memory, Tropical Storm Irene in 2011. In addition to the major flooding in the downtown area, Wilmington was entirely cut off via Route 9 which was closed in Marlboro. The National Guard actually had to do water drops for the Town because the sewer and water systems were overwhelmed and contaminated by the flooding and the town was trapped. Issues on Route 9 create a vulnerability for Wilmington from a variety of natural hazards.

There are flooding issues behind Viking Inn in the downtown area. Roadways in floodplains and undersized bridges and culverts are a big cause of stream instability generally, not just in Wilmington. A waterway that is constrained is unable to reach geomorphic equilibrium which increases flooding in that area and puts increased pressure and larger flood loads on upstream and downstream sections, as well as causing more flooding damage. A river is in geomorphic equilibrium when its water, energy, sediment, and debris are in balance. In this condition a river is neither building up sediment in the channel nor losing sediment from its bed. Importantly, a river in equilibrium has not become overly deep and can continue to overflow onto its floodplains. The water that spills onto the floodplain slows down, and the velocity of the water still in the channel does not become excessively powerful. Mitigation actions are intended to assist with achieving greater equilibrium which will also lessen or even eliminate flooding levels and damages to buildings and infrastructure. Historic development patterns limit or complicate mitigation in some areas.

Flash floods typically occur in high elevation drainage areas as a result of summer thunderstorm activity. Drainage ditches and culverts are the biggest concern for local flash flooding events. Other areas of concern during flooding events are homes located along small brooks throughout town that are subject to rise during quick flash flooding events.

Ice jam flooding is fairly common in the early springtime, generally around March. The heavy rainfall, combined with runoff from snowmelt due to the mild temperatures, results in flooding of rivers, streams and creeks, mainly from the formation of ice jams. There are some ice jams on Beaver Brook but mitigation options are limited as they are on private property. The Town does work with the dam owner Great River Hydro when flood events are warned to lower the Harriman Reservoir level to accommodate flood waters and protect the downtown from flooding. Great River Hydro also lowers the lake level every October before winter sets in in an effort to abate ice jams. The Town says that communication is effective with the dam owner.

Route 9 was cut off during TS Irene in 2011 due to fluvial erosion.

Extent

The extent of a flood event can vary from a minor event due to a typical rain event or could be a major event as a result of rapid snow melt in spring, rain on frozen ground, or as a result of a tropical depression or storm. The extent of flooding is such that brooks may breach their banks and flow onto land and down roads. Wilmington had the most infrastructure damage of any town in Vermont resulting from TS Irene. While recovery has come a long way, the flood and its

effects still impact the lives of nearly everyone in Wilmington, either directly or through the memories of the damage.

The highest recorded measurement on the North River at the nearest stream gauge to Wilmington (at Shattuckville, MA) was 18.17 feet, which was measured on August 28. 2011 during TS Irene. According to the National Weather Service flood stage at that gauge is 9 feet.[8]

Extent for thunderstorms/heavy rain events: The tables below shows the top 10 rain events at two former USGS weather monitoring stations nearby to Wilmington, that also have significant periods of record. Two stations are used to give a lengthier period of record. This table shows that TS Irene in 2011 was the seventh highest 1-day precipitation value between 1930 and 2012, based on these station data. Most stations take their observations in the morning (7 and 8am are the most common times), so the precipitation would have fallen between 7am on the previous date to 7 am on the date listed in the table.

Maximum 1-Day Total Precipitation[9] for Searsburg, VT		
Rank	Value (inches)	Ending Date
1	8.98	1949-01-01
2	8.27	1938-09-22
3	7.33	1948-12-31
4	6.51	1984-05-31
5	6.37	1990-08-07
6	6.27	1949-01-02
7	6.10	1955-08-14
8	6.07	1990-08-08
9	5.83	1935-07-09
10	5.72	1990-08-06
Period of record: 1930-05-01 to 1998-07-31		

Maximum 1-Day Total Precipitation[10] for West Wardsboro, VT		
Rank	Value (inches)	Ending Date
1	6.22	8/29/2011
2	4.75	9/17/1999
3	4.55	7/16/2000
4	4.42	10/9/2005
5	4.22	7/14/1996
6	4	3/14/1993

[8] USGS Stream gauge 01169000 North River at Shattuckville, MA (76 years of record) http://waterwatch.usgs.gov/index.php.
[9] Data provided by the NOAA, Northeast Regional Climate Center at Cornell University. http://www.nrcc.cornell.edu/. 10/10/18.
[10] Data provided by the NOAA, Northeast Regional Climate Center at Cornell University. http://www.nrcc.cornell.edu/. 10/10/18.

7	3.86	9/28/1985
8	3.85	10/1/2010
9	3.7	4/16/2007
10	3.69	8/7/1990
Period of record: 1978-09-01 to 2012-03-31		

To give context to this data, the "Precipitation Frequency Estimates" table below allows one to determine the event frequency based on the rainfall amount. This table puts Irene (24-hour value) at between a 50 and 100-year event for Wilmington. It is important to remember that precipitation levels vary throughout the region.

The table below is specific for Wilmington, and has the values associated with the size of an event in order to determine the storm frequency[11]. This is for reference. Wilmington should consider what size event is reasonable to set standards to build to, for both infrastructure and buildings. Some experts advise that towns should be using the 10 year one hour or two-hour frequency estimates to reflect the monsoon type storms that are seen in the region. Infrastructure built for 24 hour events often can't keep up with high intensity storms leading to erosion and street flooding. This should be a consideration in the future.

PRECIPITATION FREQUENCY ESTIMATES (in inches)										
Freq (yr)	5-min	10-min	15-min	30-min	60-min	120-min	3-hr	6-hr	12-hr	24-hr
1	0.27	0.41	0.51	0.67	0.84	1.05	1.21	1.53	1.92	2.43
2	0.32	0.49	0.61	0.81	1.02	1.28	1.48	1.85	2.3	2.88
5	0.38	0.59	0.74	0.99	1.27	1.61	1.86	2.32	2.88	3.56
10	0.43	0.67	0.85	1.15	1.5	1.92	2.22	2.77	3.42	4.19
25	0.51	0.81	1.03	1.41	1.88	2.41	2.8	3.49	4.28	5.2
50	0.57	0.91	1.17	1.65	2.23	2.89	3.36	4.17	5.09	6.13
100	0.66	1.06	1.37	1.94	2.64	3.44	4	4.95	6.02	7.22
200	0.75	1.22	1.58	2.27	3.14	4.1	4.78	5.9	7.14	8.52
500	0.91	1.49	1.94	2.82	3.94	5.16	6.02	7.42	8.94	10.6

Extent of Fluvial Erosion

Rose Brook, where it runs along the edge of Haystack Road, is a continual concern for fluvial erosion because it is so close to the road. The Road Foreman said that there hasn't been repairs needed in this area in the past several years, but the Brook did damage the Road during TS Irene.

Instances of fluvial erosion in Wilmington are all smaller in scale and gradual events. The Road Foreman could not note any single instance or location of the largest fluvial erosion concern in Town.

Probability of Flooding and Fluvial Erosion

Flooding is highly likely, as determined by the number of past events and the local knowledge of the Hazard Mitigation Planning Committee. There are events every year, especially during

[11] Northeast Regional Climate Center Extreme Precipitation estimates (inches): Wilmington, VT <http://precip.eas.cornell.edu/> accessed 3/3/20.

spring snow melt and late summer season rains. Flash flooding is a locally probable event, with flash floods typically occurring in summer months. Higher-elevation drainage areas and streams are particularly susceptible to flash floods, which plan participants noted are more common.

Fluvial erosion is highly likely and exists in Wilmington, especially due to the damage caused by TS Irene in 2011, where fluvial erosion hazard flooding de-stabilized many steep-sloped areas and washed out riparian zones next to roads and streams. Fluvial erosion is directly associated with flooding and large scale rain events and spring snow melt. Inundation flooding events are also a hazard in Wilmington, especially in the downtown. With areas of high elevation drainage, Wilmington is subject to flash flood events that erode stream banks and adjacent areas. There are events every year, especially during spring snow melt and late summer season rains.

Past Occurrences

Since 1996, when National Climatic Data Center detailed records start, there have been 41 flood events in Windham County, Vermont. Wilmington experiences routine spring flooding, but this is not always documented. There have been 16 Presidential Disaster Declarations in Windham County since 1953. Of these, 7 were severe storms, 5 were floods, 2 hurricanes, 1 snow event, and 1 severe ice storm.[12]

Disaster Declarations for Windham County, VT

Disaster Number	Incident Begin Date	Incident End Date	Declaration Date	Incident Type	Title	Disaster Close Out Date
4356	10/29/2017	10/30/2017	01/02/2018	Severe Storm and Flooding	SEVERE STORMS AND FLOODING	
4043	5/20/2011	5/20/2011	11/8/2011	Severe Storm(s)	SEVERE STORMS AND FLOODING	
4022	8/27/2011	9/2/2011	9/1/2011	Hurricane	TROPICAL STORM IRENE	
3338	8/26/2011	9/2/2011	8/29/2011	Hurricane	HURRICANE IRENE	3/10/2014
1816	12/11/2008	12/18/2008	1/14/2009	Severe Ice Storm	SEVERE WINTER STORM	10/15/2014
1698	4/15/2007	4/21/2007	5/4/2007	Severe Storm(s)	SEVERE STORMS AND FLOODING	3/13/2013
1559	8/12/2004	9/12/2004	9/23/2004	Severe Storm(s)	SEVERE STORMS AND FLOODING	1/4/2011
1488	7/21/2003	8/18/2003	9/12/2003	Severe Storm(s)	SEVERE STORMS AND FLOODING	1/4/2011
3167	3/5/2001	3/7/2001	4/10/2001	Snow	SNOW	2/28/2005
1336	7/14/2000	7/18/2000	7/27/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	6/30/2008
1307	9/16/1999	9/21/1999	11/10/1999	Severe Storm(s)	TROPICAL STORM FLOYD	6/30/2008
1124	6/12/1996	6/14/1996	6/27/1996	Flood	EXTREME RAINFALL AND FLOODING	2/23/2005
1101	1/19/1996	2/2/1996	2/13/1996	Flood	ICE JAMS AND FLOODING	2/17/2005
518	8/5/1976	8/5/1976	8/5/1976	Flood	SEVERE STORMS, HIGH WINDS & FLOODING	4/16/1981
397	7/6/1973	7/6/1973	7/6/1973	Flood	SEVERE STORMS, FLOODING, & LANDSLIDES	11/12/1976
277	8/30/1969	8/30/1969	8/30/1969	Flood	SEVERE STORMS & FLOODING	5/26/1972

Detail on Specific Flooding Events that have Affected Wilmington and Windham County:

August 3, 2018 - A slow-moving cold front brought several rounds of heavy rainfall and thunderstorms to eastern New York and western New England. After passing through eastern

[12] FEMA tool: Data Visualization: Disaster Declarations for States and Counties: Windham County, VT http://www.fema.gov/data-visualization-disaster-declarations-states-and-counties Accessed 5/14/18.

New York, a severe thunderstorm knocked down trees and caused localized flash flooding in the towns of Putney and West Wardsboro, Vermont.

January 12, 2018 - After a frigid end of December and beginning of January, an unseasonably warm air-mass was pumped into western New England on January 12th on southerly winds. The temperatures reached the 50s and 60s during the day. Showers also developed in the warm air-mass ahead of a cold front and were heavy at times, with some locations receiving one to two inches of rainfall. The combination of warm temperatures and heavy rainfall caused river ice to dislodge and resulted in ice jams in spots.

October 29-30, 2017 rain storm – A low pressure system developed off the southeast coast and rapidly intensified as it tracked northward tapping into tropical moisture. The powerful low moved across eastern New York and western New England Sunday night into early Monday morning bringing damaging winds, power outages, heavy rainfall and flooding to the region. As the system departed, strong winds ensued and caused thousands of power outages and trees down across southern Vermont. Total rainfall amounts reported across southern Vermont ranged from 1.07 inches in Bennington to 7.01 inches near Wilmington.

June 9, 2015 - A moist and unstable air mass ahead of an advancing cold front led to the developing of thunderstorms during the early afternoon hours on Tuesday, June 9th across eastern New York. As the thunderstorms organized into small lines, some of the thunderstorms produced wind damage, mainly to trees and power lines. These thunderstorms reached southern Vermont by the midafternoon hours and produced a report of wind damage near Halifax. Trees and wires were reported down during a thunderstorm on McMillan Road in Halifax. Thunderstorms ended over the region by the late afternoon, as the cold front crossed the region from west to east.

July 14, 2014 - As a strong area of low pressure moved across upstate New York on Monday, July 28th, repeated rounds of thunderstorms occurred during the afternoon and evening hours. This led to flash flooding across northern Windham County, as small streams and creeks rapidly overspread their banks. In addition, the Williams River reached flood stage due to the rapid surge in water. Although the worst of the flooding remained north of Windham County in Windsor County, many residents reported this flooding to be the worst seen in the area since Tropical Storm Irene in 2011. Heavy rain from thunderstorms led to flash flooding in Windham. The access road to the Tater Hill Golf Course was washed out as a result of the flooding.

July 7, 2014 - A warm and humid air mass was in place across southern Vermont on the afternoon of Monday, July 7th. A cluster of showers and thunderstorms moved from upstate New York into southern Vermont during the mid-afternoon hours. These thunderstorms had previously weakened, but were still associated with very strong winds aloft. As these thunderstorms interacted with the high terrain of the southern Green Mountains, they produced gusty winds. These winds caused damage to trees and power lines near Readsboro. The thunderstorm continued eastward towards the Connecticut River Valley, but did not produce any additional severe weather before exiting the state to the east.

September 12, 2013 - A series of cold fronts moved towards the region on Thursday, September 12th. Despite some periods of cloudiness, a warm and humid air mass ahead of the approaching boundaries allowed for moderate amounts of instability to be in place. Along and ahead of the boundaries, several lines of showers and thunderstorms developed and moved across the region during the afternoon and early evening hours. In addition to a large amount of

cloud to ground lightning, a few of the thunderstorms became severe, with damaging wind gusts. Several trees were downed across the region. Some areas that received repeated showers and thunderstorms experienced flash flooding as well, with roads washed out and/or closed as a result. The hardest hit areas were within the Town of Brattleboro. Two to four inches of rain in a short period of time was reported in the areas that experienced flash flooding.

September 1, 2013 - A moist and humid air mass was in place across the region on Sunday, September 1st. A surface frontal boundary was situated across eastern New York into southern New England during the morning hours. During the day, the frontal boundary slowly lifted northward. With enough instability in place due to daytime heating, some showers and thunderstorms developed along this frontal boundary. The showers and thunderstorms tracked over the same locations during the afternoon hours across southern Vermont. As a result of the persistent heavy rain, flash flooding occurred in downtown Wilmington. A mudslide also occurred due to the heavy rainfall. By the evening hours, the showers and thunderstorms were located north of the region and beginning to weaken, and the threat for flash flooding ended.

July 10, 2013 - Warm moist air over the northeast provided the ingredients for heavy rainfall, and saturated ground from record May and June rainfall made the region vulnerable to flooding. Showers and thunderstorms developed during the afternoon and evening of July 2 2013, producing heavy rainfall moved repeatedly across southeast Vermont, with isolated flash flooding.

Tropical Storm Irene – August 28, 2011 - The Federally Declared Disaster DR-4022, Tropical Storm Irene, tracked northeast across eastern New York and western New England during Sunday, August 28th, producing widespread flooding, fluvial erosion, and damaging winds across the region, including Wilmington. Rainfall amounts generally averaged 4 to 8 inches. Much of the rain which fell occurred within a 12-hour period, beginning early Sunday morning, and ending Sunday evening. This heavy to extreme rainfall resulted in widespread flash flooding and river flooding across southern Vermont.

Route 100 in Windham County was closed due to flooding and wash outs. Portions of Route 100 remained closed after the flood waters receded due to significant damage. The downtown village area of Wilmington experienced inundation flooding for at least 24 hours, but the lower lying areas had residual flooding for a few days. The water level rose to 27 feet above base flood elevation which was 8" higher than the 1938 flood water levels. There was over 3 ½ feet of water in the first floor of the Police Department/Town Clerk's office of the Town Hall

Flooding in downtown at Route 9 and 100 intersection. TS Irene 2011.

and over five feet of water in the Fire Department. The Memorial Hall on Main Street had over 10 feet of water in the building.

Along Dover Road in the Town of Dover, one house was destroyed and floated down the North Branch Deerfield River and other houses were destroyed or significantly damage. Much of the road was reported washed away. A woman drowned when the car she was in became trapped by flood waters from the North Branch Deerfield River in Wilmington. Route 9 was closed from Bennington to Brattleboro due to numerous reports of flooding. Portions of Route 9 remained closed after the flood waters receded due to damage. The Route 9 bridge in Woodford was reopened to traffic on September 9th, fully opening this main east-west connection across southern Vermont. Some portions of the road were dirt for a time afterwards between Marlboro and West Brattleboro. Strong winds also occurred across southern Vermont, with frequent wind gusts of 35 to 55 mph, along with locally stronger wind gusts exceeding 60 mph. The strongest winds occurred from the north to northeast during the morning hours, then from the west to northwest during Sunday evening. The combination of strong winds, and extremely saturated soil led to numerous downed trees and power lines across the region. This also resulted in widespread long duration power outages. In particular, the approximate number of customers affected by power outages included: Windham County, 18000. President Obama raised the federal match share to 90% from 75% for TS Irene relief, therefore lowering the state and local shares by 7.5% each. Wilmington received $1,480,654.34 from FEMA through declaration 4022.

Tropical Storm Irene had lasting impacts on Wilmington. Nearly every business in downtown was damaged or destroyed. The Village intersection was inundated by flood waters causing major economic impacts to the Village. The following lists those adverse impacts:

Affected Business Buildings – 4 were closed to the public	65
Affected business	68
Landlords	10
Churches	4
Town Offices / Police Dept. / Fire Dept.	3
Business Closed Permanently – 4 of these business reopened after the flood and have subsequently closed	8
Businesses to Reopen	4
Businesses moved out of Wilmington	2
Businesses that moved within Wilmington	5
New Businesses	2
Building & Property / Equipment / Inventory Losses	$6,527,632

March 7, 2011 – A cold front moved gradually southeastward across the region during the day Monday, March 7th, as a wave of low pressure moved northeastward along the boundary. To the south of the boundary, it was mild as the area was in the warm sector of the low pressure system. The storm tapped into both Atlantic and Gulf moisture, resulting in heavy rainfall of 1 1/2 to 3 1/2 inches across southern Vermont Sunday, March 6th, into Monday, March 7th before the precipitation transitioned to a wintry mix then snow early Monday morning. The heavy

rainfall, combined with runoff from snowmelt due to the mild temperatures, resulted in flooding of rivers, streams and creeks, mainly from the formation of ice jams. Damage estimates are unknown. There was 24 inches of water in the basement of the Town Hall due to an ice jam (insurance claim made).

August 5, 2008 - The passage of a strong upper level disturbance, combined with a moist and unstable air mass in place, led to the development of numerous thunderstorms across southern Vermont during Thursday afternoon on August 7th, some of which contained large hail. In addition, locally very heavy rainfall led to flash flooding in some areas.

March 8-9, 2008 - A strengthening low pressure system tracked from the central Gulf Coast states on Friday March 7th, into the central Appalachians by Saturday morning on March 8th. The low then tracked into northern New England by Saturday evening. Heavy rainfall occurred across southern Vermont from this storm system. This heavy rainfall loosened an ice jam on the Deerfield River in Wilmington, which led to flooding in low lying areas in Wilmington's downtown area. Flooding resulted, beginning around 19:30 EST Saturday, and affected the lower levels of an apartment building, a bar and restaurant, and the parking lot and racquetball court of a motel. Total of $15,000 in damages.

April 15-21, 2007 - Low pressure developed over the lower Mississippi Valley on Saturday April 14th, and then moved northeast while intensifying, reaching the southern Appalachians by Sunday morning, April 15th, and then just south of western Long Island by Monday morning, April 16th. This low became very intense, with a central barometric pressure falling below 970 millibars upon reaching just south of Long Island Monday morning. The low then headed off the New England coast by Tuesday morning. This intense coastal storm spread heavy precipitation across southern Vermont, starting on Sunday, and persisting into late Monday. Initially, the precipitation fell as a mixture of wet snow, sleet and rain, with snow and sleet more prevalent across the higher elevations. The precipitation then changed to plain rain by late Monday morning. Liquid equivalent precipitation totals from this storm ranged from 3 to 6 inches. Rain and snow caused damage to roads and utility lines across Windham County and Wilmington. Across the State, nearly 3.6 million dollars were obligated as part of the FEMA Public Assistance Program under DR1698, and Wilmington received a total of $191,077.13 from the state and FEMA ($159,282.51) for their damages.

June 29, 2006 - After being nearly stationary while deepening for several days, an upper-level trough from the Great Lakes to the lower Ohio Valley was accelerating eastward at daybreak on June 29. An associated weak low pressure over Lake Erie trailed a cold front through the Ohio Valley. During the day, this system moved rapidly eastward and touched off thunderstorms in the warm, humid air mass over western New England in the early evening. Torrential rainfall produced flash flooding in Windham County.

October 8, 2005 - On October 8 at daybreak, a nearly stationary cold front was over southwestern New England. The air over the northeastern United States was very moist. Low pressure in the vicinity of the eastern Carolina states moved slowly north northeast along the cold front. Heavy rain fell over southern Vermont through the early morning hours of October 9. During this period, there was over 6 inches of rainfall in southern Vermont, triggering widespread flooding. Several evacuations of people from their homes occurred. Route 100 was closed in portions.

The following year, another severe period of flooding and thunderstorms, which lasted from the period of August 12- September 12, 2004 engendered Presidential Disaster Declaration DR – 1559. These two events triggered funding from the FEMA Public Assistance Program which helped to pay for debris removal and overtime hours for emergency response workers. Flash flooding resulted in lots of debris.

August 3, 2003 – A tropical air mass was in place over southern Vermont on August 3. With a strong disturbance over the Great Lakes adding weak lift to a very unstable atmosphere, scattered showers and thunderstorms erupted during the afternoon hours. A slow moving storm over Windham County produced Doppler radar estimated rainfalls of 3 to 4 inches in about four hours. The torrential rains took a toll, washing out roads in Londonderry. Highway 121 was washed out in the Town of Windham. Massive flooding occurred in the Town of Grafton at the base of Fire Pond and Hinkley Brook roads, where water, debris and mud washed those roads out. The raging debris knocked a house off its foundation and damaged several other ones. This was the same area affected by the infamous Flood of 96 which was even more severe. Nearly constant rain and thunderstorms from the period of July 21 through August 18, 2003 led to FEMA Declaration 1488. Many roads were washed out and culverts needed replacing throughout town. Wilmington received $10,493.35 from the state and FEMA for damages.

July 2000 - A stalled frontal boundary across extreme southern Vermont interacted with a strong upper level disturbance from July 15 into early July 16. Two to four inches of widespread rain fell, with locally higher amounts across the higher terrain of Windham County. Specific amounts included 3.00 inches at Bennington and 5.17 inches at West Wardsboro, in Windham County. This rain produced enough runoff to cause the Deerfield River to rise 6 feet above unofficial flood stage in Wilmington. Several roads were reported under water. The widespread heavy rain event set the stage for more widespread flooding later Sunday. The air remained very moist and unstable in wake of the rainstorm. More thunderstorms erupted late in the day across southern Vermont. These storms moved very slowly, trained over the same region, and were further enhanced by the steep terrain. The thunderstorm rainfall, as well as the earlier rainstorm, dumped in excess of 8 inches locally at Newfane. Since the ground was already saturated, the heavy rains from the thunderstorms produced flooding and flash flooding across the region. In Windham County, a five-mile stretch of State Route 30 was closed due to flooding and residents were evacuated. Street flooding was reported at Brattleboro. This event resulted in 14 inches of flood water in the basement and elevator shaft at Town Hall. This event resulted in FEMA declaration number 1336 for Vermont and Wilmington received at total of $70,197.25 in disaster recovery funds from FEMA ($58,227.34) and the state of Vermont.

September 17, 1999 - The remnants of Hurricane Floyd moved up the eastern seaboard on September 16 and during the early hours on September 17. The storm brought both high winds and heavy rainfall to Southern Vermont, which included a large swath of 3 to 6 inch amounts. Specific rainfall amounts included 2.91 inches in Bennington, 3.89 inches in Sunderland, 4.54 inches at Peru and 5.70 inches at Brattleboro. The rain produced significant flooding across the region, which proved destructive. Many smaller tributaries reached or exceeded bank full. Water from the Millbrook in Weathersfield washed away a portion of State Route 5. The World's Fair in Tunbridge was cancelled for the first time in many years. Winds from the passage of Floyd were estimated to have gusted to over 60 mph, especially over hill towns. The combination of the wind and very saturated ground, produce widespread downing of trees and power lines across much of Southern Vermont. Some trees fell on vehicles and houses. The rain and wind produced power outages across the region. As many as 2,000 people lost power in Southern Vermont.

VOLUME 74 NO. 21 USPS 083-400 1987 WEDNESDAY, APRIL 1, 1987 BRATTLEBORO, VERMONT 28 PAGES 30 CENTS

Flooding rains down on valley

Homes evacuated as rivers rise

By CHRISTOPHER ROWLAND

Heavy rains Tuesday caused the Whetstone Brook to swell up and spill over its banks in several West Brattleboro locations, forcing the evacuation of several trailers at the Mountain Home Park and sending sandbag crews to the area.

The National Weather Service in Connecticut reported that the Connecticut River in southern Vermont was observed at 26.7 feet Tuesday night with the flood stage at 28 feet. The spokesman said the river is expected to crest at 35 feet this afternoon.

Power outages were reported throughout Windham County and in New Hampshire as strong winds combined with the rain. About 5,000 customers lost power in New Hampshire's Cheshire County, officials said.

Brattleboro fire crews sandbagged at Melrose Terrace off Western Avenue in an attempt to block rushing waters from swamping the West Brattleboro development.

Along the western end of Marlboro Road, the water swept across fields and into the street.

Fields behind the Fifteen Bars, the Country Kitchen restaurant and the Brattleboro West shopping center were flooded. Across the brook, water flowed past and under several mobile homes at the Mountain Home Park.

The farmers' market near the Creamery Bridge on Western Avenue was under water.

Brooks and streams were running full all over Windham County and much of the state. A flood warning issued by the National Weather Service remained in effect until 8 p.m. and a Connecticut River flood alert was in effect until this morning.

At one point, the water in Whetstone Brook was crashing into the Meadowbrook Road bridge. However, the waters began to subside at about 5 p.m. and the integrity of the bridge was not threatened, officials said.

"We'll be with it just as long as we have to," Brattleboro Fire Chief T. Howard Mattison said of the efforts to battle the floodwaters. The worst of the flooding had subsided by early Tuesday evening, Mattison said.

Fire crews were standing by to rinse the brook resumed its rise, Mattison said.

"If we get more heavy rain, we'll be back out again," Mattison said.

The rain combined with strong winds caused numerous power outages throughout the county and in Hinsdale, N.H., electric company officials reported.

"There's some pretty big water problems over here," said Richard Lemberto of the New Hampshire Public Service Co.

Power was knocked out from Hinsdale to the Connecticut River, Lamberto said, affecting at least 1,000 customers alone.

David Miller of Central Vermont Public Service said power was out at times in West Dummerston, Guilford, Wardboro and along Arms Hill Road in Brattleboro.

High winds that blew over water-laden branches caused the outages, Miller said.

Green Mountain Power spokesman David Comstock said electricity out in Rockingham, Westminster West and Dummerston Center. Power was off in parts of Putney early Tuesday morning.

"It doesn't sound too good right now, listening to the scanner," Comstock said. "If it keeps raining and blowing like it has been, we're going to be in for a long night."

Officials said the mobile homes at

See FLOOD, Page 14

Kathy McMasters

HIGH WATER — Sections of Wilmington were under water like much of the county Tuesday. Above, the south side of Route 9 along the Deerfield River was evacuated by late afternoon. During the day and late the evening, the town's police and highway departments were out continuously responding to related complaints and taking protective action.

June 19, 1998 - Thunderstorms with torrential downpours produced flash floods across parts of Windham County. Shoulders of Routes 100 and 112 were washed out near Jacksonville and Halifax. Flooding also occurred in the Putney area and at Rawsonville. Several mountain roads were washed out throughout the County.

January 19, 1996 - An intense area of low pressure which was located over the Mid-Atlantic region on Friday morning January 19th produced unseasonably warm temperatures, high dewpoints and strong winds. This resulted in rapid melting of one to three feet of snow. In addition to the rapid snowmelt one to three inches of rain fell as the system moved northeast along the coast. Many small streams across the county flooded, including Whetstone Brook, resulting in several road washouts.

March 11, 1992 – Ice jam flooding resulted in 12 inches of flood water in Town Hall.

1987 – Major flooding in Wilmington. NCDC detailed storm data only goes back to 1996.

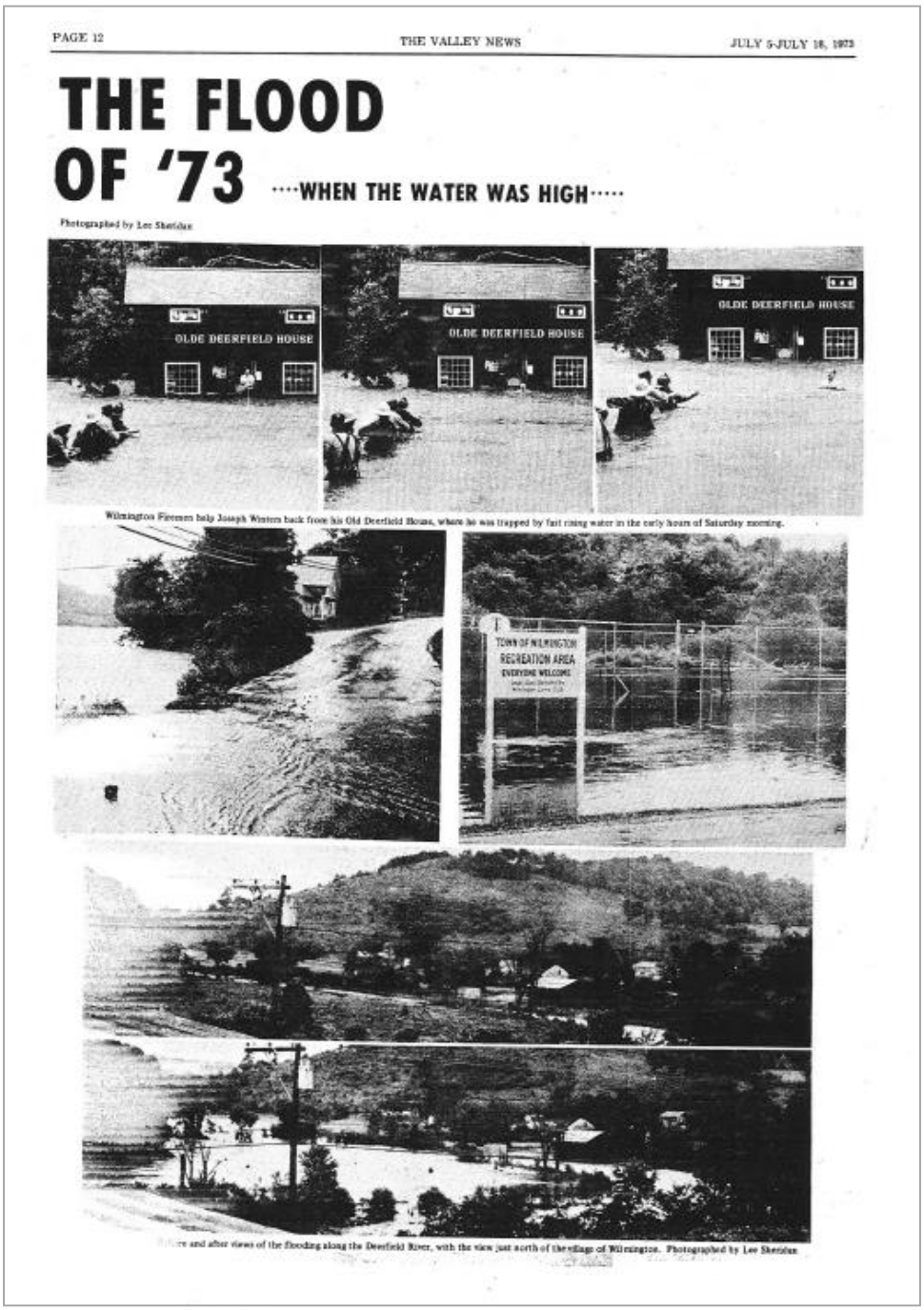
1983 – Major flooding resulted in over 20 inches of flood water in Town Hall.

During 1976, flooding occurred throughout New England, as result of Hurricane Belle, causing millions of dollars in damage. Flooding resulted in 7-feet of water in the Town Hall basement.

In 1973 there was an extreme rainfall event from June 28-30 that affected all areas of Vermont except the northwest section. Rainfall amounts as much as 6 inches in 24 hours in some locations. This was the largest rain event since the 1927 flood. Highway damage was

extensive in the south-central, southeastern, and northeastern areas of the State. Three persons were killed in the 1973 flood, and damage was estimated at $64 million. Sizable crop loss was reported, and damage to State highways was estimated to be $10 million. The entire State was declared a disaster area.[13] After this event, there was extensive dredging, berming and windrowing in an attempt to control channel location and reduce future flood impacts. Some of the smaller brooks in Wilmington flooded and there was damage to higher elevation roads, but there was not damage to Route 100. Flooding amounts in Wilmington are unknown. Fire Department records were lost. Photos from newspaper clippings show the water covering the deck of the bridge downtown. This was not as devastating as TS Irene, but there was a lot of damage to basements of buildings downtown, culverts and bridges.

[13] USGS "Vermont Floods and Droughts" information page http://md.water.usgs.gov/publications/wsp-2375/vt/. Accessed 4/3/15.



PAGE 12 THE VALLEY NEWS JULY 5-JULY 18, 1973

THE FLOOD OF '73 ····WHEN THE WATER WAS HIGH·····

Photographed by Lee Sheridan

Wilmington Firemen help Joseph Winters back from his Old Deerfield House, where he was trapped by fast rising water in the early hours of Saturday morning.

re and after views of the flooding along the Deerfield River, with the view just north of the village of Wilmington. Photographed by Lee Sheridan

Dec. 1948 flooding resulted in 3-feet of water in homes on Beaver Street south of the light, as well as near the Fire Station.

The Spring Floods of 1938, which had an effect on all of New England, caused $113 million in damage, killed 24 people and made 77,000 people homeless. During this flood alone, the main street of Hooksett, New Hampshire was 18 to 20 feet underwater. There was over 11 feet of flood water in the Wilmington Town Hall filling the basement and damaging the Town Clerk's office and records.

The Vermont Flood of 1927 was the deadliest flooding event in the history of the State; eighty-four people were killed with over $28 million in property damage.

1977 on 1927 Flood

...boro Reformer

Windham County, Vermont and Southwestern New Hampshire

...TTLEBORO, VERMONT SATURDAY, NOVEMBER 5, 1977

50 Years Ago This Week

The Flood of 1927 Overwhelmed Vermont

By VIRGINIA PAGE

Sources used

Local knowledge of areas of concern and impacts, information in 2015 Wilmington LHMP, National Climatic Data Center reports, Discussions and emails with Wilmington Road Foreman and Zoning Administrator between January and May 2020

Route 9 and 100 intersection at the center of the Village during TS Irene flooding in 2011. Photo taken by Roland Schneider.

Geographic Area of Hazard/Location/Occurrence of Fluvial Erosion and Flooding/Special Flood Hazard Area and River Corridor Mapping

The river Corridor mapping (included in this plan) shows the ANR defined River Corridors, which are likely to have fluvial erosion. The map also points out some of the issues discussed in the text of particular problem spots. Mitigation projects on private land require the consent of the land owner to complete.

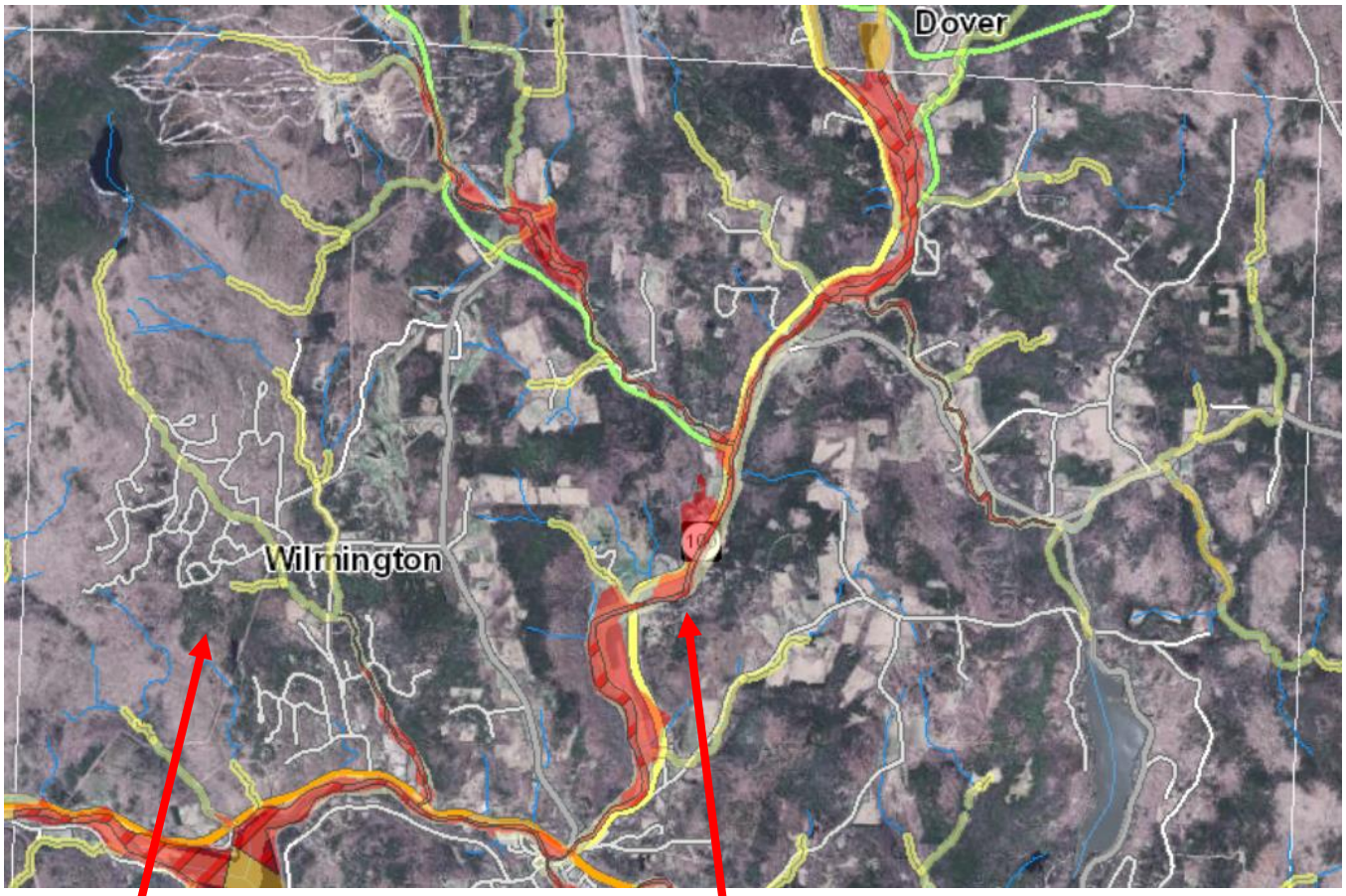
FEMA has mapped "AE" zones, including "AE with Floodway" in Wilmington. "AE" zones have Base Flood Elevations determined. Floodways are considered areas with moving flood waters and are the highest regulated flood hazard areas according to FEMA. FEMA does not map fluvial erosion. Properties within the SFHA, that have a mortgage, are required to carry flood insurance, and properties without a mortgage are advised to. Wilmington's participation in the NFIP gives residents access to discount flood insurance through the National Flood Insurance Program (NFIP). The Flood Hazard Summary Sheets on FloodReady Vermont's website say there are 34 structures in the Special Flood Hazard Area.

The maps on the following pages were created using the Vermont Agency of Natural Resources 'Natural Resources Atlas. The legend pertains to the accompanying maps. FEMA SFHA is shown in red. The floodplains shown in these maps are based on the FEMA Flood Insurance Rate Maps (FIRMs) available through the FEMA Map Service Center.[14] This map shows the River Corridors that Vermont Agency of Natural Resources (ANR) has mapped. The ANR defined River Corridor also includes a 50-foot setback requirement on all streams with a

[14] FEMA Map Service Center https://msc.fema.gov/portal

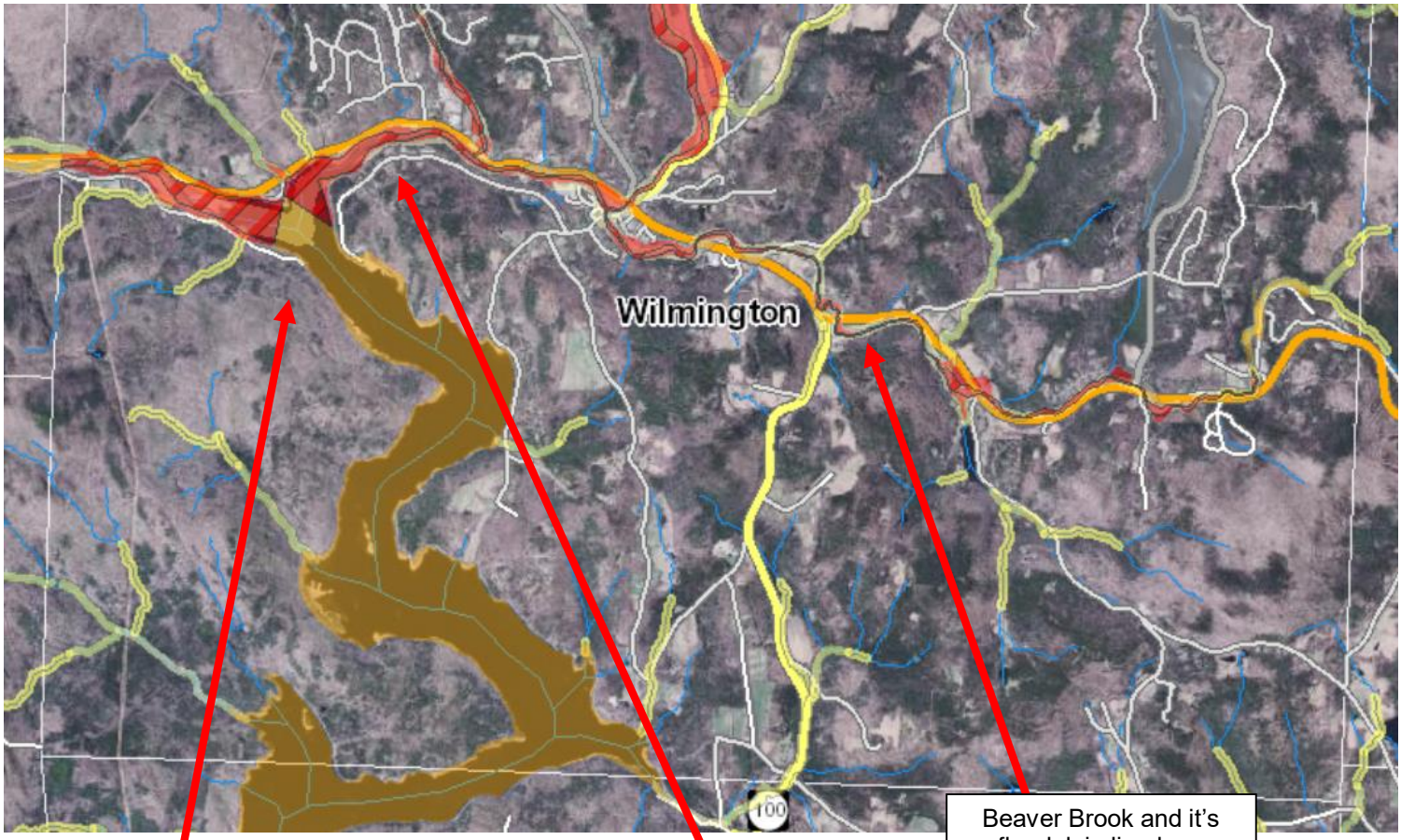
watershed between .5 and 2 square miles. Together the mapped area and the small stream buffers constitute the River Corridor. River Corridors encompass an area around the present channel where fluvial erosion, channel evolution and down-valley meander migration are most likely to occur.

The below map shows the Special Flood Hazard Areas (SFHAs) in red (AE zone) and the River Corridors in cream color. Floodway is shown in red hatching. Within Wilmington, FEMA SFHA lies primarily only along the north branch of the Deerfield River north to the town line. River Corridor is along the north branch of the Deerfield River and scattered along many smaller streams throughout the Town.



The Chimney Hill neighborhood has experienced flooding and fluvial erosion.

Note how Route 100 follows the North Branch of the Deerfield and how much of the road is in floodplain and floodway.



Harriman Reservoir flows south into Whitingham

Note the amount of floodway in the downtown area.

Beaver Brook and it's floodplain lie along Route 9.

Invasive Species

Invasive species are a region-wide hazard; however, each location will be confronted with a distinct mix of invasive species that thrive under the particular ecological conditions of that place. Each invasive species has a different potential to spread to other areas based on the rate at which it spreads and the ecological suitability of the ecosystem that it is expanding into.

Black Swallowwort carpets a bank to the exclusion of almost everything else. It even twines up a utility pole guy wire. Note the abundant seed pods. (Photo courtesy of John Anderson, Dummerston)

Many species of plants and animals have been introduced into our ecosystem for various uses; these exotic species have varying propensities for becoming invasive. An invasive species is an exotic species whose introduction into an ecosystem in which the species is not native causes or is likely to cause environmental or economic harm or harm to human health. Many species of invasive plants and animals are currently affecting Southeastern Vermont and can have significant levels of impact to the native flora and fauna.

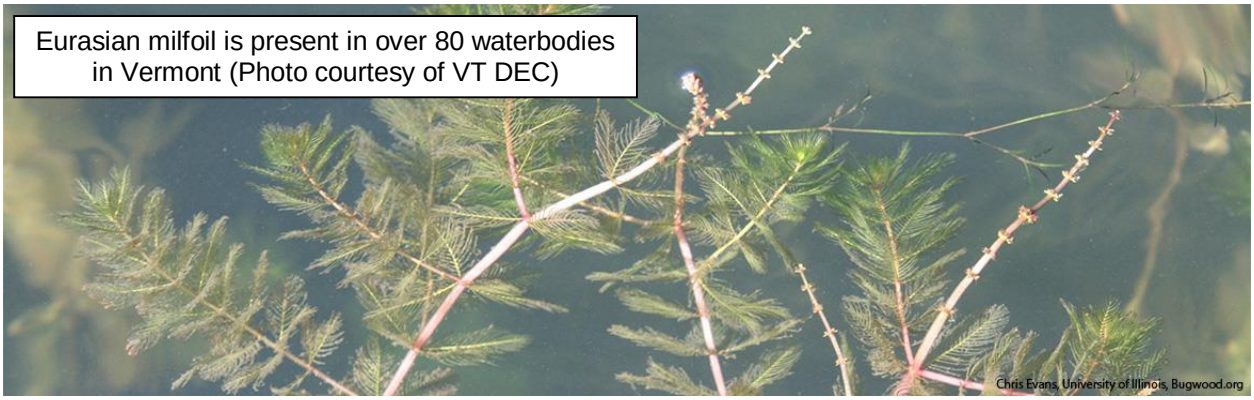
Invasive Plant Species

In the absence or near absence of natural predators or controls, invasive non-native plants are able to spread quickly and out-compete native plants. Invasive plant species can create monocultures, which often provide poor habitat for native animals that have not evolved with the non-native species, resulting in degraded habitat value and increased vulnerability. The invasive plant issue really escalated in the early 1990's. Invasive plants tend to thrive in disturbed areas. Within the Windham region, they are more prolific in the towns along the Connecticut River than they are to the west, because the eastern towns are more populated, contain major transportation routes such as I-91 and the rail corridor, which serve as vectors for their expansion, and tend to have significant land disturbance. Some of these plants were originally planted because of their positive aspects such as their ability to grow in difficult growing conditions, long growing season length, their large seed production and their ornamental value. These same reasons are a big part of why they have become invasive.

Heavy travel corridors like Route 9 and Route 100 in Wilmington are also highways for the spread of invasives. Black swallowwort (pictured above), an aggressive invasive vine plant with small purplish black flowers, is rampant along Route 30 and is working its way up the West River Trail. Some plants can't take the use of salt on roads, but a newer invasive – slender cottonweed – is working its way up I-91 and along Route 5 sparsely – and it appears to be a salt tolerant plant.

Aquatic invasive species are spread by overland transport of watercraft, trailers, and fishing and recreational equipment. Wilmington has particular concern, and pays particular attention to aquatic invasive species in Lake Raponda and Lake Harriman. Both of these spots are popular tourist and recreational destinations for boating, swimming and water sports. The most effective way to prevent spread is through education and equipment inspections designed to catch invasive species "hitching a ride" from one waterbody to another. Preventing the spread of

aquatic invasive species is far more effective and economically sensible than eradicating invasive species once they are established. With support from Vermont DEC, Public Access Greeters educate lake visitors about invasive species, provide courtesy watercraft inspections and STOP introductions[15]. The most common invasive found by the greeter program is Eurasian milfoil, which is also a top invasive concern in Wilmington.



Eurasian milfoil is present in over 80 waterbodies in Vermont (Photo courtesy of VT DEC)

Eurasian watermilfoil's tolerance of lower temperatures allows it to start growing earlier than other vegetation and form canopies that block light, which inhibits the growth of native plants and can lead to their displacement. It can also reduce the abundance and diversity of invertebrates. In very shallow waterbodies, milfoil can grow from shore-to-shore and blanket the entire lake bottom and surface area of the waterbody, forming dense impenetrable stands with no open water. Only in these extreme and rare circumstances will recreational activities like swimming, boating, and fishing be impacted by Eurasian watermilfoil. Generally, this plant species has little negative impact on fish and wildlife with the greatest concern of this invasive species being on native aquatic plant diversity. Besides the ecological impacts, infestations of milfoil have economic impacts through the reduction of property values and the high costs of various treatment options.

Non-aquatic invasive plant concerns for Wilmington are wild parsnip, giant hogweed, Japanese knotweed, and purple loosestrife. Knotweed is particularly seen along waterways. Native species, such as beech trees and hay scented fern, are not able to take over and prevent regeneration of more undesirable species when an area gets overrun by deer who overeat desirable natives. Beech bark disease is also causing the die off of older beech trees, leading to beech suckers growing from the roots which the deer don't eat by choice, but the tree clone sucker shoots are doomed to die after 10-15 years because of the beech bark disease. This means other healthy trees can't establish themselves, leaving the forest worse off in the long term.[16]

[15] https://dec.vermont.gov/watershed/lakes-ponds/aquatic-invasives/spread-prevention/greeters
[16] "Press Release: Sadawga Plant Survey" http://townofwhitingham-vt.org/press-release-sadawga-plant-survey accessed 7/31/18.

There are increasing infestations of invasive species in Wilmington. Japanese Knotweed is a particular one of concern as it presents water quality concerns due to the fact that it out-competes other vegetation and dies back in the winter, leaving shorelines susceptible to erosion because there is no other vegetation stabilizing the stream bank (Basin 11 Management Plan, Preliminary Draft 2007). TS Irene eroded the banks so much, allowing for the flourishing of invasives on the bare soil left in its wake. Six years later, the trees are starting to get reestablished in these riparian areas, and they are knocking back the Japanese knotweed somewhat by shading it out. This tree-cover may self-contain it until the next storm. Purple loosestrife is commonly seen in many riparian and wetland habitats in the region. Phragmites is a newer invasive, a tall grass, that invades wet areas to the point where nothing else will grow. It has even been spotted in remote areas away from roadways, so is possibly wind-spread. Other species such as Oriental bittersweet, certain species of honeysuckle, Japanese barberry, yellow flag iris, and common and glossy (European) buckthorn have become well established in many locations. Knapweed is semi-invasive that has been found along the power line corridors and railroad tracks—where it seems capable of withstanding spraying. Yellow rattle (pictured left) is another invasive flowering plant, a parasite on grass, is now being seen on power lines.

Yellow Rattle, pictured here, is hemi-parasitic on grasses. It can devastate hayfields. It is primarily confined to power line rights of way. (Photo courtesy of John Anderson, Dummerston)

Elevations generally below 1,500 feet are most susceptible to invasive species, though any land with some sort of major disturbance (from wind, water, logging, or land clearing and development) could potentially host them. Invasives tend to come up early and flower early, allowing them to get established before native plants have the chance. It may be possible to slow down or even halt the spread of these species by identifying and removing plants as soon as they appear. Early detection is the key. This detection can be aided by educating residents about the identification of and problems caused by invasive species. One local conservationist in the region says it is harder to find native wildflowers now, and sees the future Vermont forest as resembling southern forests more and more—with compositions consisting of sassafras, white oak and gum trees, though he says it's hard to tell what will overtake the hemlock habitat.

The below is a list of invasive plants that the Vermont Fish and Wildlife Department have on the watch list.[17]

List of Watch Species in Vermont

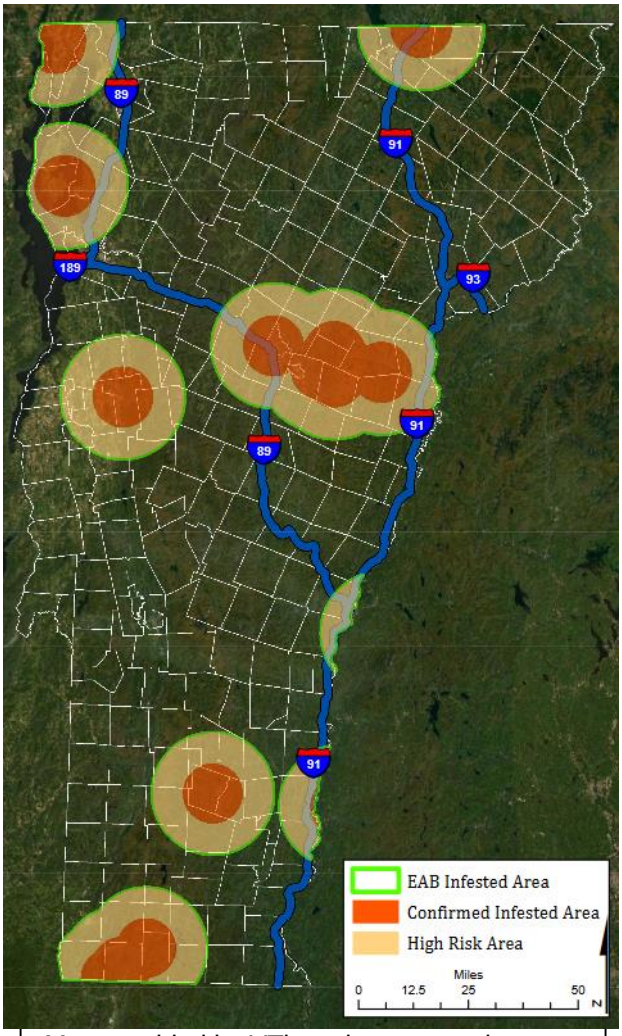
Scientific Name	Common Name
Acer ginnala Maxim.	Amur maple
Acer platanoides L.	Norway maple
Alnus glutinosa (L.) Gaertner	European black alder
Amorpha fruticosa L.	False indigo
Ampelopsis brevipedunculata (Maxim.) Trautv.	Porcelainberry
Anthriscus sylvestris (L.) Hoffm.	Wild chervil
Berberis thunbergii DC.	Japanese barberry
Berberis vulgaris L.	Common barberry
Callitriche stagnalis Scop.	Pond water-starwort
Cardamine impatiens L.	Narrowleaf bittercress
Centaurea maculosa L. Syn.: *Centaurea biebersteinii* DC	Spotted knapweed
Elaeagnus angustifolia L.	Russian olive
Elaeagnus umbellata Thunb.	Autumn olive
Euonymus alata (Thunb.) Sieb.	Winged euonymus
Euphorbia cyparissias L.	Cypress spurge
Glyceria maxima (Hartman) Holmberg	Reed mannagrass
Hesperis matronalis L.	Dame's rocket
Iris pseudacorus L.	Yellow iris
Ligustrum obtusifolium Sieb. & Zucc.	Border privet
Lonicera xylosteum L.	Dwarf honeysuckle
Lysimachia vulgaris L.	Garden Loosestrife
Marsilea quadrifolia L.	European waterclover
Microstegium vimineum (Trin.) A. Camus	Japanese stilt grass
Najas minor Allioni	Brittle waternymph
Paulownia tomentosa (Thunb.) Sieb & Zucc. Ex Ste.	Princess tree
Phalaris arundinacea L.	Reed canary grass
Polygonum perfoliatum L.	Mile-a-minute vine
Polygonum sachalinense F. Schmidt ex Maxim. Syn: *Fallopia sachalinensis* (F. Schmidt ex Maxim.) Dcne.	Giant knotweed
Populus alba L.	White poplar
Robinia pseudoacacia L.	Black locust
Rorripa nasturtium-aquaticum (L.) Hayek Syn: *Nasturtium officinale* Ait. f.	Watercress
Rosa multiflora Thunb. ex Murr.	Multiflora rose

Preventing the spread of invasive plants is something that everyone can assist with. The first step is to not plant non-native plants on your property and to remove invasives that exist. Additionally, it is important that when soil is disturbed, to plant native cover before invasives have a chance to establish themselves. Proper disposal of non-native vegetation is critical to avoid its spread, safely burning the material when possible. Avoid transporting non-native plants, including firewood and garden debris, as this is critical to prevent the spread of non-native seeds and insects. Mowing roadsides from the north to the south can also help prevent the migration of invasive seeds on-site.

[17] Vermont Fish and Wildlife Department: Wildlife Action Plan. Developed 11/22/05. Accessed 3/2/15. http://www.vtfishandwildlife.com/library/reports_and_documents/vermonts_wildlife_action_plan/_/_report/7_appendix/k_invasive_exotic_and_pest_species.pdf

Top Invasive Forest Pests and their Impacts

Non-native invasive species cause irreversible impacts on tree health, forest composition, and biodiversity. Three non-native insects which currently threaten Vermont are the emerald ash borer (EAB), Asian longhorned beetle (ALB) and hemlock wooly adelgid (HWA). Hemlock wooly adelgid is currently present throughout the state. Initially discovered in Orange County in February 2018, Emerald ash borer (EAB) has been spread quickly and as of this writing been determined the in orange areas on the below map. Asian longhorned beetle are within fifty miles of Vermont's border. Over half of the trees in Vermont are host species of one of these three invasive insects.[18]



Map provided by VTinvasives.org and current as of June 2020.

Emerald ash borer (shown above)

Emerald ash borer (EAB), *Agrilus planipennis*, is an exotic beetle that was discovered in southeastern Michigan near Detroit in the summer of 2002. The larvae feed in the cambium between the bark and wood, producing S-shaped galleries that girdle and kill branches and trees. Emerald ash borer probably arrived in the United States on solid wood packing material carried in cargo ships or airplanes originating in its native Asia. It first came into Detroit and killed off all the ash trees in the city, which had been planted after the city's elm trees had been killed by Dutch elm disease. The United States Department of Agriculture Animal and Plant Health Inspection Service (APHIS) does inspections at ports and terminals, but only inspects about 7% of materials coming into the US. Emerald ash borer has spread rapidly in the United States, killing millions of trees. Wilmington is at high risk for an infestation of EAB, and may have confirmed EAB in the southwestern corner. EAB is located in the adjacent towns of Readsboro, Searsburg and Whitingham, and in Londonderry not far to the north within the state. Tourists or second home owners may also bring EAB and other invasives from out of state. Strict regulation of not transporting firewood is one way to slow the spread. Carefully planning

[18] vtinvasives.org (accessed 2/20/15)

and managing the movement of infested or potentially infested material will slow the spread and provide greater protection for uninfested forests. EAB is currently present in 33 states (most recently in Maine).

White ash is one of the ten most common tree species in Vermont, so this insect will have a major impact in Vermont. EAB only feeds on Ash trees, but that is 7% of Vermont's tree species. EAB can travel faster than Asian longhorned beetle. EAB is often moved around on firewood that people transport. Eradicating the insect on wood requires heating it to at least 140 degrees or higher for greater than 60 minutes.

Signs and Symptoms: Symptoms and signs include D-shaped adult exit holes, bark splitting, serpentine frass-filled (sawdust-like waste) feeding galleries, wood pecker feeding, crown dieback, and epicormic shoots (whips growing off the trunk and branches). Many of these symptoms and signs are similar to other insects and diseases of ash.


Blonding with pecked holes on ash trees is a sign of EAB infestation.

EAB essentially girdles the ash trees, killing them. It lives between the inner bark and the wood, so it isn't that deep. Woodpeckers like feeding on EAB, but the woodpecker population isn't large enough to significantly impact the EAB population. Also the woodpeckers don't generally detect the insects in the trees until they have been present for about two years, which is too late to save the tree. One of the best diagnostic methods for detecting EAB is called "blonding". "Blonding" is a clear symptom of EAB infestation. It occurs when woodpeckers, while foraging for the succulent EAB larvae, flake off outer layers of bark, revealing the lighter or blond-colored inner layers of bark.[19]

A native ground-nesting wasp, *Cerceris fumipennis*, is providing a handy solution to the EAB detection problem. This wasp will prey on the adult emerald ash borers (as well as related native beetles) and carry them, paralyzed, back to its burrow. The paralyzed beetle is then stored underground as food for the wasp's larva.

Green Mountain Power spends a lot of time and has a dedicated crew that takes down ash trees both proactively and reactively in areas of confirmed EAB infestation. They do not have the resources to invest in areas that don't have confirmed cases, so ash trees of concern would need to be dealt with by private contractors and removal paid for privately or by the town in those non-infested areas, such as Wilmington. EAB presents an expensive conundrum for many towns, and for Green Mountain Power.

Hemlock woolly adelgid

The hemlock woolly adelgid (HWA), *Adelges tsugae*, is a tiny insect from east Asia that attacks forest and ornamental hemlock trees. It feeds on young twigs, causing needles to dry out and drop prematurely. Trees may die in four to six years. Some survive, but with sparse foliage, losing value as shelter for wildlife and their ability to shade streams.

[19] University of New Hampshire Cooperative Extension – Blonding on Ash trees information sheet. <http://extension.unh.edu/resources/files/Resource004103_Rep5824.pdf> Accessed 3/2/15.

The HWA first arrived in the southeast U.S. and spread to the northeast through the Long Island Sound. Sustained cold leads to kill off of the adelgid insects. Mortality rates of even 91%, however, can still lead to population growth through the warm season because they reproduce asexually so it only takes one for the population to expand. The HWA mortality rate shifts each year based on temperature patterns throughout the year, especially cold winter temperatures cause die off.

HWA is present in Wilmington, including in the State Park. In the Windham region, it was initially found in Brattleboro and the Guilford area. It is now found in 14-15 Windham Region towns, and has been recently found in Springfield in Windsor County. It has not been found in Weston, Winhall, Somerset, Searsburg or Readsboro. HWA is moving south to north in lower elevations first, and is mostly throughout southern Vermont at this point. Dead or dying hemlocks are a sadly regular sight in the region. It was first found at the SIT campus in 2010 and is now found throughout the town of Brattleboro.

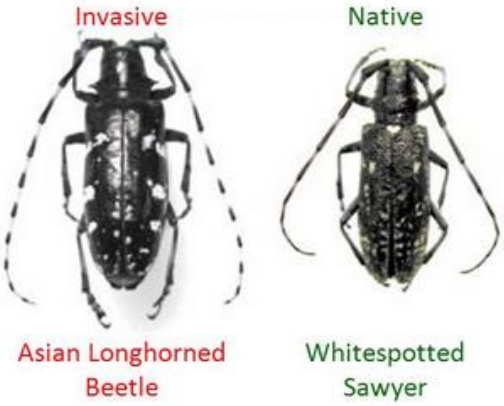
Hemlock trees and even whole stands are showing signs of decline, but trees in Vermont have not been reported to have been killed from HWA alone. Foresters have been watching infested trees for eight years, and the trees haven't been killed yet most likely because winter temperatures kill off enough of the HWA to give the tree a temporary reprieve. HWA does weaken the trees to the point that other secondary stresses, such as funguses and disease, may result in their mortality. Another pest, Hemlock elongate scale was found recently for the first time in Guilford, Vernon and Brattleboro.

Asian longhorned beetle[20]

The Asian longhorned beetle (ALB), *Anoplophora glabripennis*, is an invasive insect that feeds on certain species of hardwood trees, eventually killing them. Also known as the Starry Sky or Sky Beetle, the ALB is native to eastern Japan, and Korea. It was brought to the US, to New York City first, in packing material from Asia. ALB attacks a variety of native hardwood species, including maple, birch, elm, poplar, horse chestnut and willow. ALB prefers maples and does not like trees in the oak family. Upon hatching, the larvae tunnel through the heartwood of a host tree until fully grown. They then burrow out of the trunk as adult beetles. This process weakens the wood, making it prone to breakage, and can cause tree health to decline. Outbreaks of this beetle pose a severe threat to even perfectly healthy trees in both forests and urban and suburban landscapes. The beetle has caused tens of thousands of trees to be destroyed in Illinois, Massachusetts, New Jersey, New York and Ohio. Trees that aren't destroyed by people trying to prevent the spread are usually killed by the pest within a couple years. About half of

[20] http://www.maine.gov/dacf/php/caps/ALB/ALBdamagepics.shtml

Vermont's trees are susceptible to Asian longhorned beetle. This insect will have a major impact if it becomes established in Vermont.



Signs and Symptoms of Infestation: Oval to round wounds on the bark where the females have chewed out a site to deposit their eggs. Round emergence holes in the trunks and branches of trees. Piles of coarse sawdust at the base of trees.

The closest area to the Windham region that has the pest is Worchester County, Massachusetts in 2008. They have an active quarantine and public notification campaign about the pest.[21] They are having to destroy every host tree, infected or not, and will be replanting with oaks. Boston had a small outbreak which they believe was caught in time. New York and Ohio also have quarantines in effect in their boundaries to prevent the spread. ALB has not been detected in upstate NY or in NH. It is difficult to spot infected trees from the ground, so inspectors need to climb trees. To treat wood for transport it needs to be heated to at least 160 degrees for longer than 75 minutes.

Impact

The impacts of invasive species have ripple effects that go on and on. Hemlock is a foundation tree species, and when it goes away invasive plant species tend to take over, causing wildlife habitat and water quality to decrease. Deer use hemlock stands to winter over in because of the cover a healthy tree provides, so there could be a detrimental impact to the deer population, and hunting, caused by the loss of hemlock. Hemlocks provide shade to waterways, so their loss could mean warmer streams and lower water quality, potentially impacting aquatic life. The hemlock isn't a comparatively very valuable wood product, but it is used for logging and wood products, so there are economic threats to its loss. The large deer population is causing the loss of new trees to regenerate the forest hardwoods, thereby leaving vulnerability for invasives to come in.

Ash logs are more valuable than hemlock logs, but the bigger concern with the loss of ash is the cascading ecological impacts. There are over 40 arthropod obligate species that are threatened by the loss of ash trees (they depend on ash for their survival), and ripple effects of the loss of these arthropods and the interrelationships aren't even fully known at this point. Ash is a valuable tree for wood products and logging, so the economic impacts could be severe, not to mention the cost to towns for removing dead or dying trees and the aesthetic and community open space impacts caused by their loss. Ash trees are about 12% of the forest cover in Vermont, and there are pockets of lots of ash in Wilmington. Wilmington has not done an ash tree survey to know where vulnerable trees are located. They have also not completed an EAB plan. Interested private citizens can obtain purple traps for assistance with early detection of EAB on their property.

The loss of maple trees to ALB, could mean a devastation to the maple industry, which is a big industry in Vermont, including in Wilmington. A lot of people sugar in Wilmington, not all commercially, but it is a big activity in town. Economic impacts could be great. Sap can't be used once a maple is treated with insecticide, and the lag time before it can be used again is

[21] http://www.worcesterma.gov/city-manager/asian-longhorned-beetles. Accessed 3/2/15.

unknown. Fall foliage tourism is a big draw for visitors to Vermont and this would be big loss of "leaf peepers" who are a big driver of the economy for the area.

Probability

As mentioned earlier in this section, emerald ash borer and hemlock wooly adelgid are currently known to be present in the state of Vermont. Asian longhorned beetle has been found within fifty miles of Vermont's border. Wilmington's proximity to a known EAB infestation area makes the Town highly susceptible to EAB. HWA has been confirmed in Wilmington and 13-14 other towns in the Windham region. Additionally, certain invasive plant species are present in every town in the region.

Extent

Over half of the trees in Vermont are host species of one of these three main pests, so the potential impact is great. EAB only feeds on Ash trees, which are 7% of Vermont's tree species and a strong component of beech/birch forest stands. Southeastern Vermont has primarily white ash and green ash, while black ash are less common here, they are found more so to the north. Green ash is common in urban environments because they are good shade trees and do well in an urban setting. Newfane is an example of a town in the Windham region that has planted a lot of green ash trees, so they are particularly vulnerable to EAB.

Ash planted on roadside rights of way have the highest potential for infestation of EAB. There is the potential for hundreds of dead Ash trees along roadways throughout the state and near extinction of Ash trees. The current mortality rate is 99.8% of trees. Cutting dead trees is a very hazardous activity and the potential for a lot of dead trees along road ways is a concern for protecting public safety and infrastructure. Green Mountain Power expects EAB to severely impact their grid over time, so they are proactively removing vulnerable Ash trees near their power lines in confirmed affected areas. Areas that haven't been confirmed must contract for tree removal for trees they are concerned with.

Being proactive is key for stopping, or at least curtailing, the spread when pests are detected. Inventories of roadside ash trees are a good thing for towns to do now. Training road crews to identify threats and who to alert of outbreaks is also a good idea. Numerous towns (including Brattleboro) in Vermont have developed EAB preparedness plans. Ash trees can be treated to prevent EAB, and weighing the cost of proactive treatment versus removal of dead trees and replacement is something a community must consider.

There are EAB insecticides that are registered for use in VT and they are fairly effective at protecting trees, but they have to be applied to each tree individually so this isn't practical to protect all ash trees in a forest environment, but is a good option for an urban tree canopy. Additionally, trees have to be retreated every one to two years because of the insect's life cycle. ALB eradication is to cut and chip all the trees that are infested. There is another insecticide that works for ALB, but it is only effective if the tree is treated before the larvae burrow too deeply into the wood beyond the tree's vascular system. The ALB larvae spend a lot of time in the interior wood, out of the vessel system of the tree so they aren't exposed to the insecticide.

The worst example of the potential impact of ALB infestation in the U.S. is Worchester County, Massachusetts. This problem has been going on since 2008, although upon detection it was well established, as much as 15 years went by before it was discovered. The Massachusetts ALB Cooperative has confirmed a regulated area of 110 square miles, which has been expanded over time from the original 17 square miles considered infested. This area is under

strict regulation by order of the Commonwealth of Massachusetts, no one can cut, move, harvest, carry, transport or ship firewood, green lumber and other material within or outside of the affected area unless authorized. These are significant restrictions, so the impact of ALB detection should be taken very seriously as it affects numerous hardwood species.

ALB can be eradicated when discovered early. It is usually found in industrial settings, because it usually arrives in pallets from an Asian shipment. ALB is now being moved around through human activities, especially through the movement of firewood. It is easier to detect ALB than EAB because the ALB is larger.

Invasive plants are also a threat to the ecology and economy of Wilmington. Invasive plants are present in Wilmington. Long-standing and spreading forest threats in the Windham Region are glossy buckthorn, purple loosestrife, Japanese barberry, multi-flora rose, Japanese knotweed, cow parsley, and garlic mustard, and Asiatic bittersweet. There are more and more invasive plants moving up along roadways and waterways from lowland areas. All threaten forest regeneration, and multi-flora rose and Asiatic bittersweet can destroy mature trees. Smaller invasive plants such as garlic mustard, purple loosestrife, and goutweed present a threat to native herbaceous plants. The health threat posed by Japanese barberry should be noted: According to Jeffrey Ward, Chief Scientist at the Connecticut Agricultural Experiment Station, a forest infested with Japanese barberry harbors an average of 120 black-legged ticks per acre while a forest without barberry harbors an average of only 10 black-legged ticks per acre. Black-legged ticks are known to transmit the causal agents of several diseases, including Lyme disease. TS Irene spread a lot of invasive plants around the region through the transport of seed material from various sources, including flood waters. Logging, and particularly clear cutting, create areas that are particularly susceptible to invasives. Logging is a frequent occurrence in Wilmington as approximately 78% of the town is forestland. Logging is recognized as an important industry in Wilmington and statewide.

VTinvasives.org is a great resource for towns interested in engaging in activities around invasives, including using their template to develop a custom invasive species plan for your town.[22] The idea is to continue to create as much awareness as you can so residents know who to call when they see things. The sooner an outbreak is found, the better the chances of containment. Bio-controls are being worked out currently but aren't yet a solution. Insect pests are often found first by concerned citizens, arborists and foresters.

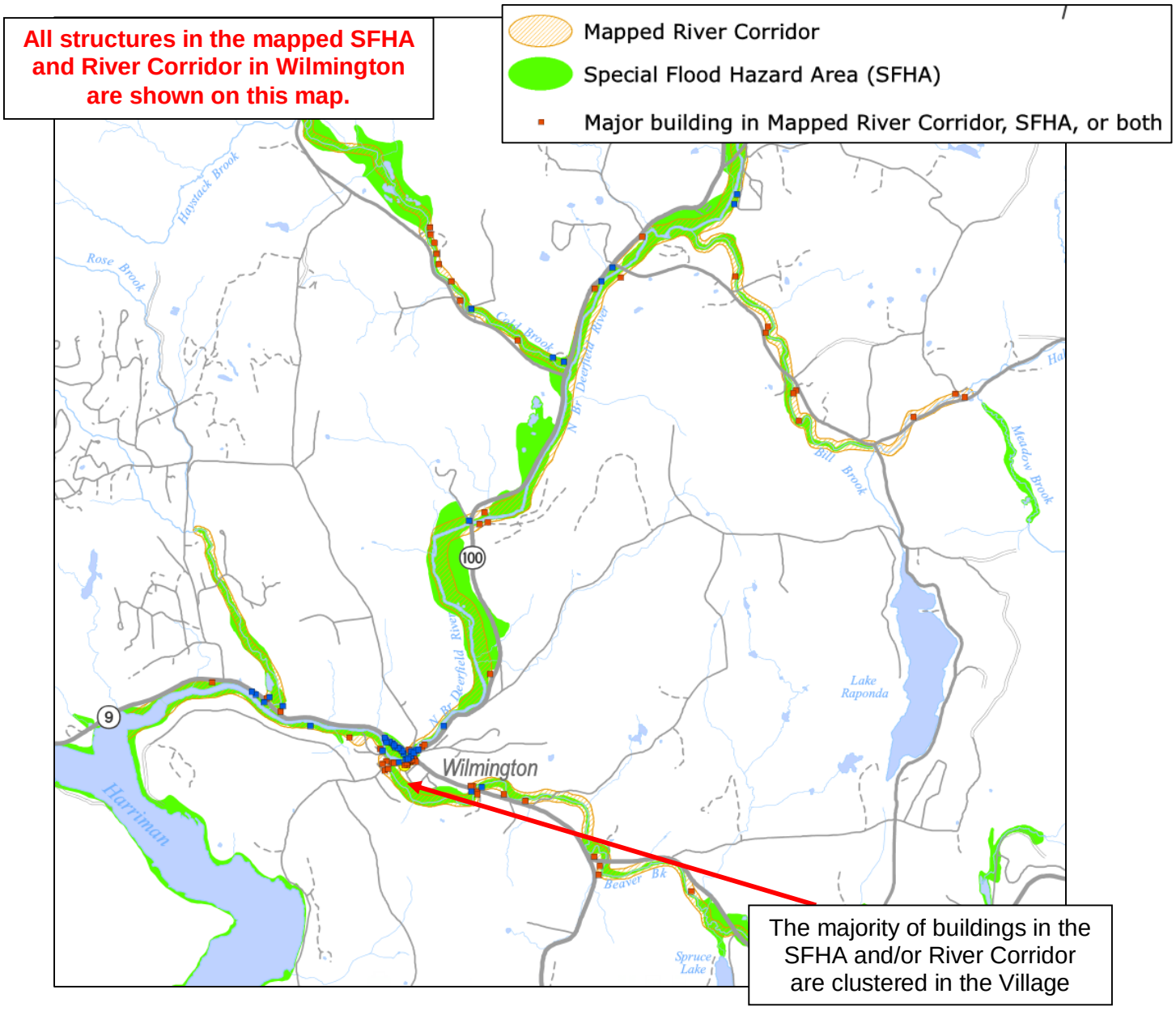
Sources Used
Email with VT State Forester Jim Esden on 2/21/20 (802-885-8822 or jim.esden@vermont.gov); Email with Windham County Forester Sam Schneski on 2/21/20 (sam.schneski@vermont.gov); Interview with Windham County forester Bill Guenther on 3/2/15 (802-257-7967 or bill.guenther@vermont.gov); Interview with First Detector Jordan Fletcher on 4/29/15; VT Fish and Wildlife website; VTinvasives.org; Cerceris.info webpage; Maine Forest Service webpage[23]; Images courtesy of Google images and Maine Forest Service.

[22] < http://www.vtinvasives.org/tree-pests/community-preparedness>
[23] http://www.maine.gov/dacf/mfs/forest_health/invasive_threats/index.htm

ASSESSING VULNERABILITY

Structures in the SFHA or River Corridor

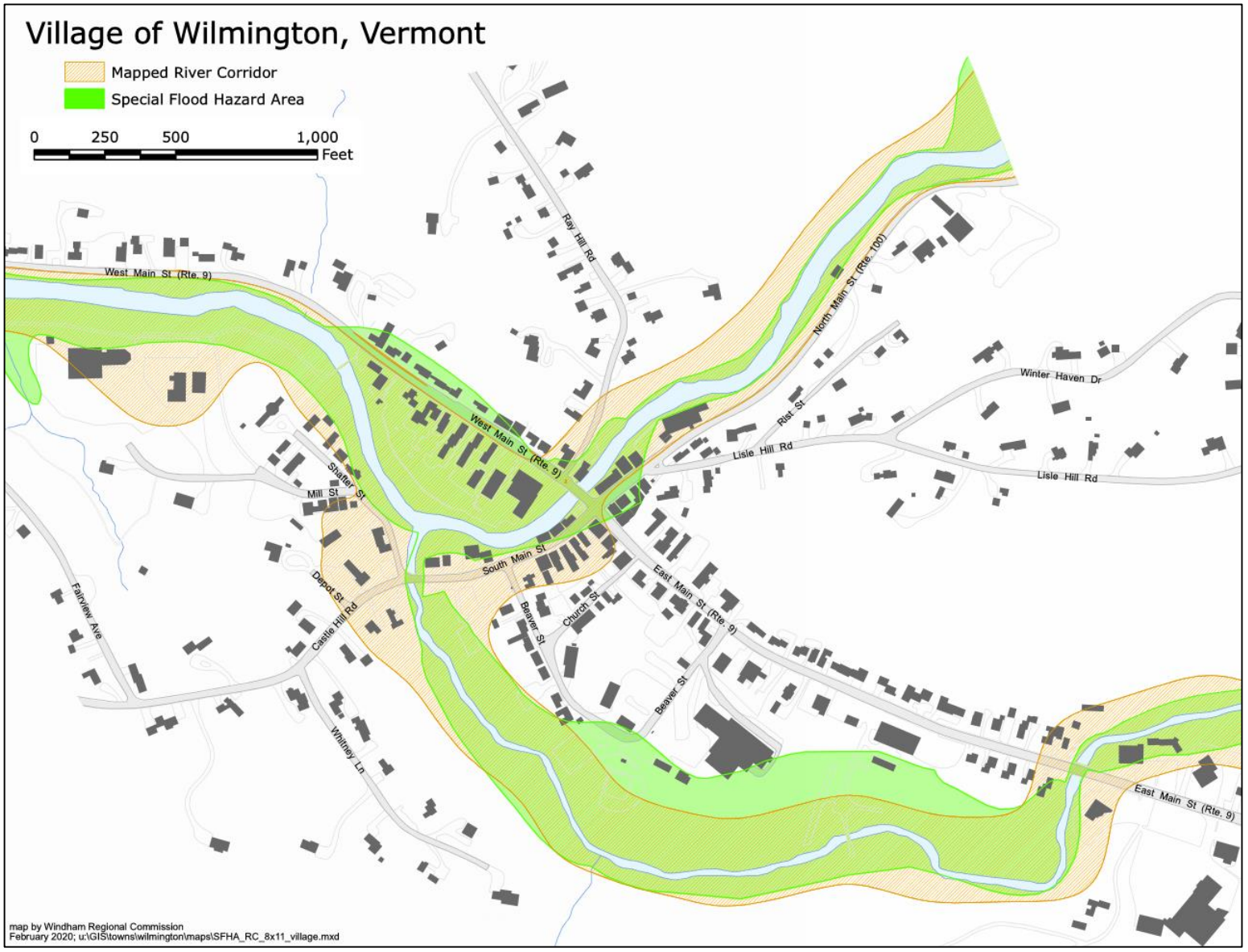
There are 100 buildings within FEMA-designated Special Flood Hazard Areas (SFHAs).[24] There are 97 structures that lie in the River Corridor, some which may also be in SFHAs. The map below shows the location of these structures. The affected structures are primarily in the Village center, with some also along Routes 9 and 100 outside of the Village, and along Coldbrook Road and Higley Hill Road. Public infrastructure vulnerabilities in Wilmington are primarily to roads and other associated infrastructure. There are five reporting Tier II facilities located in the SFHA. Tier II facilities are facilities that house or use hazardous chemicals on their premises.



[24] 2020 Flood Hazard Summary Sheet for Wilmington

Structures within SFHAs, that are under a mortgage, are required to purchase flood insurance. Wilmington's participation in the National Flood Insurance Program (NFIP) gives residents access to discount flood insurance through the National Flood Insurance Program. Flood insurance can still be purchased privately, however, it is more expensive. Development in SFHAs must meet additional construction standards as outlined in Wilmington's floodplain regulations, which is part of their zoning ordinance and was most recently adopted in 2016.

Below is an inset map of the Village, showing building footprints in relation to FEMA SFHA and ANR mapped River Corridor.



Repetitive Loss Structures

According to FloodReady.Vermont.gov, Wilmington has had 8 repetitive loss claims.[25] Information about what type of properties these claims pertained to was not available due to access rights issues that the State of Vermont is currently working on with FEMA. A repetitive loss structure is an NFIP-insured structure that has had at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978.[26] Severe repetitive loss (SRL) structures are NFIP-insured buildings that, on the basis of paid flood losses since 1978, meet either of the loss criteria described in the SRL section. SRL properties with policy effective dates of January 1, 2007 and later will be afforded coverage (new business or renewal) only through the NFIP Servicing Agent's Special Direct Facility (SDF) so that they can be considered for possible mitigation activities. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

- That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or
- For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.
- For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.

Participation in and Compliance with the National Flood Insurance Program (NFIP)

The National Flood Insurance Program (NFIP) is a voluntary program organized by FEMA that includes participation from 20,000 communities nationwide and 247 Vermont towns and cities. Combined with floodplain mapping and floodplain management at the municipal level, the NFIP participation makes affordable flood insurance available to all homeowners, renters, and businesses, regardless of whether they are located in a floodplain.

The NFIP was instituted in 1968 to make flood insurance available in those communities agreeing to regulate future floodplain development. As a participant in the NFIP, a community must adopt regulations that: 1) require any new residential construction within the 100-year floodplain to have the lowest floor, including the basement, elevated above the 100-year flood elevation; 2) allow non-residential structures to be elevated or dry flood proofed (the flood proofing must be certified by a registered professional engineer or architect); 3) require anchoring of manufactured homes in flood prone areas. The community must also maintain a record of all lowest floor elevations or the elevations to which buildings in flood hazard areas have been flood proofed.

In return for adopting floodplain management regulations, the federal government makes flood insurance available to the citizens of the community. In 1973, the NFIP was amended to mandate the purchase of flood insurance as a condition of any federally regulated, supervised or insured loan on any construction or building within the 100-year floodplain. In 2012, Congress passed the Biggert-Waters Flood Insurance Reform Act to reduce subsidies for structures built

[25] Report listing repetitive losses is available here:
<http://floodready.vermont.gov/sites/floodready/files/documents/cisrpt_RL%206.26.18.PDF>
[26] https://www.fema.gov/national-flood-insurance-program/definitions

before the NFIP was instituted (called pre-FIRM structures). Over 50 percent of Vermont's NFIP policies are pre-FIRM, which means that flood insurance premiums for many will increase over the ensuing years.

While the NFIP floodplain management criteria are administered by states and communities through their floodplain management regulations, FEMA's role is to provide technical assistance and to monitor communities for compliance with the minimum NFIP criteria. Wilmington joined the NFIP on May 1, 1978 and is a member in good standing (CID 500142). The latest floodplain ordinance was adopted in August 2007 and is in the zoning ordinance. The latest Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) referred to in the development of this plan have an effective date of September 28, 2007.

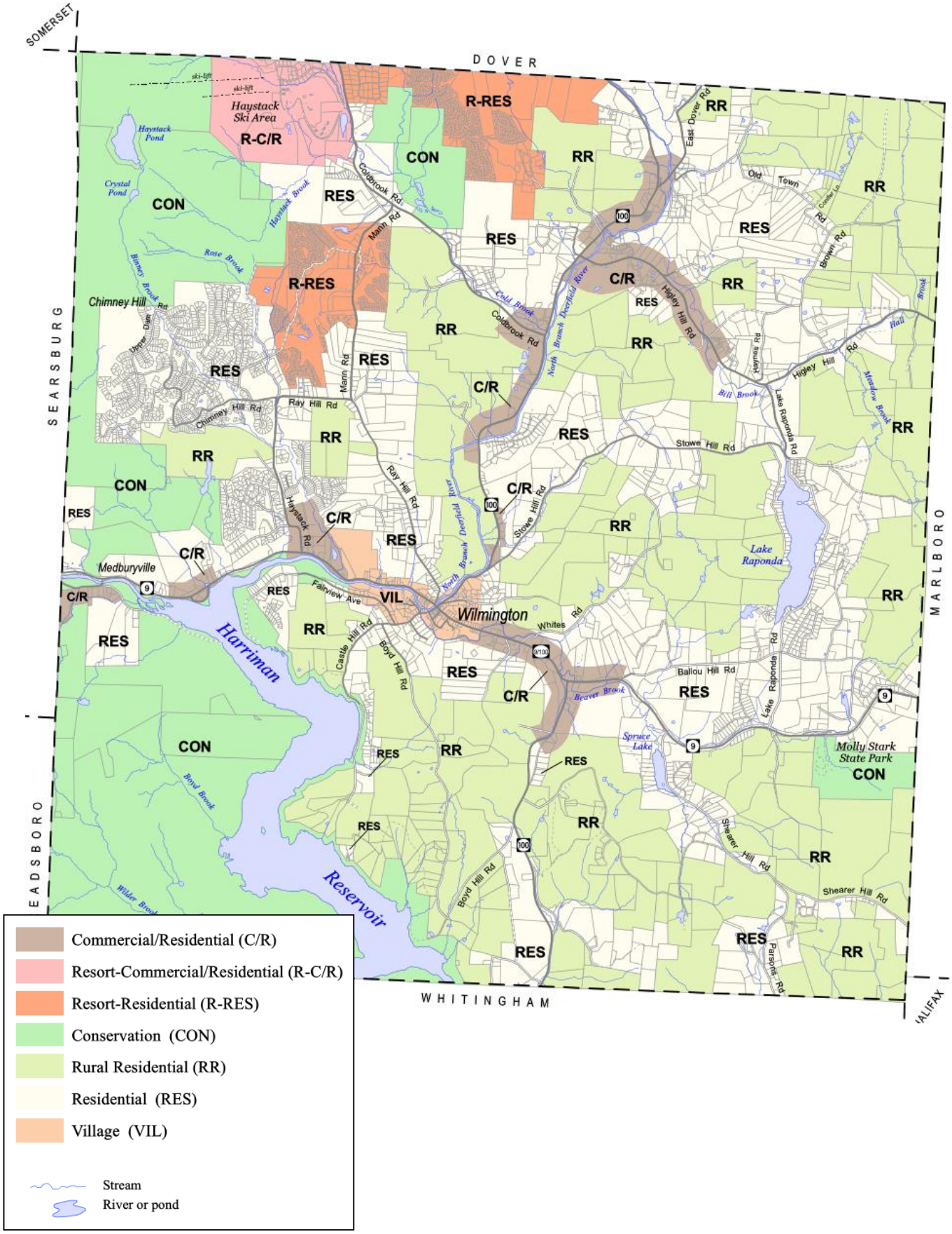
The latest record indicates that there are thirty-eight (38) active NFIP policies in Wilmington, with thirty-two (32) of those policies being for buildings in the SFHA and six (6) for buildings outside the SFHA. These policies have a total value of $7,942,500. There have been forty-nine (49) NFIP claims filed in Wilmington since joining the NFIP with a total payout of $3,196,969.[27] Wilmington may want to do public outreach to encourage the purchase of flood insurance for people in the River Corridor and the FEMA 500-year floodplain (Zone X on the FIRMs). Flood insurance is reasonably priced in these areas, and covers damage from fluvial erosion, as well as inundation flooding. Nearly 20% of flood insurance claims nationally are for flood damage to buildings located outside the SFHA.

The Town works with the elected officials, Windham Regional Commission, the state and FEMA to correct any compliance issues and prevent further NFIP compliance issues through continuous communications, training and education. The NFIP is administered locally by the Zoning Administrator, who also fulfills the role of Floodplain Administrator.

TS Irene Flooding on West Main Street (Route 9) in the Village. Photo taken by Kristin Trudeau

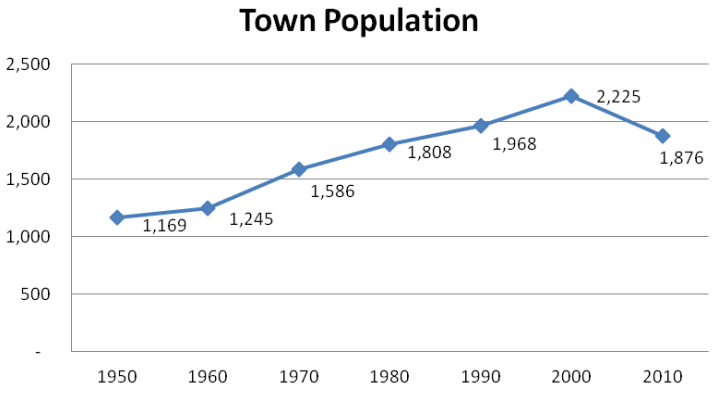
[27] FEMA NFIP Insurance Report, June 2018, accessed June 12, 2019. http://floodready.vermont.gov/sites/floodready/files/documents/cisrpt_NFIP%206.26.18.PDF

Proposed Land Use Map from 2018 Wilmington Town Plan



Development Trends

Wilmington's population fell by 16% between 2000 and 2010.



From 2000 to 2010, the number of housing units in Wilmington rose from 2,232 to 2,493, a 12% increase, while total households fell from 992 to 866, a 13% decrease. Approximately 62% of Wilmington's housing units are seasonal homes, some of which are also used for short term rentals. This goes to show just how much Wilmington relies on tourism, and how much the population can vary from mid-week to busy ski weekends. There is a designated downtown in Wilmington as well as a public school. With proximity to both Haystack and Mount Snow, these are the primary draws for purchases of second homes in the town. The Towns sees a few new home permits per year, including some redevelopment. New development is primarily residential and second homes. Workforce housing availability is an issue in the town, and region generally. Aging in place options are also limited. The town wishes to attract families. The school age population is dropping within the schools. There could be better connectivity between the school and town in planning efforts.

The Hermitage is a private ski resort located in Wilmington. In recent years there have been ownership changes and recently the Resort was bought by a membership consortium. How this will play out remains to be seen at this point, but there is a lot of the town at stake as the former ownership had also purchased a number of local business establishments which the new ownership will have to decide what to do with.

Wilmington does have zoning. The development pattern has not changed appreciably over the years, so the historic settlement pattern remains predominant, and unfortunately much of the built environment in Wilmington is located along Routes 9 and 100 and within land vulnerable to flooding and fluvial erosion. New development has merely extended along the road frontages in all sections of town. There is only about one new building permit issued per year. Taxes are considered high so building or owning a home in Wilmington is expensive. Property values are high, due to the proximity to the resorts, which affects everyone's ability to buy a home or maintain living in Wilmington. The median gross monthly rent for the period 2012-2016 was $1,072. In comparison, Windham County's median gross monthly rent was $849.

Since the prior Local Hazard Mitigation Plan, Wilmington has made a number of changes to lower vulnerability. There are fewer vulnerable structures due to buyouts, floodproofing, and loss of the structure from flood damage. The Town has put a concerted effort towards reducing vulnerability of road and bridge infrastructure. Hard to solve vulerability issues do remain, both for road and building infrastructure. Wilmington can expect to experience future damage primarily to the buildings and infrastructure that remain in the floodplain and fluvial hazard area. The Town did consider in 2019 adopting a fluvial erosion hazard bylaw, to regulate prevent and regulate future development in this hazard zone, but the Selectboard voted not to approve the bylaw. There is a lot of development in the floodplain and River Corridor that remains at risk.

MITIGATION STRATEGY

Local Hazard Mitigation Goals for this Plan

The below Hazard Mitigation Goals, which were contained in the prior Wilmington Local Hazard Mitigation Plan, were reviewed by the planning participants as part of the Plan update process. The participants unanimously felt that the overall goals outlined here remain the town's overall hazard mitigation goals.

- Reduce the loss of life and injury resulting from all hazards.
- Reduce the impact of hazards on the town's water bodies, natural resources, and historic resources.
- Reduce the economic impacts from hazard events.
    - Minimize disruption to the road network and maintain access,
    - Mitigate financial losses incurred by municipal, residential, industrial, agricultural and commercial establishments due to disasters,
    - Ensure that community infrastructure is not significantly damaged by a hazard event.
    - Be proactive in implementing any needed mitigation projects for public infrastructure such as roads, bridges, culverts, municipal buildings, etc.
- Encourage hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan and Town Local Emergency Management Plan.
- Ensure that members of the general public continue to be part of the hazard mitigation planning process.

In addition to the above goals, there were two specific problem statements and goals listed in the 2015 Wilmington Local Hazard Mitigation Plan. Here again are the problem statements and goals (restated in the original language), along with the current status for each:

Problem Statement 1:

The Town does not have a good flow of communication between emergency/road departments, who are practiced at responding to hazard events, and the town official/administrative level who are not as familiar with the ICS command structure and system of responding to hazard events. The town does not have a COOP & COG, nor an emergency notification tree. Communication going to and from the State Emergency Management office is unclear at best, which means that the town does not have a proper conduit to State emergency personnel. The Town would like to have a way to inform everyone when a possible hazard event is expected, particularly before a widespread power outage.

Goals and Strategy 1:

- To make Wilmington more autonomous for at least 96 hours – able to function and respond via local emergency personnel and help from adjacent communities – without need for State aid.
- Train Town Officials in ICS NIMS – so people will know the proper flow of command.
- Designate a Red Cross Emergency Shelter
- Continue to have coordination and informational meetings prior to any potential hazard event.

Current Status:

The lines of communication have improved over the years. The EMD is engaged and connected both internally and externally with other towns and the SEOC. There aren't

structures in place for all contacts, but the town is small enough that this is not entirely necessary. The EMD is known locally for being a quality department head and has pushed positive actions forward in the community, and he is adapting the changing needs of fire safety. There appears to be more community support and connection with fire safety rather than the local police department.

Goal 2:
Eliminate or reduce damage to municipal structures and prevent the interruption of town functions.

Strategy 2:
Relocate Fire, Police and Town Offices to newly closed down Twin Valley High School, which is a large enough facility for these offices, and out of the floodplain.

Current Status:
The Town is in the design stage for a relocated Fire/Police building to be outside of floodprone areas. The possibility of relocating the Town Offices outside of the floodplain is in the future but no plans are in place currently for this project.

Town Plan Policies and Recommendations that Support Mitigation

The 2018 Wilmington Town Plan presents an indirect focus on mitigation, which is highlighted by the number of policies and action items that relate to mitigation. I will mention them here, but not include the entire section that they are a part of:

FLOOD RESILIENCE
Policy 1: Protect river corridors, floodplains, wetlands, and upland forested areas to moderate flooding and fluvial erosion.

Action 11.1.1: Identify Flood Hazard Areas and River Corridors. Develop an updated Flood and Fluvial Erosion Hazard regulation aligned with state and local goals to protect and preserve these areas.
Action 11.1.2: Work with the Agency of Natural Resources and Army Corp of Engineers on stream and river management.
Action 11.1.3: Promote, continue and expand agricultural and forestry operations.

Goal 11: Make Wilmington a flood resilient community.

Policy 2: Provide Flood Hazard regulations to protect residents and infrastructure from flooding loss.

Action 11.2.1: Expand Flood Hazard District zoning regulations to minimize flood hazard development risk.
Action 11.2.2: Remove floatables from the floodplain through regulation and by working with property owners where floatables are grandfathered as an existing use or protected through agricultural or silviculture protection regulations.
Action 11.2.3: Adopt River Corridor Protection regulations aligned with state and federal goals to ensure maximum state and federal funding availability in the event of a flood.

Policy 3: Flood emergency preparedness and response planning are encouraged.

Action 11.3.1: Hold public meetings to review Emergency Preparedness plans for the community, so all will understand what will happen in the event of a flood.
Action 11.3.2: Annually update the Local Emergency Operations Plan.
Action 11.3.3: Update local Hazard Mitigation Plan as needed to comply with FEMA requirements.

Policy 4: Protect town infrastructure from flood damage to ensure uninterrupted commerce during a flood.

Action 11.4.1: Install 100-year flood size culverts, where feasible, replacing the 25-year flood culverts currently in use.
Action 11.4.2: Move key public services out of the flood hazard areas.
Action 11.4.3: Expand economic development outside of the flood hazard areas.
Action 11.4.4: Assess opportunities for reducing flood obstructions at the West Main Street Bridge.
Action 11.4.5: Explore working with Agency of Natural Resources (ANR) to refine River Corridor mapping.

Natural Resources
GOAL 13: Manage Rivers, streams and waters in conformity with state and federal guidelines.

Policy 1: Promote all state and federal guidelines on river, stream, lake, pond, and wetland management.

Action 13.1.1: Explore the adoption of river and stream management regulations.
Action 13.1.2: Identify riparian buffers along waterways, streams, rivers, ponds, and lakes. Develop regulations to protect against pollution and erosion and ensure the preservation of water quality and wildlife habitat. Prohibit new development in buffer areas not yet developed.
Action 13.1.3Conform to the Vermont Shoreland Protection Act.
Action 13.1.4: Assess local vs. state oversight role for the Shoreland Protection Act.

Past and Ongoing Mitigation and Maintenance Efforts

Below is an update on prior identified hazard mitigation projects that were listed in the 2014 Wilmington LHMP. The planning participants reviewed these actions at two meetings in November and December of 2019 and provided the current status on each item. Current status is listed here in the last column, and prioritization changes are called out where applicable. Overall prioritization changes between plans had to do with the hazards that the community addresses, no longer looking to address high winds or snow/ice storms, and adding in invasive species.

HAZARD	MITIGATION ACTION	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE	PROJECT PRIORITY	CURRENT STATUS AS OF DEC 2019
Flood	Replace 72” culvert with hydraulically correct size #157 on Coldbrook Road	Highway Dept.	1 year	Structures Program Grant	High	Completed in 2017.
Flood	Replace 132” culvert with correct hydraulic size #158 on Coldbrook Road	Highway Dept.	1 year	Grant	High	This has not yet been done and remains a high priority item (located by Brook Bound Inn)

HAZARD	MITIGATION ACTION	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE	PROJECT PRIORITY	CURRENT STATUS AS OF DEC 2019
Flood	Remove debris on southeast side of the [Route 9] bridge that is impeding flow	VTrans	1 year	VTrans	~~High~~	This is no longer a continuing issue. No longer a mitigation action the town wishes to pursue.
Flood	Update zoning ordinance to add flood and economic resiliency elements	Town Manager / WRC planner	1 year	Town budget/ dues to WRC	High	This is ongoing and remains a priority for the Planning Commission. Recent attempt to add river corridors to flood hazard bylaw did not pass SB vote.
Flood	Digitization of Town Records	Town Manager	1 year	CDBG DR grant	High	Within the last 2 years, land records have been digitized and are now stored in off-site electronic storage. The vault is still on the first floor of the building and is not waterproofed. Police department records have been digitized and are now stored electronically off-site.
Flood	Acquisition Project of 130 Rt. 100 North	Town Manager	Immediate – upon approval	HMGP Funding	High	Completed. This was a welding shop.
Flood	Buy out/Acquisition of 3 Shafter Street	Town Manager	Immediate – upon approval	HMGP Funding	High	Completed. This was a home.
Flood	Relocation of Fire and Police Department out of floodplain	Town Manager	2 years	Partially CDBG DR grant	High	This is in process now. This is moving into the RFP phase for design feasibility. The potential site is 41 Beaver Street. This will be completed ideally within 3-5 years.
Flood	Dry Flood Proof North Star Bowl & Pizza	Town Manager	12 months	HMGP Funding	High	The design is complete but the project is on hold pending funding.
Flood	Replace and widen the bridge in the center of town on Route 9	VTrans	Within 10 years	VTrans	Medium	This is a state highway and the state has not prioritized this in their 10-year plan. The town has no control over this action.
Flood	Relocation of Town Clerk Office for the safe keeping of the Town Records	Town Manager	24 months	Town Budget / CDBG grant	~~Medium~~ Low	There is conversation on this but relocation of emergency services is the highest priority at the moment. This is a low priority, 5-10 years.
Flood	Beaver Mitigation	Highway Dept.	Annually – as needed	Highway Dept. Budget	Medium	Beaver trapping is done as beavers present an issue.
All Hazards	NIMS/ICS Training for Town Officials (Town Mgr. and Selectboard)	Town Manager	2013/2015	Provided by HSU	Medium	Complete.
High Winds	Potentially Hazardous Tree Assessment – Remove dead or dangerous tree limbs near power lines	Road Foremen	Annually	Highway Dept. Funding	Medium	Problem trees are removed as needed, but no formal assessment has been done. Some property owners have put up a fight on removing specific trees. The Town does coordinate with GMP.

HAZARD	MITIGATION ACTION	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE	PROJECT PRIORITY	CURRENT STATUS AS OF DEC 2019
High Winds	Retrofit municipal buildings and infrastructure vulnerable to structural damage from wind or ice	Selectboard	Annually	Town's building Maintenance Fund	Medium	Chimneys on Memorial Hall and Town Hall have been repaired. Removable flood gates are in the town office. No other retrofits planned.
Winter Storm / Ice Storm	Checking of Culverts for debris removal and ice jams	Road Foreman	Annually	Highway Dept. Funding	High	Regular culvert maintenance and cleanouts in spring and fall, and after high water events. This is part of regular maintenance.
Winter Storm / Ice Storm	Education to citizens to keep emergency kits in cars, at home, etc. Education to location of emergency shelter.	Fire Department	Annually	Fire Dept. Budget	Medium	This hasn't happened. Fire prevention program in the school, and preschool. Fire department does some initiatives.
All Hazards	Radio Communications Interoperability for all Town Departments; roads, Emergency Services and Town Officials	Selectboard	2013-2014	HSU funding	~~High~~ Medium	There are a number of compatibility issues with this action, and priority is shifted to medium.

There are certain ongoing efforts in the town that serve to either mitigate for hazards, assist with readiness of town to deal with a hazard, or both. Those efforts are listed here:

1. Leaf removal, tree trimming and culvert/ditch cleaning are maintenance activities done every spring by the road crew. If ditches are being eroded, the crew may also stone line them.

2. The town manages a local emergency operations center (EOC) during disasters.

3. The town maintains one emergency shelter at the Twin Valley Elementary School, and it is capable of being an overnight shelter.

4. Wilmington is a member in good standing of the National Flood Insurance Program. The floodplain ordinance is kept compliant and the town maintains SFHA maps at the town office.

5. Wilmington has a Greeter program on both Lake Raponda and Lake Harriman. With support from Vermont DEC, Public Access Greeters educate lake visitors about invasive species, provide courtesy watercraft inspections and STOP introductions. This has been going on for several years at the Lakes.

Additional Actions Completed

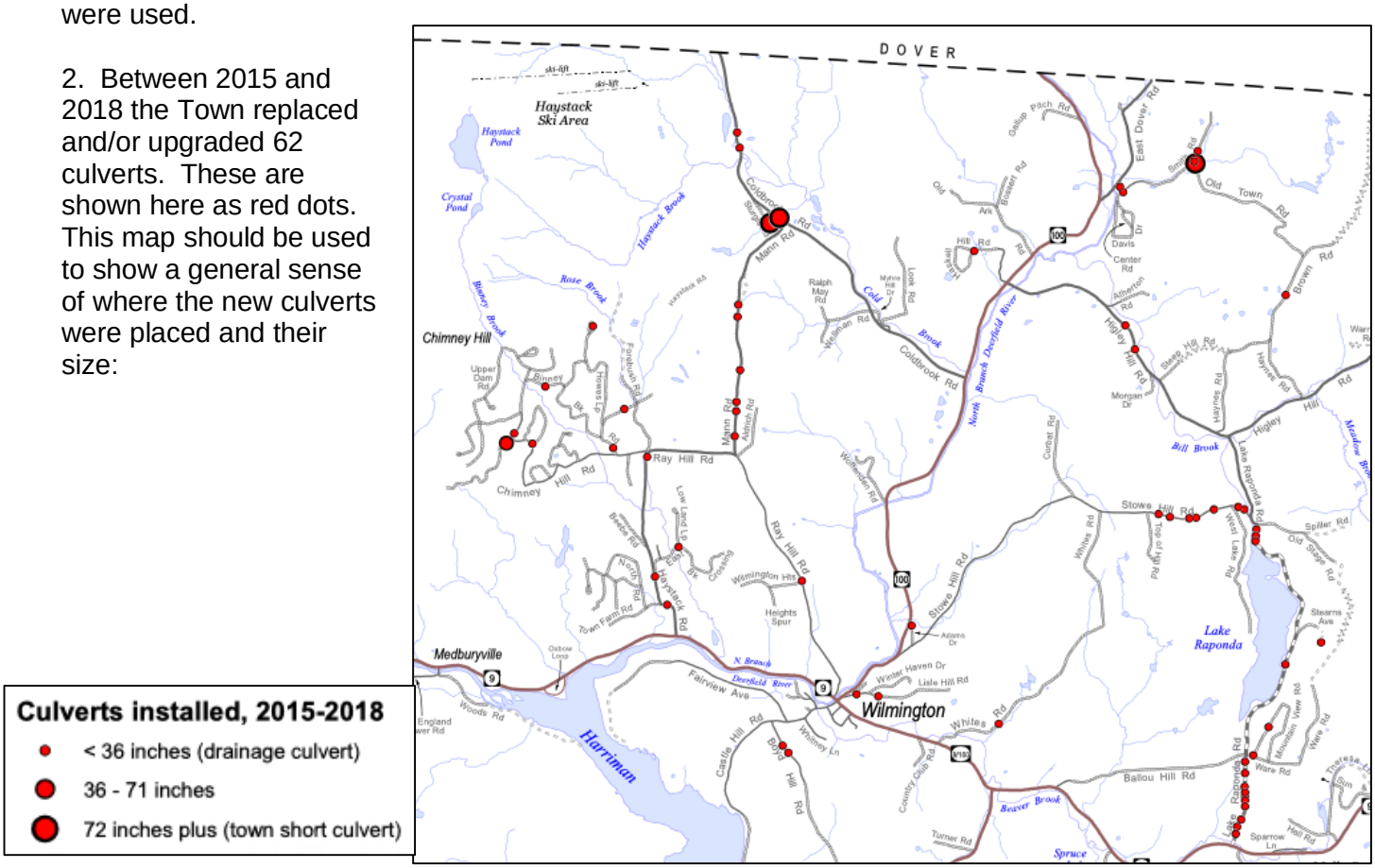
At the time of the prior Plan, there were five properties "in the Village that the Town realizes need future mitigation because they are in the floodplain. This is that list and what mitigation has occurred for each:

1) Dot's Restaurant – was flood-proofed
2) Bartleby's Bookstore – the electrical and heating infrastructure were raised when it was rebuilt
3) Red Mill Inn - the electrical and heating infrastructure were raised when it was rebuilt
4) Craft's Inn – nothing done here
5) Coleman's – this building was destroyed with Irene and not rebuilt

Wilmington completed additional mitigation projects that were not identified in the previous plan:

1. Two sewage pump stations on West Main Street were flood proofed with flood doors, and they had some flood vents raised. This was completed after TS Irene and FEMA HMGP funds were used.

2. Between 2015 and 2018 the Town replaced and/or upgraded 62 culverts. These are shown here as red dots. This map should be used to show a general sense of where the new culverts were placed and their size:



Identification of Mitigation Actions

The Wilmington Hazard Mitigation Planning participants identified the following hazard mitigation activities based on an evaluation of hazard event vulnerability not addressed by existing hazard mitigation initiatives and the feasibility of new activities.

Mitigation actions are listed in priority order by hazard. Actions were prioritized by the plan participants. These are new actions so any shifts in prioritization of actions came out through the multi-year plan development process. The following criteria were used in establishing project priorities. The ranking of these criteria is largely based on the best available information and best judgment as many projects are not fully scoped out at this time. Prioritization was done during the meetings for the plan development in discussions among participants and guided by WRC's Emergency Planner. Actions relating to future development were considered, but the plan participants did not find them to be feasible at this time due to lack of political will/community support.

- Does the action reduce damage?
- Does the action contribute to community objectives?
- Does the action meet existing regulations?
- Does the action protect historic structures or structures critical to town operations?
- Can the action be implemented quickly?
- Is the action socially acceptable?
- Is the action technically feasible?
- Is the action administratively possible?
- Is the action politically acceptable?
- Is the action legal?
- Does the action offer reasonable benefits compared to its cost of implementation?
- Is the action environmentally sound?

Cost-Benefit Analysis

As part of public involvement discussions, there was a rough cost/benefit analysis done for each action listed in the table and those results are shown in the table. The below cost and benefits tables address the priorities for the mitigation strategies that are stated in the Mitigation Actions Table. This was how the mitigation actions were assessed by the Hazard Mitigation Planning participants. Priority was assessed somewhat independently of cost/benefit and was based more on the perceived need of each action and availability of funding, versus what the action costs and benefits.

At the time of applying for FEMA's PDM-C, FMA or HMGP grant programs, each project listed below will undergo full benefit-cost analysis (BCA) methodology, version 5.1 or higher to maximize savings. Whenever possible, Wilmington will utilize 406 mitigation funding.

Cost Estimates

High	= >$100,000
Medium	= $25,000 – 100,000
Low	= < $25,000

Benefit Estimates

High	Public Safety
Medium	Infrastructure/ Functionality
Low	Aesthetics/ General Maintenance

Mitigation Actions Identified by the Hazard Mitigation Planning participants

HAZARD(S) ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPAREDNESS	PRIORITY	Notes / Status
Flooding / Fluvial Erosion	Currently this is a 6' galvanized pipe. It sometimes gets plugged, but there have been 4 events that have overtopped the culvert. The culvert does not meet bank-full width.	Upgrade culvert #33. This will likely need to be replaced by a box culvert. The alignment likely needs to be corrected as well.	Road Foreman would oversee contractors to complete the work	2023 or 2024, but sooner if possible	VTrans grant	Mitigation	High	This has been on the town's list for years. TS Irene. This will need to be engineered. Cost would probably be $1 million.
Flooding / Fluvial Erosion	East Dover Road culvert #6 is 6' diameter corrugated metal culvert currently. It is in poor condition.	Replace East Dover Road culvert #6 with large box culvert or a bridge, depending on ANR's recommendation.	Road Foreman would oversee contractors to complete the work	2022 or 2023, but sooner if possible	VTrans grant - Bridge Structures grant	Mitigation	High	Road Foreman is going to talk with ANR to see if the town can put a cement invert to temporarily support the culvert until replacement.
Flooding / Fluvial Erosion	Inlet is smaller than the outside, the water did top the culverts during TS Irene.	Blue Hill Road two different size boiler tubes, to be replaced with a box culvert (6'x12').	Road Crew	2020, a month to complete during the summer	Better Back Roads grant	Mitigation	High	The grant has already been awarded, the Road Foreman is preparing to do this work in the upcoming building season.
Flooding / Fluvial Erosion	Inundation flooding damaged this historic building in Irene and has had some floodproofing since Irene.	Install flood vents and structural support on Memorial Hall. The engineering and architecture has been done. The construction needs to be done.	Selectboard / Contractor	Summer 2020 start and finish	Capital fund for Memorial Hall; town funds only	Mitigation	High	Stevens Associates assessment suggested this work after Irene and architectural work has been done. The town is negotiating a contract with a builder now. Cost estimate $30-35,000.

HAZARD(S) ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPAREDNESS	PRIORITY	Notes / Status
Flooding / Fluvial Erosion	The Fire and Police Stations are not currently located together, which would enhance their interoperability and coordination. The relocation would also move both out of their current floodprone locations.	Move the Police and Fire station outside the floodplain.	Contractors	2021 start;/ complete in one year	Town bond; grant funding through FEMA	Mitigation	High	Land for the move is owned by the Town. Town is currently in the RFP stage for the project plan. Land feasibility study yet to be done. The project is pending voter approval. Projected cost is $5-7 million.
Flooding / Fluvial Erosion	The Route 9 bridge over the North Branch of the Deerfield River is in poor condition and it is a problem during high waters because it causes a bottleneck.	Upsizing the Route 9 bridge. The town doesn't know the size that is needed. This is a VTrans state owned bridge and roadway.	VTrans	Unknown, as this is VTrans schedule and they have not told the Town of any expectation.	VTrans / possibly with town match	Mitigation	High	The Road Foreman is not aware that this bridge is on any VTrans list for replacement/ upsizing. VTrans has asked the town to "take over" two miles in downtown, which encompasses two bridges but this would be economically difficult for the Town and they have not agreed.
Flooding / Fluvial Erosion	The town would like to have a better understanding of the decision behind raising or lowering the level of Lake Harriman. The town would like the the dam owner to understand the town's concerns.	Have a formal conversation with Great River Hydro on decisions and protocols about when the Lake level is lowered. Goal would be to put on paper a communication protocol for going forward.	EMD and Police Department	Fall 2020 - one meeting	Town funds	Mitigation / Preparedness	Medium	

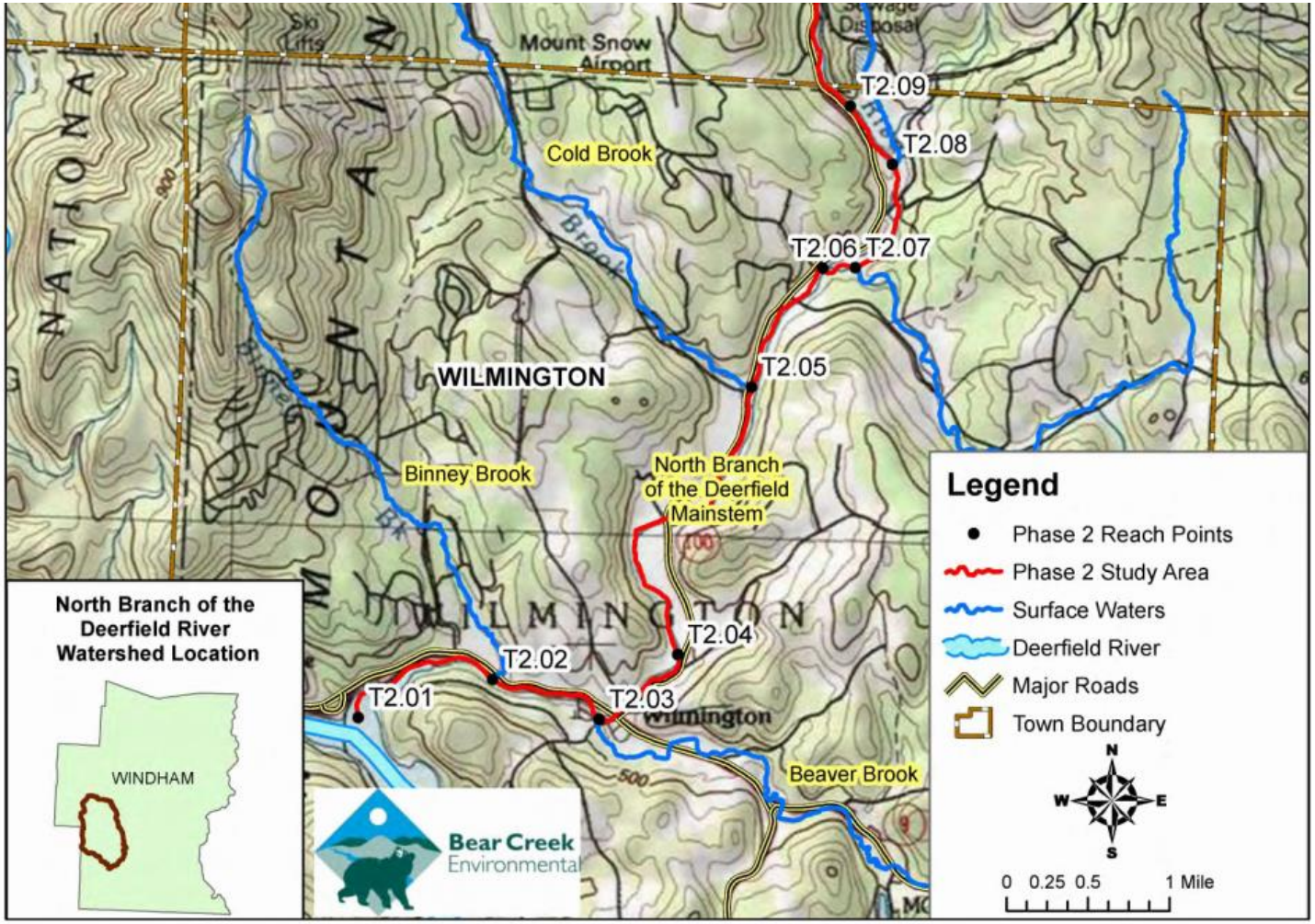
HAZARD(S) ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPAREDNESS	PRIORITY	Notes / Status
Flooding / Fluvial Erosion	The Planning Commission may wish to again pursue this in the future. It was voted down by the Selectboard in late 2019.	Adoption of an enhanced flood hazard bylaw to include River Corridors and a freeboard factor in the floodplain.	Planning Commission and Selectboard	Unknown	Town funding / possible ACCD grant	Preparedness	Low	Town politics would not currently support this.
Flooding	Town Hall is located in a vulnerable location and has been flooded multiple times.	Land acquisition for relocation of town office to move it out of the floodplain. This is step one of that move.	Selectboard and Town Staff	No start date yet set, hope to complete within the next 5 years	Seeking grant funding	Mitigation	Medium	This may or may not happen depending on funding and community support.
Flooding	Install a beaver mitigation fence on culvert on #42 Higley Hill Road. Flooding doesn't damage the road but flows down the side of it.	Install a beaver fence on culvert #42	Road Foreman	Summer 2020	Town funds	Mitigation	Medium	Road foreman is going to reach out to adjacent road foreman to learn about this practice.
Flooding	Many landowners have concern about the downtown bridge blockage and vulnerability it created during TS Irene.	Work with ANR regarding possibility of removing trees and stumps on an as needed basis from rivers and streams to prevent blockages in future floods.	Selectboard / Road Foreman	approaching ANR in 2020	Town funds	Mitigation / Preparedness	Medium	ANR sets the rules on woody debris in streams.
Invasive Species	The Town would benefit from having more of the population aware of invasive insects. Reach out to State Forester to host the training.	Host a First Detector training to raise awareness and train first detectors to spot invasive insects in Wilmington.	Zoning Administrator	Hold training in 2021	Town funding	Mitigation / Preparedness	Medium	Without more attention to invasive insects Wilmington runs the risk of an infestation. The Town is in a high risk area for EAB.

HAZARD(S) ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPAREDNESS	PRIORITY	Notes / Status
Invasive Species	Japanese knotweed is present in Buzzy Town Park and along the North Branch river bank.	Work with Youth Conservation Corps on an invasive plant removal of project for Buzzy Town Park.	Town Manager / Tree Warden	Spring 2021	Town funding	Mitigation	Medium	
Invasive Species	Invasives are present on town and private lands.	Encourage the Wilmington Trails Committee to do identification and removal of invasive species management on their trail network on an annual basis.	Trails Committee / Planning Commission	Start Spring 2021	Town funding	Mitigation	High	The Trails committee regularly uses the trails, so training them would provide a lot of benefit for Wilmington.
Ice and snow	Falling ice and snow is a hazard for nearby driveway for Crafts Inn.	Install a snow and ice fence on Memorial Hall.	Selectboard / Contractor	fall 2020, start and complete	Town funds	Mitigation	Medium	awaiting cost estimate
All hazards	The town needs a shared channel between fire, police and highway. They currently operate on different bands. The issue is that they can communicate in the vehicles but not on handheld radios. First Net will not solve this. This will involve network and some equipment upgrades, some equipment is compatible.	Hire outside consultant to audit current capabilities around communication inoperability and show an economically feasible solution for interoperability.	Police Chief and EMD, Town Manager and Selectboard	Winter 2020	Town funds	Mitigation / Preparedness	High	

HAZARD(S) ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPAREDNESS	PRIORITY	Notes / Status
All hazards	Educational article once per year in the Wilmington Town newsletter with link to FEMA emergency kit information online.	Write annual article yearly emergency management subject matter.	EMD	Fall 2020	Town funds	Preparedness	Medium	
All hazards	Ensuring proper fire safety awareness for local children and families.	Institute once a year in-school educational program where the Fire Department visits and shares fire safety education to students.	Fire Chief	2020/2021 School year	Town Funds	Preparedness	Medium	

Actions Identified in the North Branch of the Deerfield River Corridor Plan

The following actions have been identified in the *River Corridor Plan for the North Branch of the Deerfield River*. This *Corridor Plan* was completed in 2013 by the consultant Bear Creek Environmental. A map showing the reach locations listed on the following table is shown here and the table of actions is on the following pages.



North Branch of the Deerfield River Main Stem Site Level Opportunities for Restoration and Protection Identified in the Corridor Plan Wilmington, Vermont							
Segment	**Type of Project**	**Site Description Including Stressors and Constraints**	**Project or Strategy Description**	**Technical Feasibility and Priority**	**Other Social Benefits**	**Costs**	**Potential Partners/Programs**
T2.01	Active Restoration	Old bridge abutment was noted on the field map in 2005. This abutment appears to have been replaced by a ramp to install riprap in this area, which is causing a channel constriction. The road was completely washed out during Tropical Storm Irene.	Reduce encroachment	Low Priority (Area impounded by Harriman Reservoir)	NA	Unknown	Town of Wilmington, VTrans, VANR, WRC
T2.02	Active Restoration	Old dam is noted on field map, but is not listed as a channel constriction. According to local knowledge, this structure is actually an old abutment. Abutment is minor channel constriction and bottom of structure is at grade.	Remove old dam	Low Priority (abutment does not appear to be causing major geomorphic instability)	NA	NA	WRC, CRWC, VANR
T2.03-B & T2.04-A	Passive	Western bank along agricultural field lacks adequate buffer.	Streamside plantings, away from channel – river is widening.	High Priority	Improved habitat, water quality, and geomorphic stability	Cost of plantings	Landowner, Windham County NRCD, WRC, CRWC, VCF, VANR, Town of Wilmington CREP, TFS, WHIP
T2.04-A	Passive Restoration	Channel has fair to good floodplain access along agricultural fields	Protect river through corridor easement	High Priority	Flood resiliency; improved habitat, water quality, and geomorphic stability	Cost of easement	Landowners, WRC, VANR, Town of Wilmington RCE

Segment	Type of Project	Site Description Including Stressors and Constraints	Project or Strategy Description	Technical Feasibility and Priority	Other Social Benefits	Costs	Potential Partners/Programs
T2.04-A	Passive Restoration	Areas along agricultural fields that lack adequate buffer	Streamside plantings, plant away from channel – river is widening	Moderate Priority	Improved habitat and water quality	Cost of plantings	Landowners, Windham County NRCD, WRC, CRWC, VCF, VANR, Town of Wilmington CREP, TFS, WHIP
T2.04-A	Passive Restoration	Northern bank along agricultural field lacks adequate buffer	Streamside plantings, plant away from channel – river is widening	Moderate Priority	Improved habitat and water quality	Cost of plantings	Landowner, Windham County NRCD, WRC, CRWC, VCF, VANR, Town of Wilmington CREP, TFS, WHIP
T2.05	Passive Restoration	Channel has fair floodplain access along agricultural fields	Protect river through corridor easement	High Priority	Flood resiliency; improved habitat, water quality, and geomorphic stability	Cost of easement	Landowners, WRC, VANR, Town of Wilmington RCE
T2.05	Passive Restoration	Area along western bank that lacks adequate buffer	Streamside plantings, plant away from channel – river is widening	Moderate Priority	Improved habitat and water quality	Cost of plantings	Landowners, Windham County NRCD, WRC, CRWC, VCF, VANR, Town of Wilmington CREP, TFS, WHIP
T2.06 & T2.07	Passive Restoration	Northern river corridor, majority of channel has poor floodplain access	Protect river through corridor easement	Low Priority	Flood resiliency; improved habitat, water quality, and geomorphic stability	Cost of easement	Landowners, WRC, VANR, Town of Wilmington RCE

Segment	Type of Project	Site Description Including Stressors and Constraints	Project or Strategy Description	Technical Feasibility and Priority	Other Social Benefits	Costs	Potential Partners/Programs
T2.07	Active Restoration	An old abutment is noted on field map, is not a channel constriction. The abutment is currently deteriorating on its own. The bank where the abutment is located is steep and would need to be stabilized if the abutment were to be removed.	Remove old abutment	Low Priority	NA	NA	Landowner, WRC, VANR, Town of Wilmington
T2.07 & T2.08-A	Passive Restoration	River corridor has fair to good floodplain access; proposed easement expanded to include the tributary, Ellis Brook	Protect river corridor through easement	High Priority	Flood resiliency; improved habitat, water quality, and geomorphic stability	Cost of easement	Landowners, WRC, VANR, Town of Wilmington RCE
T2.08-B	Active Restoration	A 900-foot long berm along the eastern bank is restricting floodplain access. Berm is preventing flooding of North Branch Fire District #1 spray disposal field. Recent site visit (May 2013) revealed that there is floodplain access upstream and downstream of the berm.	Berm removal	Low Priority (likely conflicts with land use, floodplain access above and below)	Improved geomorphic stability	Cost of berm removal	Landowners, WRC, CRWC, VCF, VANR, Town of Wilmington ERP

Actions Under Consideration by US Army Corps of Engineers

The US Army Corps of Engineers (USACE) has been doing some preliminary planning and screening of several potential actions related to floodplain management in Wilmington. The status of these actions is unknown at this time. The Vermont ANR may not support all of these actions but all identified actions are listed here for awareness. The USACE potential actions include:

Reach Name: North Branch Deerfield

North Branch Deerfield 1
Problem: flooding downtown Wilmington

1. Construct a 4,000 linear ft. floodwall/levee along both banks of the North Branch Deerfield River and the right bank of Beaver Brook
2. Channel improvements - 4,000 linear foot of channel improvements (widening and or deepening), to the point where the downstream reservoir controls the profile. This would include substantial alterations to the structures in the vicinity of the Route 9 Bridge.
3. Raising Route 9 from Ray Hill Rd to Haystack Rd

North Branch Deerfield 2
Problem: flooding mobile home park on Route 100

1. Relocation of mobile homes and travel trailers park near confluence with Bill Brook
2. Elevating the mobile homes above the flood elevation either by upgrading the units or raising the foundation.
3. Easements on upstream floodplain areas to provide emergency floodwater retention or maintain current floodplain storage

Implementation of Mitigation Actions / Capabilities

Each town has both barriers and capabilities that will affect how they are able to carry out mitigation actions. These have been identified by planning participants as relevant to Wilmington:

Barriers to Implementation:

1. Aging population with little in-migration of younger residents
2. Limited population base, though this also lowers risk. Large second home population creates two populations, weekend and non-weekend.
3. Wilmington does not currently regulate development in the River Corridor through its zoning, which limits control of this hazardous area.
4. Limited emergency response training for town staff and volunteers.
5. There is no Conservation Commission in town, but there is beautification group focused on the downtown.
6. It takes so long to get hydraulic studies which lengthens time to decrease vulnerability.
7. Transportation projects can get drawn out for 2-3 years between getting an engineering study, getting engineering design work completed, and getting funded.
8. Boards are the same all the time and finding replacements or new members is difficult.
9. Wilmington Fire Department is small and volunteer.
10. Taxes are high because of second home population, which makes the town often not eligible for grant funded programs through ACCD, etc. This limits the outside grant funding that would benefit the town. No mitigation fund set up currently.

Capabilities to build upon for implementation:

1. 10 full-time road crew staff
2. 7 full-time town staff
3. Town police department with local dispatch
4. Well-functioning fire department. Good number of volunteers on the force (30), compared to many other small towns that struggle to get volunteers.
5. Grant writing staff in-house.
6. Two different populations in town. The local population is good about looking out for each other. The second homeowners rely on locals to watch their homes. Road Crew knows the property maintenance entities in the area and gets in touch with them if they notice an issue at a second home. Neighborly attitude amongst locals.
7. Selectboard with lots of local knowledge
8. Well-functioning EOC
9. Windham Regional Commission assistance when needed
10. Floodplain ordinance in place. Town could update floodplain ordinance to include River Corridors and/or more restrictive standards.
11. Development review board
12. Residents are generally the hearty and self-sufficient type

Recognizing that there is no place that doesn't have barriers to overcome in project implementation, Wilmington should focus on engaging around emergency management at the town level. There are a limited number of committed volunteers and staff who make this town function well. They are invested and plan to remain in the area. The Town has a hard time recruiting new volunteers. Wilmington is not struggling financially, but there has been a drop in

TS Irene flooding inside and outside of the current Wilmington Volunteer Fire Department, which is located in the floodplain and is proposed for relocation to a safer location.

population. Wilmington is located along Routes 9 and 100, which are major travel corridors of the region, yet many residents live on back dirt roads that can be difficult to access during certain times of the year. This lends to a "do it yourself" mentality that serves Wilmington positively.

The town looks to and works closely with the Windham Regional Commission. They look to the Regional Plan policies for guidance on land use decisions which influence their town plan policies and goals. The town works closely with VT Department of Environmental Conservation Agency of Natural Resources and the Army Corps of Engineers when mitigating any work in streams or rivers. Additionally, the town adopts the latest VTrans Road Standards for road/culvert/bridge improvement projects. With the support of these agencies and the Commission, Wilmington is capable of carrying out all of the mitigation actions outlined in this plan.

Existing Planning Mechanisms / Integration

The following policies, programs and activities related to hazard mitigation are currently in place and/or being implemented in the Town of Wilmington. The Hazard Mitigation Planning participants analyzed these programs for their effectiveness and noted improvements needed. Wilmington uses all of the tools listed below to help plan for current and future activities with the town. For example: the Local Emergency Management Plan has a contact list that is used for response purposes in the case of a hazard event, and is updated every year after Town Meeting. Town Road and Bridge Standards are followed by the town and Wilmington completed their last culvert inventory in 2018, and the Road Foreman is good about keeping their culvert inventory updated. In the development of this plan, the latest 2018 Town Plan was used.

As Wilmington goes through the update process for the planning mechanisms outlined in the table below, they will look to the Hazard Mitigation Plan's Table of Actions and Risk and Vulnerability Assessments to help guide land use district decisions, and guide goals and policies for those districts. They have agreed to this. At the Town Meeting every March, policies and action items in the Town Plan will be reviewed and integrated into hazard mitigation activities as needed. The Local Emergency Management Plan contact list is updated after Town Meeting each year, including updates to vulnerable geographic locations, as well as locations of vulnerable populations. Updates to each of the planning mechanisms outlined in the table below are handled by the identified responsible party identified. There is no timeframe for updating the below referenced plans and regulations to better incorporate hazard mitigation, however, as each document is updated the hazard mitigation plan will be reviewed for incorporation. The goals of this hazard mitigation plan will be incorporated in the upcoming town plan update to ensure that emergency preparedness and mitigation planning efforts are included in the Town Plan, with particular attention to including the projects in the Mitigation Actions Table. This will assist with ensuring that this plan is utilized and project follow-through occurs.

This updated hazard mitigation plan will be considered and incorporated in the next Town Plan update, as appropriate. The LEMP is updated yearly and was updated last in 2020. Other mitigation/emergency planning related documents and their status are outlined in the below table:

Type of Existing Authority / Policy / Program / Action	Description	Effectiveness/Enforcement/ Hazard that is addressed	Gaps in Existing Protection/Improvements Needed
Town Plan	Plan for coordinated town-wide planning for land use, municipal facilities, etc.	Flood Resilience is addressed	Current Town Plan incorporates flood resiliency. The Town Plan was last updated by the Planning Commission with assistance from the Windham Regional Commission in 2018.
Town Local Emergency Management Plan	Municipal procedures for emergency response	Incident Command; Hazard Annexes included	LEMP adopted by Town Select board in 2020; next LEMP should include all of the appendices. LEMP is completed by Town Clerk and Selectboard.
School Emergency Response Protocol	School procedures for emergency response	The school does have an emergency plan in place.	Ensure that the school works with Vermont Emergency Management, local police and local emergency management director to continue to keep the plan relevant. Coordination should be improved between the town and school around emergency plan update and exercising for maximum plan effectiveness.
Mutual Aid – Emergency Services	Agreement for regional coordinated emergency services	Local police dispatch; fire dispatch is Keen Mutual Aid; the fire department handles fire and EMS for Wilmington, Somerset, and Searsburg. State police provide backup	None identified
Mutual Aid – Public Works / Road Crew	This would address sharing of equipment or services between towns.	No formal agreements in place.	It would be beneficial for all towns to have formalized agreements in place before needs arise. Not having this creates unnecessary legwork during and following events.
Road Standards	Design and construction standards for roads and drainage systems	Adopted the latest VTrans Road Standards.	No gaps identified. Road Crew will continue to comply with the most recent Town Road and Bridge standards set by VTrans.
Zoning regulations	Regulates the division of land, standards for site access and utilities	Zoning in place, updated fairly often	Zoning was last updated in 2016. Next zoning update should include River Corridors. The Zoning Code needs to be rewritten with modern zoning and uses in mind. There is ambiguity as to whether things require DRB review.
Sewage Regulations	Regulates on-site sewage systems	State Regulations apply	None Identified
Flood Hazard Area Regulations	Regulates development in FEMA identified SFHAs	In zoning bylaw; regulates only to BFE, no freeboard; does not include River Corridors	Revised in 2007 to include new FEMA DFIRM's.

Type of Existing Authority / Policy / Program / Action	Description	Effectiveness/Enforcement/ Hazard that is addressed	Gaps in Existing Protection/Improvements Needed
Maintenance Programs	Bridge & Culvert Inventory	Updated in 2018, and kept up to date	NA
Building Code	Regulates building construction standards	No building codes in place	NA
Wetland protection – VT Wetland Rules	Protected by 1990 Vermont Wetland Rules	Protection of environment, water resources, wildlife, biota	None identified

PLAN MAINTENANCE PROCESS

Monitoring and Updating the Plan – Yearly Review

Once the plan is approved and adopted, the Zoning Administrator and the Planning Commission, along with interested and appointed volunteers and stakeholders, will continue to work with the Windham Regional Commission to monitor, evaluate, and update the plan throughout the next 5-year cycle. The plan will be reviewed annually before Town Meeting Day at a Selectboard meeting along with the review of the town's Local Emergency Management Plan (LEMP). This meeting will allow town officials and the public to discuss the town's progress in implementing mitigation actions and determine if the town is interested in applying for grant funding for projects that can help mitigate future hazardous events; e.g., bridge and culvert replacements, road replacements and grading, as well as buying out any repetitive loss structures that may be in the Special Flood Hazard Area, and revise the plan as needed. Windham Regional Commission's emergency planner will assist the Zoning Administrator in Wilmington with this review, as requested by the Town. Progress on actions will be kept track using a table that WRC will provide to the Emergency Committee to update. There will be no changes to the plan, unless deemed necessary by the Town. If so, the post disaster review procedure will be followed.

Plan Maintenance – 5 Year Update and Evaluation Process

The Hazard Mitigation Plan is dynamic. To ensure that the plan remains current and relevant, it is important that it undergo a major update periodically as required in 44 CFR § 201.6(c)(4)(i). This update process will be thorough and occur every five years. This update will include a thorough evaluation of the plan and incorporate any new requirements that FEMA has for Hazard Mitigation Plans. Participants outlined below will work with the Emergency Planner at the Windham Regional Commission (WRC) in accordance with the following procedure:

1. The Planning Commission will appoint a team to convene a meeting of the hazard mitigation planning committee. The town's Zoning Administrator will chair the committee, and other members should include local officials such as Selectboard members, fire chief, zoning administrator, constable/police chief, road commissioner, Planning Commission members, health officer, interested stakeholders, etc. The Zoning Administrator will work with the Windham Regional Commission Emergency Planner and be the point person for the Town.

2. The WRC Emergency Planner will guide the Committee through the update process. This update process will include several advertised public meetings. At these meetings the Committee will use the existing plan and update as appropriate guided by the WRC Emergency Planner to address:
   - Update of hazard events and data gathered since the last plan update.
   - Changes in community and government processes, which are hazard-related and have occurred since the last review.
   - Changes in community growth and development trends and their effect on vulnerability.
   - Progress in implementation of plan initiatives and projects.
   - Incorporation of new mitigation initiatives and projects.
   - Effectiveness of previously implemented initiatives and projects.
   - Evaluation of the plan for its effectiveness at achieving its stated purpose and goals.
   - Evaluation of unanticipated challenges or opportunities that may have occurred between the date of adoption and the date of the report, and their effect on capabilities of the town.
   - Evaluation of hazard-related public policies, initiatives and projects.
   - How mitigation strategy has been incorporated into other planning mechanisms
   - Review and discussion of the effectiveness of public and private sector coordination and cooperation.
   - Impacts of climate change and how the local environment is changing due to climate impacts

3. From the information gathered at these meetings, and other interactions the Emergency Planner has with the Town, along with data collected independently during research for the update, the WRC Emergency Planner will prepare the updated draft in conformance with the latest FEMA Region 1 *Local Hazard Mitigation Plan Review Crosswalk* document.

4. The Planning Commission will review the draft report. Consensus will be reached on changes to the draft. Emphasis in plan updates will be put on critically looking at how the plan can become more effective at achieving its stated purpose and goals.

5. Changes will be incorporated into the Plan by the WRC Emergency Planner.

6. The Zoning Administrator will notify the public that the draft is available for public comment. The Town will advertise and make available the draft plan to provide comments both electronically and in hard copy. The draft plan will simultaneously be distributed electronically to adjacent towns for review and comment.

7. Public and adjacent town comments will be incorporated by the WRC Emergency Planner. The final draft will be provided to the Zoning Administrator, and interested individuals that participated in the update, for final review and comment, with review comments provided to the Committee and incorporated into the plan.

8. WRC Emergency Planner will finalize the plan with any remaining comments from the Emergency Management Director and others, and submit electronically to VEM and FEMA.

9. The Plan will be reviewed by the VEM State Hazard Mitigation Officer (SHMO) and FEMA Region 1.

10. SHMO and FEMA comments will be addressed in the plan by the WRC Emergency Planner.

11. The plan will be resubmitted as needed until the plan is approved pending adoption. Once the plan is approved by FEMA, it will be ready for adoption.

12. The Selectboard will adopt the plan and distribute to interested parties.

13. The final adopted plan will be submitted by the WRC Emergency Planner to VEM and FEMA.

14. FEMA will issue final approval of the adopted plan and the five year clock will begin again.

Post-Disaster Review/Update Procedure

Should a declared disaster occur, a special review will occur amongst the Planning Commission, the Zoning Administrator, the WRC Emergency Planner, and those involved in the five-year update process described above. This review will occur in accordance with the following procedures:

1. Within six months of a declared emergency event, the town will initiate a post disaster review and assessment. Members of the State Hazard Mitigation Committee will be notified that the assessment process has commenced.

2. This post disaster review and assessment will document the facts of the event and assess whether existing Hazard Mitigation projects effectively lowered community vulnerability/damages. New mitigation projects will be discussed, as needed.

3. A draft After Action Report of the review and assessment will be distributed to the hazard mitigation committee.

4. A meeting of the committee will be convened by the Selectboard to make a determination of whether the plan needs to be amended. If the committee determines that NO modification of the plan is needed, then the report is distributed to local communities.

5. If the committee determines that modification of the plan IS needed, then the committee drafts an amended plan based on the recommendations and forwards to the Selectboard for public input.

6. The Selectboard adopts the amended plan after receiving approval-pending-adoption notification from FEMA.

Continued Public Participation

Maintenance of this plan and implementation of the mitigation strategy will require the continued participation of local citizens, agencies, and other organizations. To keep the public aware of and involved in local hazard mitigation efforts, the town will take the following measures:

- Provide hazard mitigation information at Town Meeting
- Schedule and advertise a planning meeting each year, soon after Town Meeting
- Seek participation from key players in addition to general public interest:
    - Selectboard
    - Planning Commission
    - Public Works
    - School
    - Fire & Rescue
    - Police
    - Emergency Management/ 911 Coordinator
- Post the hazard mitigation plan on the town website
- Selectboard will review current hazard mitigation committee members and consider whether new members should be added. Representatives of local businesses, nonprofits, academia, etc. should especially be considered.
- Notify the public of committee meetings through town bulletin board, town website, Deerfield Valley News, etc.

Photo of the bowling alley taken looking north on Route 100. Photo taken by Meg Libby.

APPENDIX

1. Adoption Certificate
2. Email sent to adjacent towns for public comment on the draft plan
3. Flyer advertising availability of Draft Hazard Mitigation Plan for public comment
4. Email sent 5/18/20 to town staff and Hazard Mitigation Planning Committee for review of the draft
5. Response received from 5/18/20 comment solicitation from town and Hazard Mitigation Planning Committee on the draft plan
6. October 29, 2019 Meeting agenda (date mislabeled on agenda)
7. December 2, 2019 Meeting agenda
8. Meeting flyer that was posted around town
9. Website advertisement for public comment on the draft plan, posted 6/4/20-6/18/20

Certificate of Adoption
Town of Wilmington, VT
Selectboard

A Resolution Adopting the Local Hazard Mitigation Plan
for the Town of Wilmington, VT

WHEREAS, the Town of Wilmington, VT has worked with the Windham Regional Commission to identify natural hazards, analyze past and potential future damages due to natural disasters, and identify strategies for mitigating future damages; and

WHEREAS, The Town of Wilmington, VT Local Hazard Mitigation Plan analyzes natural hazards and assesses risks within the community; and

WHEREAS, the Town of Wilmington, VT Local Hazard Mitigation Plan recommends the implementation of action(s) specific to the community to mitigate against damage from natural hazard events; and

WHEREAS, the Town of Wilmington, VT authorizes responsible agencies to execute their responsibilities to implement this plan for the purposes of long term risk reduction and increased community resiliency and;

WHEREAS, the Town of Wilmington, VT will follow the Plan Maintenance Process outlined in this plan to assure that the plan stays up to date and compliant; and

NOW, THEREFORE BE IT RESOLVED that the Town of Wilmington, VT adopts the *Town of Wilmington Local Hazard Mitigation Plan* as well as future revisions and maintenance required by 44 CFR 201.6 and FEMA for a period of five (5) years from the date of this resolution.

Duly adopted this 21st (*date*) day of July 2020 (*month, year*).

Selectboard

Tom Fitzgerald, Co-Chair

John Gannon, Vice Chair

Vincent Rice, Clerk

Sarah Fisher

ATTEST

Jessica DeFrancesco, Administrative Assistant

2. Email sent to adjacent towns for public comment on the draft plan

Wed 6/3/2020 3:53 PM

Alyssa Sabetto <asabetto@windhamregional.org>

Review and comment opportunity for the draft Wilmington Local Hazard Mitigation Plan

To gig@whitinghamvt.org; searsburgtc@gmail.com; halifaxsecretary@gmail.com; dvradmin@sover.net; admin@readsborovt.org; laurenbmac@gmail.com; marlboroemergencymanagement@gmail.com

Cc 'Mike Tuller'; 'Alyssa Sabetto'

Wilmington_ 2019 Haz... 6 MB

Hello towns adjacent to Wilmington,

Attached please find a draft of the updated Wilmington Hazard Mitigation Plan. I have recently worked on finalizing and updating this draft plan with the help of the town. It is now being sent to you for your review and comment, per FEMA requirements. Please share with your planning commission and Selectboard. **Please review and provide comment back to me by June 18, 2020.** My contact information is shown below.

I would appreciate you letting me know that you have reviewed the draft, even if you do not have comment.

I appreciate your time and assistance in this matter. If you have any questions, please let me know.

Thank you,
Alyssa

Alyssa Sabetto, CFM
Senior Planner
Windham Regional Commission

3. Flyer advertising availability of Draft Hazard Mitigation Plan for public comment

Wilmington Hazard Mitigation Plan

PUBLIC COMMENT PERIOD

The draft Wilmington Hazard Mitigation Plan is now available for public review on the town website: www.wilmingtonvermont.us. If you are unable to access the Plan electronically, please call the Administrative Assistant at 464-8591 to request a mailed hard copy.

The Plan will be available for comment until June 18, 2020.

Anyone who would like to comment on the plan should contact Alyssa Sabetto at the Windham Regional Commission. She can be reached via phone at 802-257-4547 x113 or email at asabetto@windhamregional.org. We encourage your review and participation!

4. Email sent 5/18/20 to town staff and Hazard Mitigation Planning Committee for review of the draft

Mon 5/18/2020 3:52 PM

Alyssa Sabetto <asabetto@windhamregional.org>

Wilmington Local Hazard Mitigation Plan for internal town review

To 'Mike Tuller'; smoore@wilmingtonvt.us; stucker@wilmingtonvt.us; sbrassor@wilmingtonvt.us; claflamme@wilmingtonvt.us; jdefrancesco@wilmingtonvt.us; ghavreluk@wilmingtonvt.us; tfitzgerald@wilmingtonvt.us; sandbox@sover.net

Cc 'Alyssa Sabetto'

Wilmington_ 2019 Haz... 6 MB

Hello Wilmington,

I hope this email finds you well. Attached is the first draft of the Wilmington Local Hazard Mitigation Plan. **This draft is just being passed around at this point for internal town review and is not yet out for public comment. Please review the attached draft and provide comment back to me by June 1st.** I'll incorporate comments and then put the plan out for public comment. If you don't get the chance to comment during this internal opportunity, you can comment during the public opportunity. You can mark up the attached document and scan it back to me, call me with comments or email me back a list of comments. I'm not able to send in a word version, as the file is too large for email.

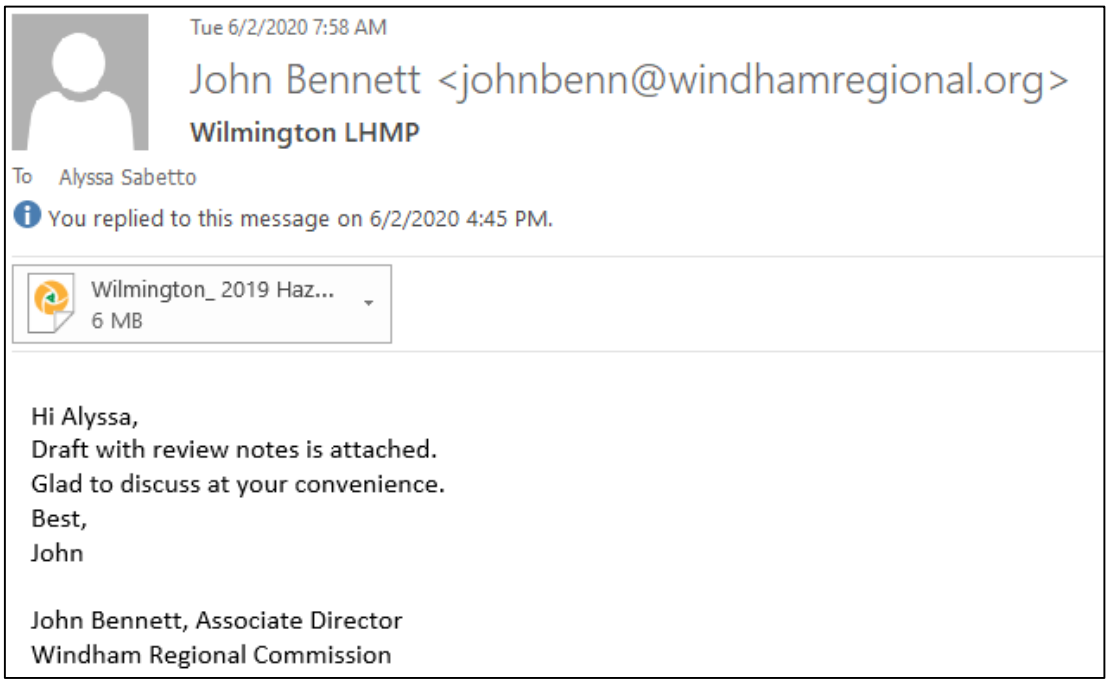
Please note that the yellow highlighted sections of the plan are *not yet completed* for Wilmington and are awaiting further information. They will be customized for Wilmington and un-highlighted as the process moves forward. There are also a few of the appendices that are not yet developed, but will be in the final plan.

If there are any town staff or board members who are not getting this email that should, please forward it on to them.

Thank you,

Alyssa Sabetto, CFM
Senior Planner
Windham Regional Commission

5. Response received from 5/18/20 comment solicitation from town and Hazard Mitigation Planning Committee on the draft plan



Tue 6/2/2020 7:58 AM

John Bennett <johnbenn@windhamregional.org>

Wilmington LHMP

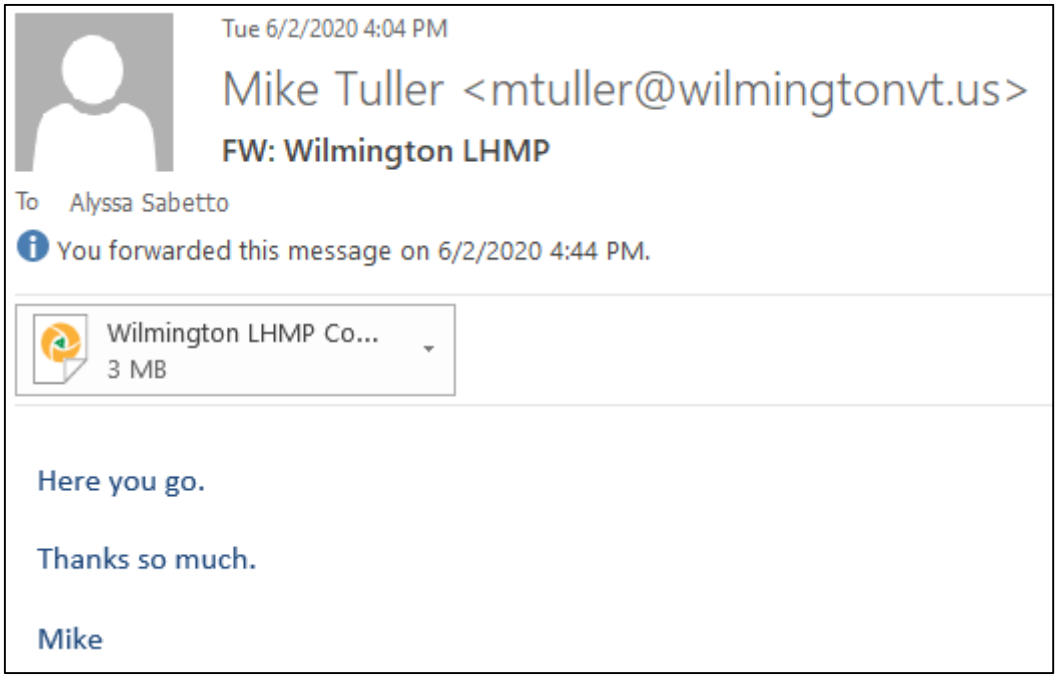
To Alyssa Sabetto

You replied to this message on 6/2/2020 4:45 PM.

Wilmington_ 2019 Haz...
6 MB

Hi Alyssa,
Draft with review notes is attached.
Glad to discuss at your convenience.
Best,
John

John Bennett, Associate Director
Windham Regional Commission



Tue 6/2/2020 4:04 PM

Mike Tuller <mtuller@wilmingtonvt.us>

FW: Wilmington LHMP

To Alyssa Sabetto

You forwarded this message on 6/2/2020 4:44 PM.

Wilmington LHMP Co...
3 MB

Here you go.

Thanks so much.

Mike

6. October 29, 2019 Meeting agenda (date mislabeled on agenda)

Wilmington Hazard Mitigation Plan Update & Community Resiliency Meeting

Wilmington Town Office – November 29, 2019

Agenda

1. Update of the current Wilmington Local Hazard Mitigation Plan

a) Purpose
b) Process

2. Hazards

a) Review and update the Hazard Ranking Table / Worksheet
b) Discuss hazard events that have occurred since the last Plan
c) Mark up the town vulnerability/hazard location map as a group

3. Mitigation Goals and Actions

a) Review/edit Mitigation Goals
b) Review the current Mitigation Actions Table that the Selectboard updated
c) Create an updated Mitigation Actions Table for the updated Plan
d) Identify gaps and capabilities with implementation

4. Other Updates

a) Discuss recent mitigation work completed by the town
b) Discuss development trends – new developments, upcoming developments
c) Overall resiliency concerns or ideas
d) Review of other elements and address questions that weren't discussed

5. Next Steps

7. December 2, 2019 Meeting agenda

Wilmington Hazard Mitigation Plan Update
& Community Resiliency Meeting
Wilmington Town Office – December 2, 2019

Agenda

1. Let's look at a map together

a) Mark up the town vulnerability/hazard location map as a group

2. Mitigation Goals and Actions

a) Review/edit Mitigation Goals
b) Create an updated Mitigation Actions Table for the updated Plan
c) Identify gaps and capabilities with implementation

3. Other Updates

a) Discuss recent mitigation work completed by the town
b) Discuss development trends – new developments, upcoming developments
c) Overall resiliency concerns or ideas
d) Review of other elements and address questions that weren't discussed

4. Next Steps

8. Meeting flyer that was posted around town

Update of the Wilmington Local Hazard Mitigation Plan Public Meeting Announcement

2 Meeting Dates:

October 29th and December 2nd, 2019

Time: 4:00-7:00 PM

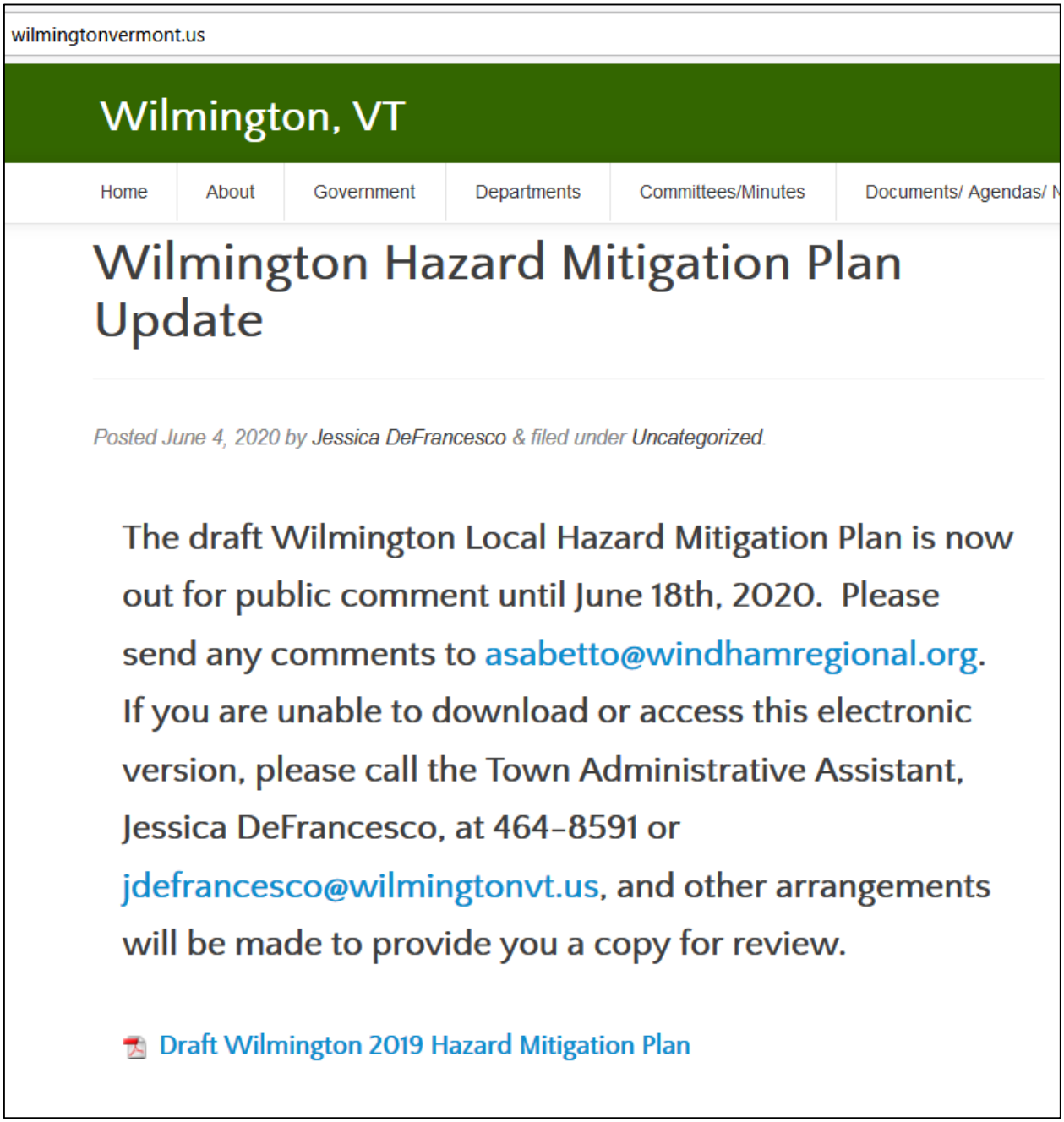
Location: Wilmington Town Office
2 East Main Street, Wilmington, VT 05363

Come learn about and help to update Wilmington's Local Hazard Mitigation Plan! What hazards does the town face? What actions can the town take now to lower vulnerability before the next natural hazard strikes?

For more information contact
Alyssa Sabetto at 802-257-4547 x113

WINDHAM REGIONAL COMMISSION

9. Website advertisement for public comment on the draft plan, posted 6/4/20-6/18/20



wilmingtonvermont.us

Wilmington, VT

Home | About | Government | Departments | Committees/Minutes | Documents/ Agendas/ N

Wilmington Hazard Mitigation Plan Update

Posted June 4, 2020 by Jessica DeFrancesco & filed under Uncategorized.

The draft Wilmington Local Hazard Mitigation Plan is now out for public comment until June 18th, 2020. Please send any comments to asabetto@windhamregional.org. If you are unable to download or access this electronic version, please call the Town Administrative Assistant, Jessica DeFrancesco, at 464-8591 or jdefrancesco@wilmingtonvt.us, and other arrangements will be made to provide you a copy for review.

Draft Wilmington 2019 Hazard Mitigation Plan