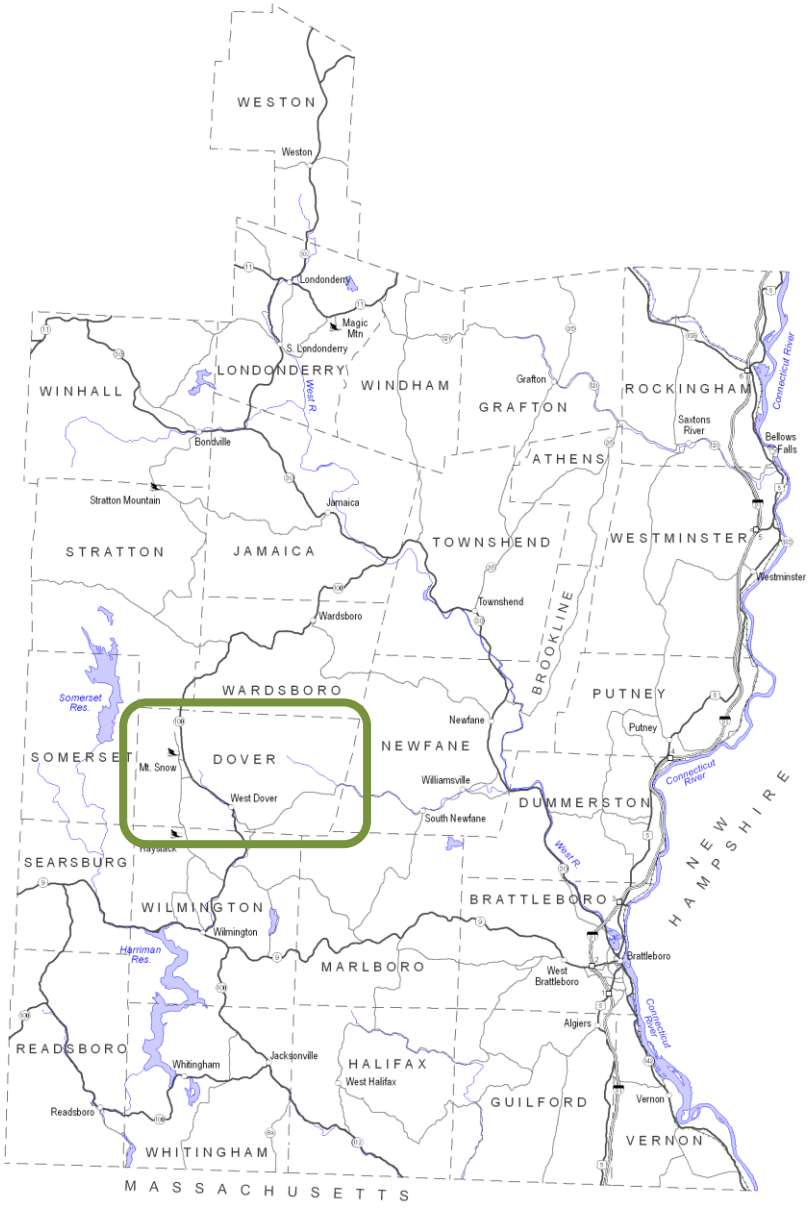
Town of Dover
Local Hazard Mitigation Plan



Municipal Adoption Date: 11/15/2022

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Technical Assistance by the
Windham Regional Commission

WINDHAM
REGIONAL
COMMISSION

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INTRODUCTION AND PURPOSE

This Single Jurisdiction Hazard Mitigation Plan is an UPDATE to a Plan approved by the Federal Emergency Management Agency (FEMA) effective August 21, 2015 and expired August 21, 2020.

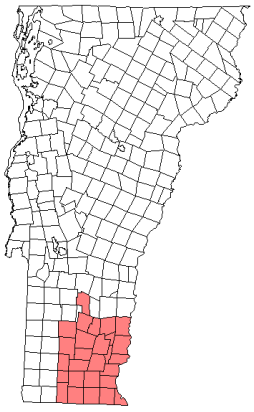
The purpose of this plan is to assist the Town of Dover in identifying all of the hazards facing the town and to identify new and continuing strategies to reduce long term risks from identified hazards.

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



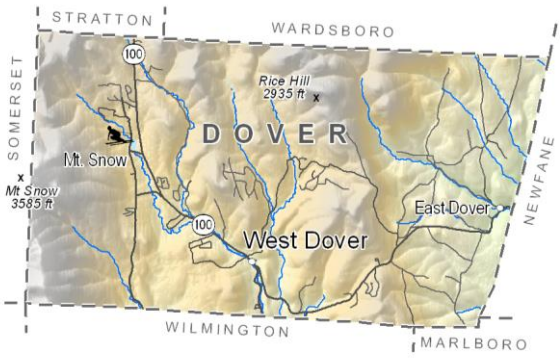
Situated in Vermont's southeastern corner, the Windham Region consists of 23 towns in Windham County, the neighboring towns of Readsboro, Searsburg, and Winhall in Bennington County, and Weston in Windsor County. The region is bordered by Massachusetts to the south and New Hampshire to the east. At over 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.

DOVER GEOGRAPHY & TOWN PROFILE

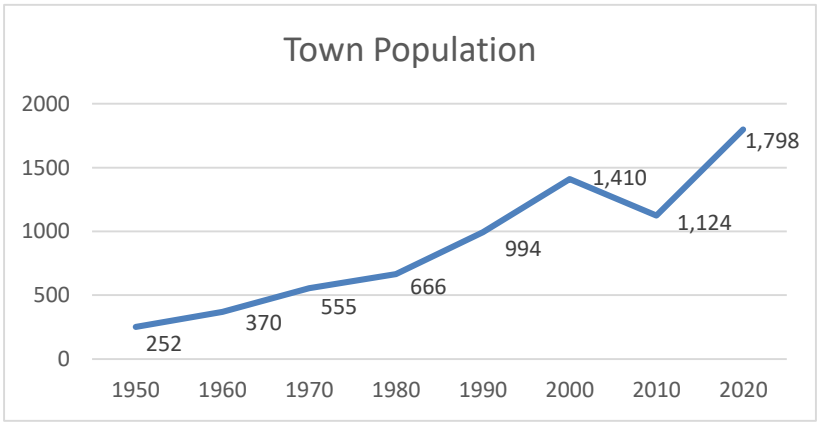


Dover is a rural town of 22,912 acres or 35.8 square miles in southern Windham County. It is characterized by high, mountainous terrain. Significant topographic characteristics of Dover include a mountain ridge that runs north to south across the western border of the community. A second ridge runs down the center of the community from the north, geographically separating the west half of Dover from the east half. 'Elevations range from 3,556 at Mount Pisgah (Mount Snow) to 2,350 feet at the Cooper Hill Inn, to 1,060 feet at the East Dover Fire Department, to 1,958 feet at the Mount Snow airport. The North Branch of the Deerfield River and its tributaries drain through the West Dover valley, while streams flowing through East Dover make up a portion of the headwaters of the Rock River, flowing down to the West River watershed. The eastern one-third of the Town slopes to the east forming a valley with a number of streams, the largest of which is the Rock River, which flows into Newfane at East Dover. This is at an elevation of 1,000 feet, the lowest in Town.

Due to its relatively high location and mountainous topography, Dover sometimes experiences weather events that don't affect surrounding towns to the same degree. 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.

State highway 100 runs north/south through Dover. Dover Hill Road is used by many tourists who travel from Route 30 through Dover to access the resorts in Wilmington and Dover.

Dover's population as of 2020 was 1,798, which represents a 60% increase in population from 2010. This significant gain is likely partially due to Covid-19 and second homeowners moving to those homes. By 2022 at this writing, some had left and some had stayed so there is a real population increase that has occurred in recent years. In 2020, Dover had the highest number of home sales to out of state buyers of any town in the state, with 230 sales in 2020.



Ludlow (219 sales) and Stowe (176 sales) were next line in the state for top home sales. This is likely attributed to Vail Resorts recent purchase of Mount Snow in Dover, Okemo in Ludlow and Stowe Resort in Stowe[1].

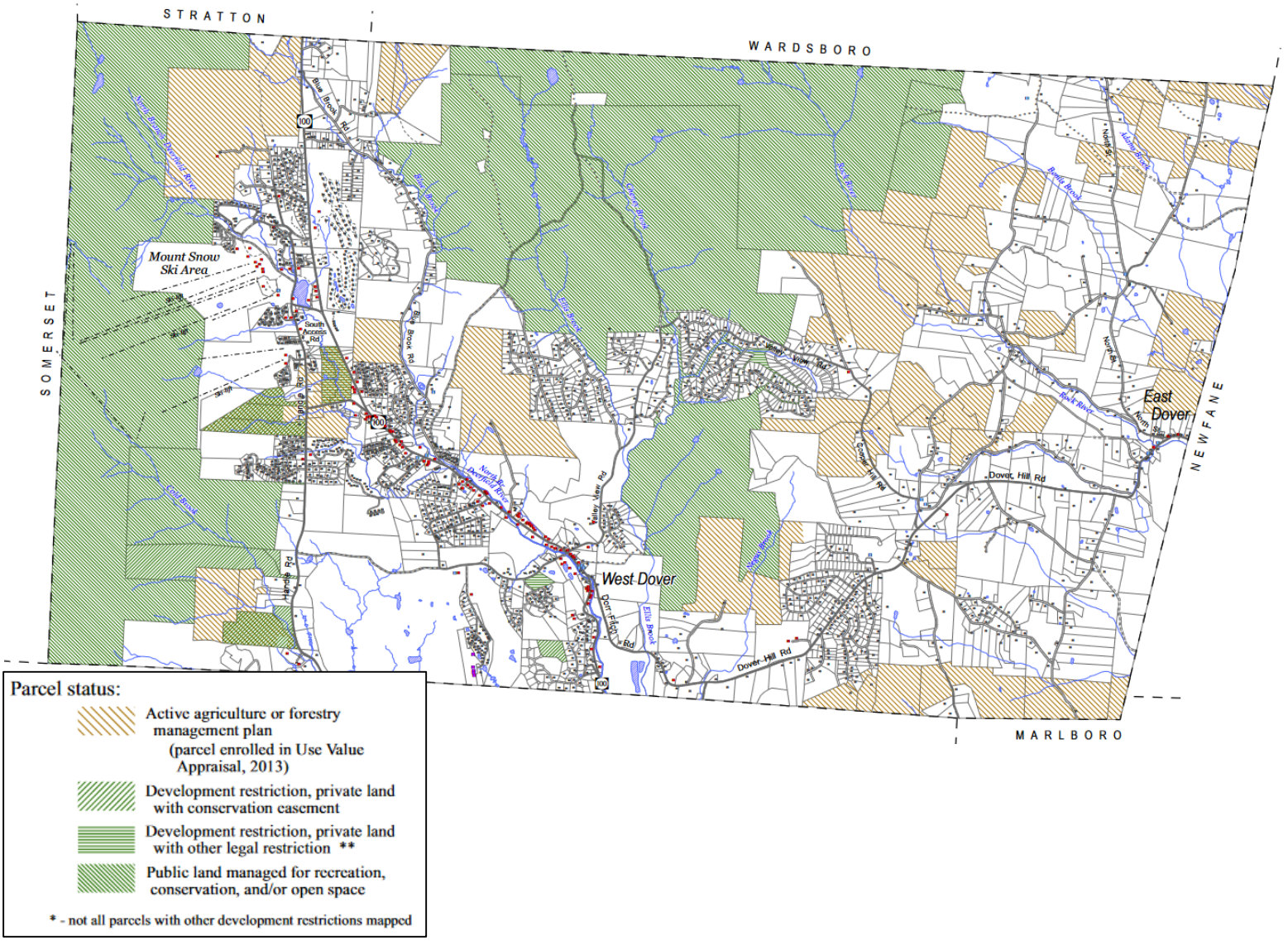
In resort communities, it is important to recognize the consequences of a visitor population. Dover's population varies significantly from season to season. Once primarily a winter resort town, Dover has experienced an increase in the number of visitors during the summer and fall. The high proportion of vacation or second home units in Dover (80% of all units as of 2010) provides a measure of seasonal population flux. In addition, there are approximately 3,600 commercial lodging beds.[2]

Land use and settlement patterns have been significantly influenced by the presence of Mount Snow. Most of the residential development that has occurred over the last 30 years is a response to the demand of housing and services by resort users. Much of the commercial development stretches along a 2½ mile portion of Route 100, creating a condition that may be described as sprawl.

Forestland is the most prominent landscape feature in Dover. The Green Mountain National Forest has considerable land holdings in the town. The western boundary of the town is part of the Green Mountain National Forest and has been designated primarily for recreation use. The National Forest Proclamation Boundary extends further into Dover and includes land still in private ownership.

[1] Property Transfer Data Analysis https://ptt.mapvt.com/
[2] 2008 Dover Town Plan available at http://www.doververmont.com/sites/default/files/Town%20Plan%202008.pdf

Existing Land Use Map from the 2016 Dover Town Plan[3]



[3] 2016 Dover Town Plan available at http://windhamregional.org/images/docs/towns/Dover/dover_townplan_2016-05-03.pdf

Emergency Services
Dover currently depends on organizations located inside and outside of the community to provide necessary health care and emergency services. There are medical professionals located throughout the Deerfield Valley. Deerfield Valley Health Center in Wilmington and Mountain Sports Medicine, located at the base of Mount Snow was purchased by Southwestern Vermont Medical Center in 2007, and re-established as Base Camp Rapid Care. It will be open during the ski season and during special events to service resort visitors' injuries and illnesses.

Hospitals serving Dover residents are Grace Cottage Hospital in Townshend, Brattleboro Memorial Hospital in Brattleboro, and Southwestern Vermont Medical Center in Bennington.

Deerfield Valley Rescue, Inc. (DVR) provides 24-hour ambulance coverage to Dover, Wilmington, Searsburg, Whitingham and Marlboro. DVR is staffed by two full-time paid staff members and volunteers trained in emergency care and transport. They have one ambulance stationed in West Dover. DVR is funded through a combination of subscription services, billing for services rendered, and donations. The East Dover Volunteer Fire Company, Inc. also provides emergency care to East Dover residents and assists DVR with its volunteer rescue squad emergency care attendants.

The Town of Dover is one of the few towns in the Windham Region that has its own police department. The Dover Police Department consists of a Police Chief, Sargent, Detective Sargent, 3 Patrol Officers, and an Office Manager. Vermont State Police and other law enforcement agencies assist as needed in providing law enforcement coverage in Dover.

The Town is served by two fire departments: East Dover Volunteer Fire Company, Inc. and the West Dover Fire Department. Both departments participate in a mutual aid program, making personnel and equipment available to neighboring towns in the event of a shortage. Many of the larger residential and commercial developments in Town have installed water systems for fire protection. In areas that are not served by any water system, the fire department must obtain water from surface waters. In some locations, water sources and dry hydrants have been installed.

Impact of Resorts
In winter, the town frequently experiences high winds, heavy wet snows, at least one event where the area is hammered by ice or rain on snow, creating havoc for the area residents. Typically, power outages occur after these types of weather events. At the same time these major snow events are happening, tourists are coming in droves to take advantage of the ski conditions. A small town of less than 1,200 permanent residents quickly turns into a large town with 10,000 – 20,000 residents on a winter weekend. This causes significant impact to the police and fire departments. Manpower becomes inadequate when a small volunteer department is suddenly faced with a huge temporary increase in population. Additionally, development regulations in town are now allowing 3-4 story buildings, which is not what firefighters are accustomed to facing in rural Vermont.

The Fire Department is also faced with a unique situation in the Mt. Snow ski area. There are many private developments where the town is not responsible for the maintenance of roads, but instead the development is responsible. The roads are usually maintained in winter, but not always. Yet, if there is a structure fire within a private development, and the road has not had efficient snow removal, the Fire Department still has to get through. In those situations, they are forced to seek assistance from the Highway Department.

PLANNING PROCESS

Town residents who took part in the planning process for developing the Local Hazard Mitigation Plan for Dover 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 the Federal Emergency Management Agency (FEMA) effective August 21, 2015 and expired August 21, 2020.

The Town began the plan update process in March 2021. It is important to keep in mind the context of the update process taking place during the Covid-19 pandemic. This pandemic meant that the update process was done remotely using a variety of virtual tools. Alyssa Sabetto, Emergency Planner for the Windham Regional Commission met with a group of planning participants at a virtual public meeting, as well as having separate conversations with the numerous town officials. The Hazard Mitigation Planning participants convened on March 25th via Zoom to provide input into the plan update. The Town Administrator and Emergency Management Director led the effort at the town level, directly inviting town officials, local business owners and members of the public. The general public was informed through advertisement on the town website, on the town Facebook page, and physical postings at all normal posting locations in Town. The update meeting lasted for 3 hours. Over the course of the meeting the group completed and discussed:

- **Update of the 2015 Dover Local Hazard Mitigation Plan**
  - Purpose
  - Process

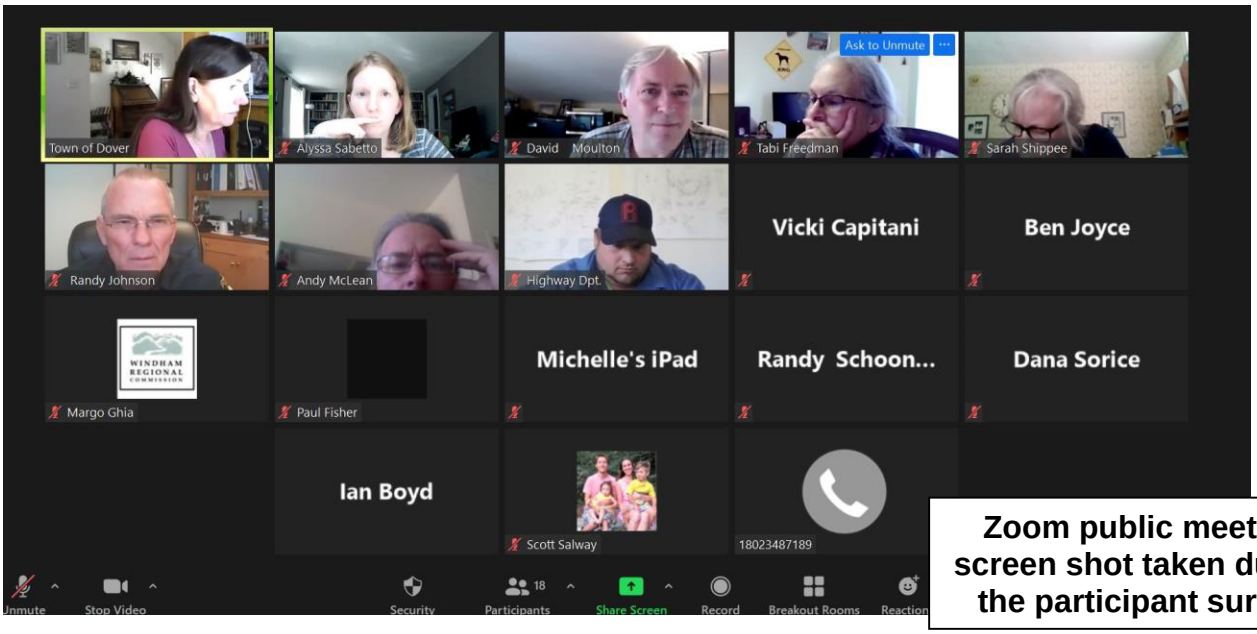
- **Hazard assessment included:**
  - Discussion of hazard events that have occurred since the last Plan
  - Virtual hazard assessment survey using Google Forms
  - Discussion of meeting participant survey results
  - Discussion of online public survey results (survey that was on Facebook)

- Brief review of existing/expired Dover Local Hazard Mitigation Plan
  - Decision on what hazards the updated Plan will address
  - Marking up of the online Vermont Natural Resources Atlas with local hazard notes

- **Mitigation Goals and Actions**
  - Review/edit 2015 Mitigation Goals
  - Brief review of the 2015 Mitigation Actions Table that the EMD/Town updated
  - Creation of an updated Mitigation Actions Table for the updated Plan
  - Identify current gaps and capabilities with implementation

- **Other Updates**
  - Discussion of recent mitigation work completed by the town
  - Discussion of development trends – new developments, upcoming developments
  - Overall resiliency concerns or ideas
  - Review of other elements and address questions that weren't discussed

Alyssa updated the plan to meet the current standards and guidelines of FEMA for hazard mitigation plans. She took the information from the public meeting, along with follow-up information gathered in conversations with the Road Foreman, Emergency Management Director and Town Clerk. The plan utilized the best available data on hazards and environmental characteristics. Plans, studies, reports and technical information utilized in this plan are cited throughout the plan where the information was integrated. Specific hazard citations of information sources are listed at the end of each hazard section. The draft was presented for internal town review by the Committee, town personnel, Planning Commission and Selectboard on August 16, 2022. This internal town review period was from August 16-30. Two positive comments and were received back requiring no revisions. Alyssa then finalized the draft for public comment.



Zoom public meeting screen shot taken during the participant survey

The draft plan was put out for public comment on September 1, 2022. This was done by posting an electronic copy on the town website[4] and having a hard copy available at the town office. Flyers were posted around town advertising its availability for review and comment, and the comment period was noted at a Dover Selectboard meeting. No comments were received from the public during the two-week comment period. It was simultaneously distributed to the adjacent towns of: Stratton, Wardsboro, Newfane, Marlboro, Wilmington, Searsburg and Somerset for comment via email.[5] 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

[4] See appendix for posting.
[5] See appendix for email.

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:

Dover Select board:
Vicki Capitani, Chair
Sarah Shippee, Vice Chair
Scott Salway, Board member

Town Office Staff:
Jeannette Eckert, Town Administrator
Andy McLean, Town Clerk and Trails Committee
Tabi Freedman, Zoning Administrator

Town Planning Commission:
Kevin Stine, Chair
Dana Sorice, Member
Michelle Pinkham, Member
Peter MacDonald, Member

Fire and Rescue:
Jon Abel, East Dover Chief
Rich Werner, West Dover Chief
Ian Boyd, Firefighter
Paul Fisher, Firefighter
Ben Joyce, Search & Rescue

Dover Police:
Randy Johnson, Chief

Dover Highway:
Travis Briggs, Road Commissioner

Mt. Snow Staff:
Dave Moulton, Chief of Operations
Ashley Havreluk, Environmental Compliance

Deerfield Valley Transportation (Moover):
Randy Schoonmaker, Director

Public Involvement and Input from Neighboring Communities

Making the Dover 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.[6]
- Public survey about hazard concerns and mitigation action ideas was on Facebook for a couple of weeks to gather public input in advance of public meeting
- The Hazard Mitigation Planning participants convened on October 25th 2021 for a virtual public meeting to provide input into the plan update.
- Alyssa had numerous follow-up calls with the Road Foreman, Emergency Management Director and Town Clerk to gather details for the Plan.
- A draft of the plan was posted from September 1-16, 2022 on the town website for public comment.[7]
- Flyers were put up around town for public comment on the draft.[8]
- On September 1, 2022, an invitation was extended via email to neighboring towns to provide a means and opportunity to review and comment on the draft Dover Local Hazard Mitigation Plan.[9] No comments were received. Inter-town communication will repeat for future revisions of this Plan.

[6] See appendix 8.
[7] See appendix 3.
[8] See appendix 3.
[9] See appendix 2.

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 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
1	Unlikely: <1% probability of occurrence in the next 100 years
2	Occasionally: 1–10% probability of occurrence per year, or at least 1 chance in next 100 years
3	Likely: >10% but <75% probability per year, or at least 1 chance in next 10 years
4	Highly Likely: 100% probability in a year

Potential impact was 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 frequency scores for each hazard and the impact ranking for each hazard related to infrastructure, life, economy and the environment, were together used determine the hazard ranking score for each hazard. These results were analyzed in real time with the planning participants. Results along with community input were used to determine which hazards the plan would address. The participants used the results to formulate their discussion, however, local knowledge and the will to act or not act did impact their choices on the chosen hazards to address.

Results

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 Dover 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 Dover has decided are pertinent to their community and they have chosen to mitigate for at this time which are High Winds, Ice, Flooding and Fluvial Erosion together, and Invasive Species. High winds encompasses hurricanes and tornados. The below tables show the results of the hazard assessment:

Frequency of Hazard Occurrence: Ranking by scores	
Frequency of Occurrence	**Totals**
Significant Ice Storm	57
Significant Snow Event	56
Damaging High Winds	54
Below Normal Cold	48
Infectious Disease Outbreak / Pandemic	48
Fluvial Erosion	44
Significant Hail Event	43
Above Normal High Heat	42
Invasive Plant or Insect Species	40
Drought	38
Inundation Flooding	35
Wildfire	30
Landslide	26
Earthquake	21

The above frequency ranking table highlights in orange the hazards that the Town has chosen to address. As shown, the Town has not chosen to address all of the highest ranking hazards. Particular to snow and cold, these are hazards that Dover is very accustomed to due to the location of the Town, and indeed the Town relies on these "hazards" for their ski industry driven economy. It is also worth noting that "infectious disease/pandemic" scored fairly high on the frequency ranking. This may be due in part to the fact that the survey was taken in the midst of the Covid-19 pandemic, and hence is a part of everyone's immediate life at this time. The Town did not feel a need to further prepare for future pandemics above the measures that have been taken to accommodate the needed changes to handle and carry on during the current pandemic. The sense being that the preparations are in place should another pandemic strike. Indeed, this is likely true, as there were many changes, upgrades and mitigation measures put in place when the pandemic started in Vermont in early 2020. These preparations and this real world "practice" have improved the town's ability to migrate to remote means should the need arise in the near or mid-future. Hail, heat, drought and wildfire scored somewhat high on the frequency ranking, indicating that these hazards may be rising in frequency over time and may become more pressing in terms of the 'will to mitigate' over time. At this point, however, these hazards are seen as rare enough that mitigation is not justified on a wide scale.

The table below shows the results of the same hazards when surveyed separately from frequency and just in relation to their impacts to infrastructure, life, the economy and the natural environment. The chosen hazards are again highlighted in orange so that one can see clearly where they lie in the rankings. In this ranking, the chosen hazards are more of the top ranking hazards for impact. Of note in this table is that again, snow ranks high for impact, just as it did for frequency, but the impacts are accustomed to in Dover. Also of interest is that inundation flooding scores higher in the rankings on impact than it did for frequency, and fluvial erosion scores lower on the impact rankings than it did for frequency. My sense is that the difference between inundation flooding and fluvial erosion is not widely understood, and the more common

feeling is that 'flooding' generally is seen as the issue, which in Vermont includes both fluvial erosion and inundation damage.

I've highlighted in blue what I consider to be outlying impact scores. For infectious disease/pandemic, it again scores high in these rankings, in particular because of the impacts to life and the economy. In the 2015 Dover LHMP, pandemic was not included in the hazard assessment, so a direct comparison cannot be made about the realization of vulnerability to pandemic. However, in larger society, the awareness of humanities vulnerability to pandemic has been heightened due to the experience of Covid-19. Through this experience we see not only our physical vulnerability, but the vulnerability of everything in our society to the impacts of mass shutdowns required by pandemics. This realization will likely last generations, but like most hazard events, as the memory of the experience fades the preparation level for the next event will diminish if certain preparatory protocols are not kept in place. On a separate note, but again highlighted in blue in the below table are the rankings for heat, wildfire and drought. The awareness of potential impact of heat, wildfire and drought is likely increasing in the population, though the current impact level remains on the lower end to justify mitigation at this time. The town may choose to mitigate them in the future. For the remaining hazards, either the possibility is considered too low to mitigate them or current methods of handling them are deemed adequate.

	Impact of Hazard Occurrence to:				**Ranked**
Hazard	**Infrastructure**	**Life**	**Economy**	**Environment**	**Totals**
Significant Ice Storm	11	11	7	6	35
Inundation Flooding	10	6	7	10	33
Damaging High Winds	12	8	6	6	32
Significant Snow Event	8	7	6	3	24
Infectious Disease Outbreak / Pandemic	2	8	10	1	21
Fluvial Erosion	4	2	5	6	17
Invasive Plant or Insect Species	2	1	3	8	14
Above Normal High Heat	1	3	3	2	9
Wildfire	2	2	0	5	9
Drought	0	2	1	3	6
Below Normal Cold	1	1	1	2	5
Landslide	1	0	0	1	2
Significant Hail Event	0	0	0	0	0
Earthquake	0	0	0	0	0

The natural hazards addressed in the 2015 Dover LHMP were Flooding/Fluvial Erosion, Winter & Ice Storm, High Winds, Wildfire and Landslide. Wildfire and Landslide are not addressed in this Plan as the Town representatives involved in this update considered the hazard presence or frequency too low to mitigate them or current methods of handling them are deemed adequate.

HAZARD PROFILES

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 Dover.

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 Dover. 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. Dover 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.[10] The mapped FEMA SFHA primarily includes the North Branch of the Deerfield along Route 100, including the tributaries Blue Brook and Ellis Brook in West Dover, with a small amount of floodplain in limited areas along the Rock River and tributaries in East Dover. Dover is very divided topographically by mountain and hilly terrain between East and West Dover. The flooding hazards are therefore different between the east and west as the west is more open flat valley land, whereas the east is more of a steep hilly terrain with narrow stream valleys. This lends to more inundation flooding in West Dover and fluvial erosion flooding in East Dover.

Fluvial Erosion Description

Much of the destruction from flooding in Dover, and in Vermont generally, 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 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.

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 Dover 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

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

the landscape along these roads which have existed for 200 years or more, so cannot be easily closed or relocated.

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. Dover does not currently have a fluvial erosion bylaw.

Though not taken in Dover, this photo 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.

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, Vulnerability Assessment and Hazard Location

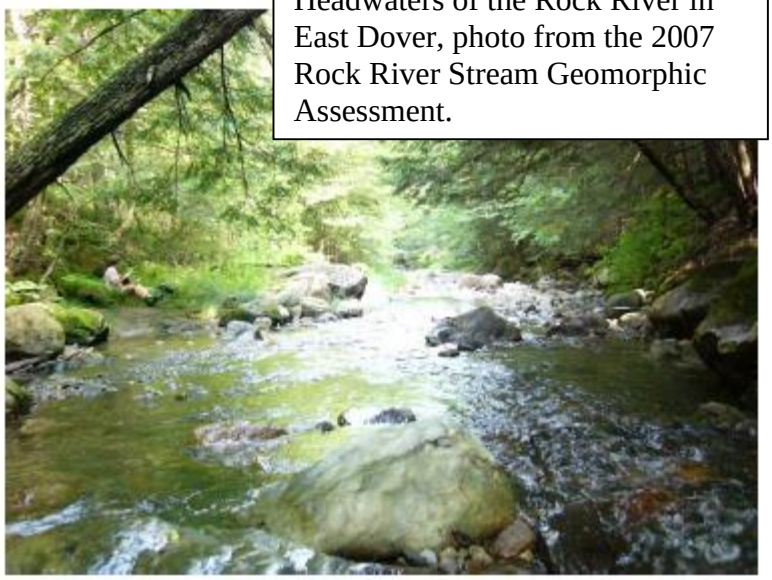
Impact and Vulnerability Assessment

The largest waterway in Dover is the North Branch of the Deerfield River. From its source in the Green Mountain National Forest in Dover, the *headwaters* of the North Branch flow south down the forested mountainside. As the river flows through the Mount Snow Ski Resort base area it is impounded by Snow Lake, a lake created by the resort for snowmaking and aesthetics. Approximately two miles below Snow Lake, the river changes to an eastwardly direction. At the confluence with Blue Brook the river begins to flow southeast along Route 100 in Dover and then south along Route 100N in Wilmington. Less than a mile south of the Dover-Wilmington town boundary, Ellis Brook enters from the north[11]. The headwaters of the North Branch are very steep, but below Snow Lake, the floodplain of the North Branch is mostly flat to where the North Branch connects to Harriman Reservoir in neighboring Wilmington. Most of the development of the North Branch is concentrated around Mount Snow and West Dover village. The 2013 North Branch of the Deerfield River Corridor Plan identifies a number of projects to improve the health and function of the River, and those projects are also included in this Plan for

[11] 2013 North Branch of the Deerfield River Corridor Plan.

cross reference and to emphasize that projects that improve a waterway are mitigation because improving the waterway function lessens flood and fluvial erosion risks in the immediate area and downstream.

In East Dover, the prominent waters are the headwaters of the Rock River on the western side of the watershed. These waters are located in a narrowly confined valley and the Dover Road runs along a portion. There are several mass failures on the banks and at least one swimming hole.

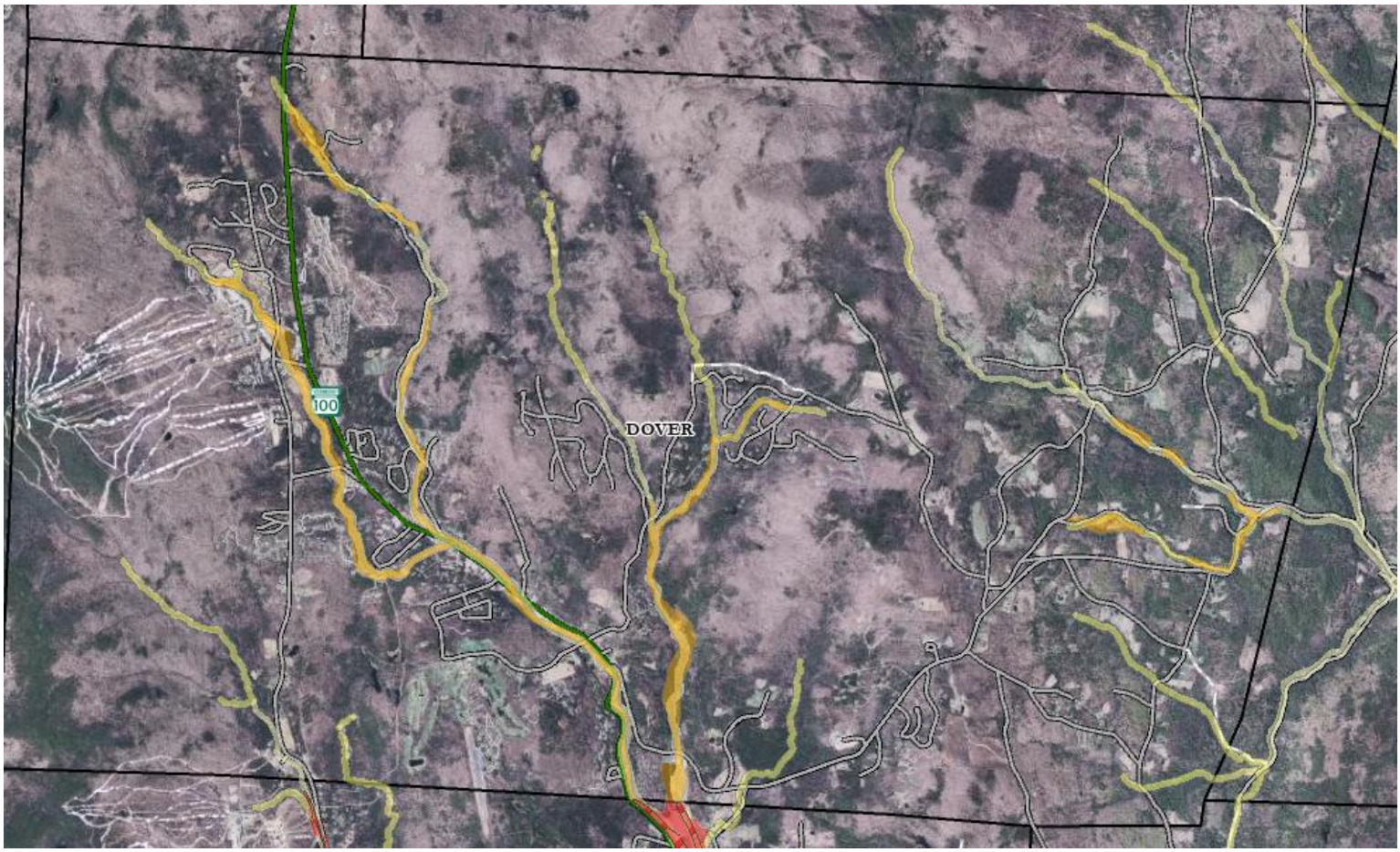


Headwaters of the Rock River in East Dover, photo from the 2007 Rock River Stream Geomorphic Assessment.

It is useful to combine the discussion of impact with the discussion of location and take a look at the mapping. The below maps were created using the Vermont Agency of Natural Resources (ANR) 'Natural Resources Atlas' which is an online mapping tool[12]. This map shows the special flood hazard areas (SFHAs) that FEMA has designated in Dover, as well as the VT ANR designated River Corridors. All SFHAs in Dover are "A" zones, shown in orange below. "A" zones are the flood prone areas that have not undergone detailed study with FEMA. There are no floodways designated in Dover, though one can see the red area, just to the south in Wilmington is a mapped floodway. The floodplains shown in these maps are based on the FEMA Flood Insurance Rate Maps (FIRMs) available through the FEMA Map Service Center.[13] The map effective date for the latest FIRMs for Windham County is 9/28/2007.

The River Corridors are shown in cream color, and this map includes the small streams with a watershed size between .5 and 2 square miles also in cream. Small streams require a 50-foot setback from top of bank, but haven't been designated with bounds on the mapping. For the purposes of Act 250, there is River Corridor regulation of streams down to .25 miles of watershed size, which are not included on the below map but can be seen on the online Atlas.

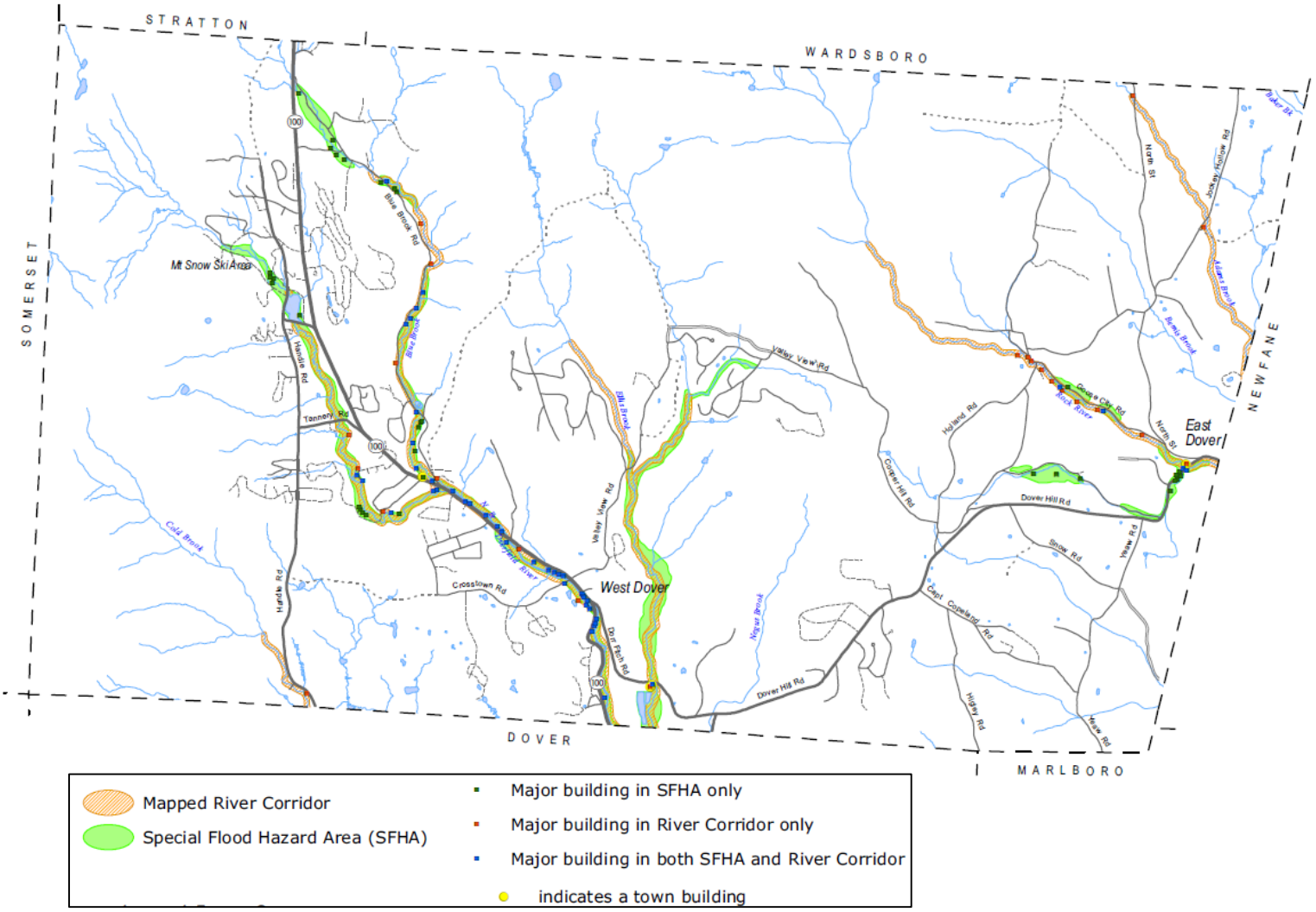
[12] Vermont Agency of Natural Resources, Natural Resources Atlas <https://anrmaps.vermont.gov/websites/anra5/>
[13] https://msc.fema.gov/portal/search?AddressQuery=wndham%2C%20vermont.



Properties within the SFHA, that have a mortgage, are required to purchase flood insurance. For non-mortgaged properties, coverage is optional. Dover's participation in the National Flood Insurance Program, or NFIP, gives residents access to discount flood insurance through the federal program. There are 76 occupied structures in the SFHA, of which 33 are also overlapping with the River Corridor. There are 56 structures in the River Corridor, of which 23 are only in the River Corridor. The below map shows where the structures are located in Dover. Here's the breakdown:

In SFHA only: 43
In RC only: 23

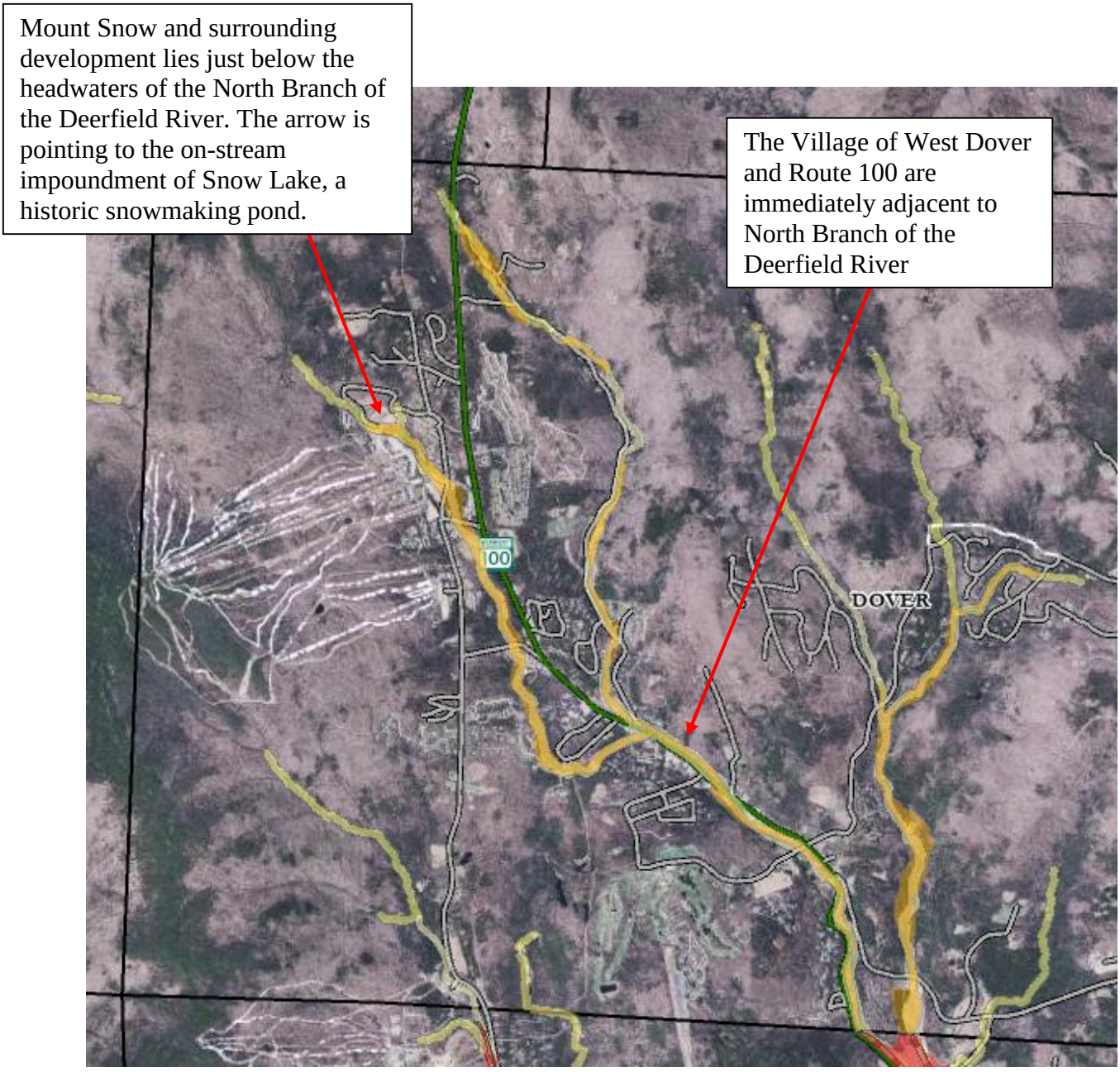
In both: 33



The latest Expanded Community Report on FloodReady Vermont's website lists 108 structures in the Special Flood Hazard Area. The difference between the figures of 76 and 108 is primarily that the 108 also includes non-occupied structures, such as sheds and barns. Both numbers are important to understanding the risk in the Town, as unoccupied buildings still pose a risk.

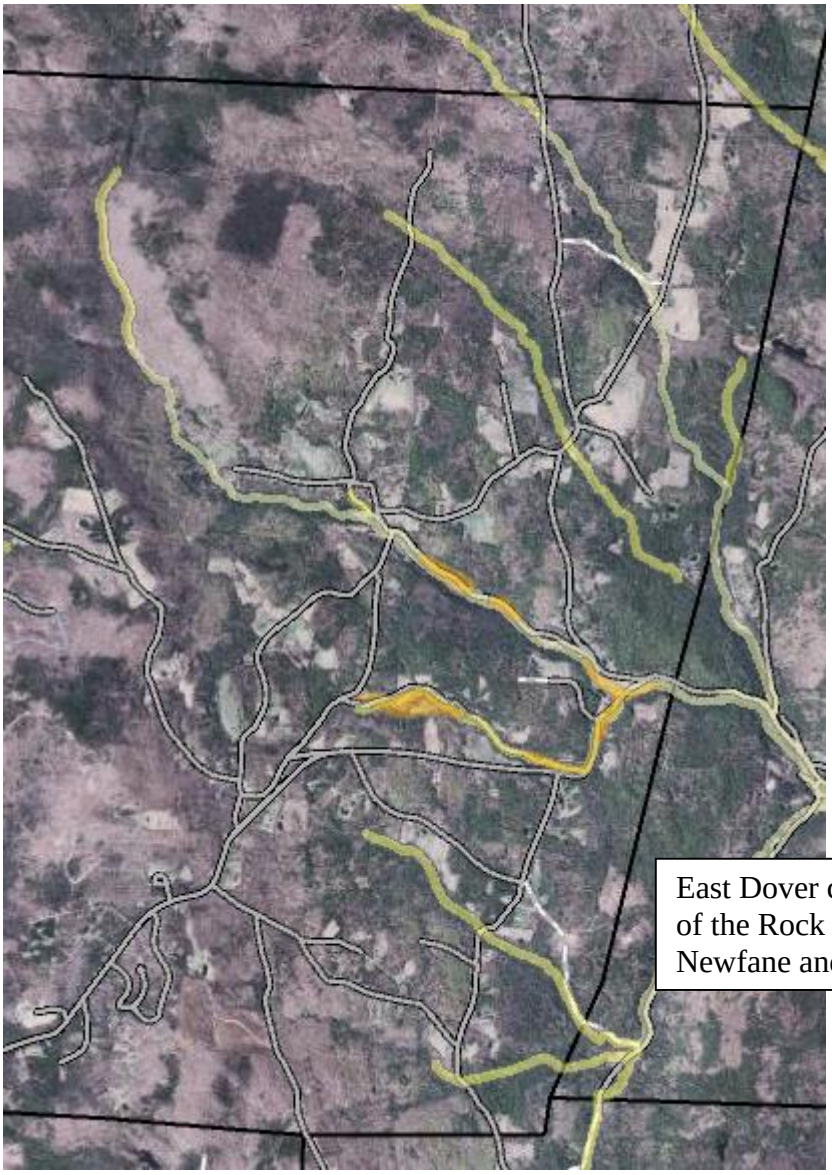
The above map shows that most of the structures are located in West Dover along the North Branch of the Deerfield River and Route 100, and along Blue Brook. In East Dover there is a concentration where the Taft Brook comes into the Rock River. These structures are particularly vulnerable to flooding and fluvial erosion hazards described in this plan.

There are a total of 22 active National Flood Insurance policies in Dover, of which 6 are in the SFHA. This means that approximately 14% of the 76 occupied structures that are insured. This low rate of coverage should be a concern for the town, and they should encourage building owners in vulnerable areas to purchase flood insurance. Structures outside of mapped SFHA, such as those in the River Corridor, can still purchase coverage by choice and in some situations it is advisable.



Taking a more detailed look at West Dover, shown above, we can see that a significant amount of developed area lies in SFHA and/or River Corridor. There is a strong river and road connection. This is primarily the North Branch of the Deerfield River, which lies just west of Route 100, intersecting with the Blue Brook just to the east of Route 100 and continuing south along Route 100 to Dorr Fitch Road. This leaves a majority of downtown Dover in the SFHA. Route 100 from the town line to Dunn's Corner experienced flooding during Irene. There are runoff concerns with Mount Snow, but more in the realm of water quality than flooding directly in the area as the resort is at the top of the watershed.

Blue Brook Road, which has house along it, runs along Blue Brook and a large portion of the Road is in SFHA. Ellis Brook has significant SFHA and is east of Route 100. Most of Ellis Brook's floodplain is undeveloped, except in the northern portion near Valley View Road. The wastewater treatment plant is located in the SFHA along the southern portion of Ellis Brook.



East Dover contains the headwaters of the Rock River which goes into Newfane and on to the West River.

The above map shows the SFHAs and mapped River Corridor in East Dover. SFHAs in this area lie along Dover Hill Road, Taft Brook Road and Goose City Road. Culverts on these roads sometime experience problems. Dover Hill Road, from the school to East Dover Village is subject to flooding. The Rock River, along Goose City Road, north of the Village, gets flooded during major events. A culvert on Holland road needs replaced as it is repeatedly gets damaged when Taft Brook floods. The East Dover Firehouse is in a particularly vulnerable location in the floodplain of the Rock River. One major impact of flooding in Dover is that when Rock River floods Dover Hill Road, it cuts off the eastern route out of town.

Roadways in floodplains and undersized bridges and culverts are a cause of stream instability generally, not just in Dover. 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, around March timeframe. 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. Dover doesn't have mapped ice jams.

VTrans Highway Flood Vulnerability and Risk Mapping

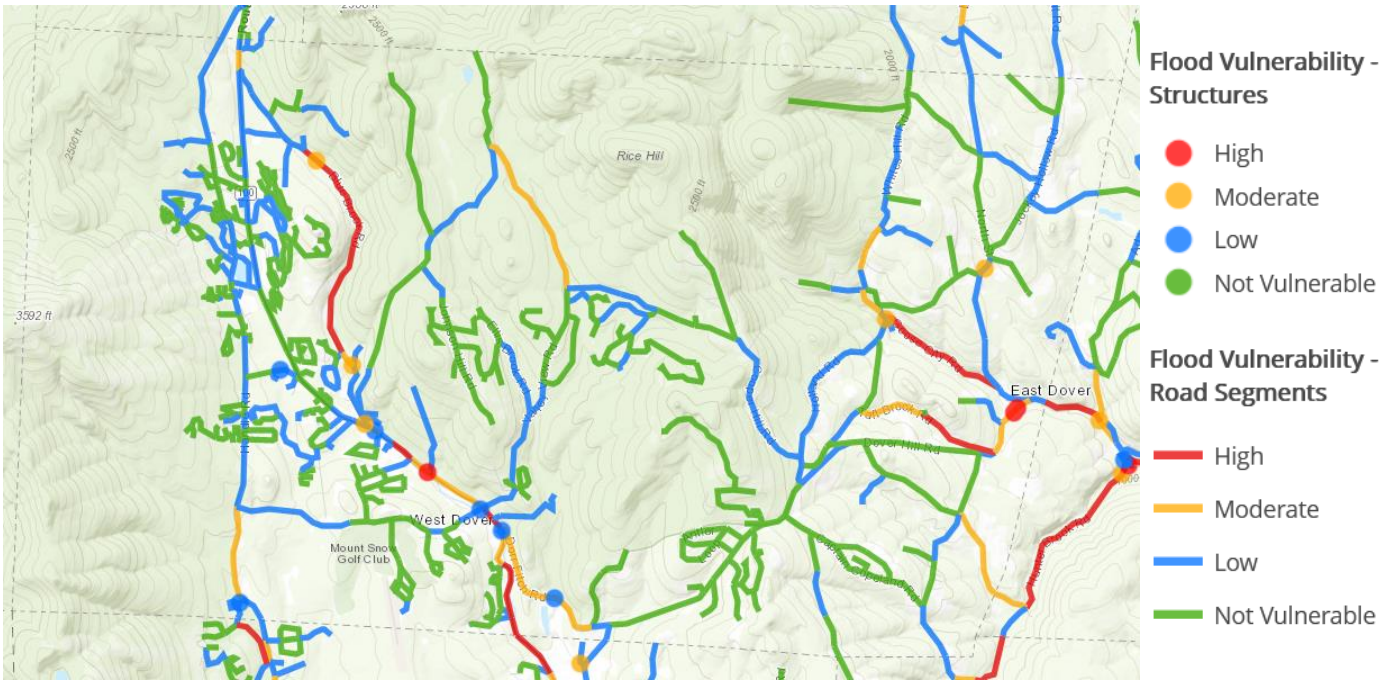
As part of the scope of work for the Transportation Resilience Planning Tool, the Vermont Department of Transportation has developed metrics to quantify the flood vulnerability and risk of bridges, culverts, and road embankments throughout the state.[14] Vulnerability assessments were completed for the following infrastructure:

- Road/river embankments along state and town highways
- All long structures (spans greater than 20 feet) on state and town highways
- All culverts and short structures on the state highway system

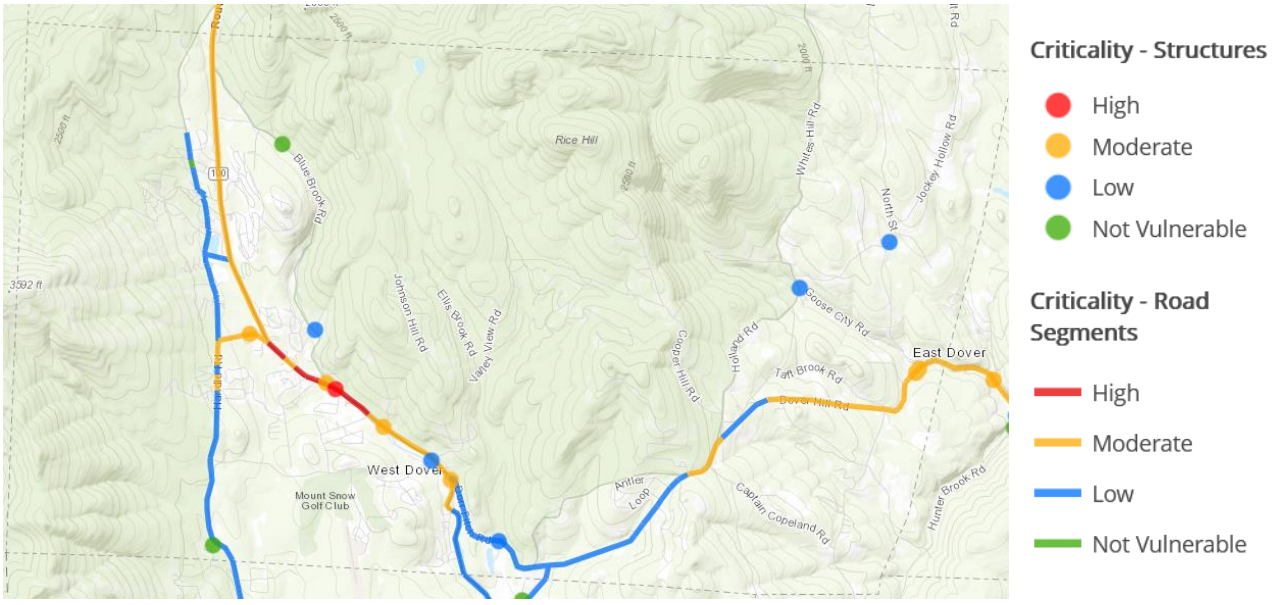
This analysis provides an estimate that can be used for hazard mitigation planning, supporting emergency preparedness, and for capital programming. The analysis was done for three different categories: vulnerability, criticality, and flood risk.

The vulnerability map below provides an analysis of the probability of inundation, erosion, or deposition and the potential severity of the damage to infrastructure or structure. The map identifies sections of Route 100, Blue Brook Road, Goose City Road, and Taft Brook Road as being highly vulnerable road segments. The following structures are identified as highly vulnerable: (1) bridge at the intersection of Route 100 and Windy Hill Road; (2) 2 bridges on Dover Hill Road in East Dover between Brick Yard Road and North Street.

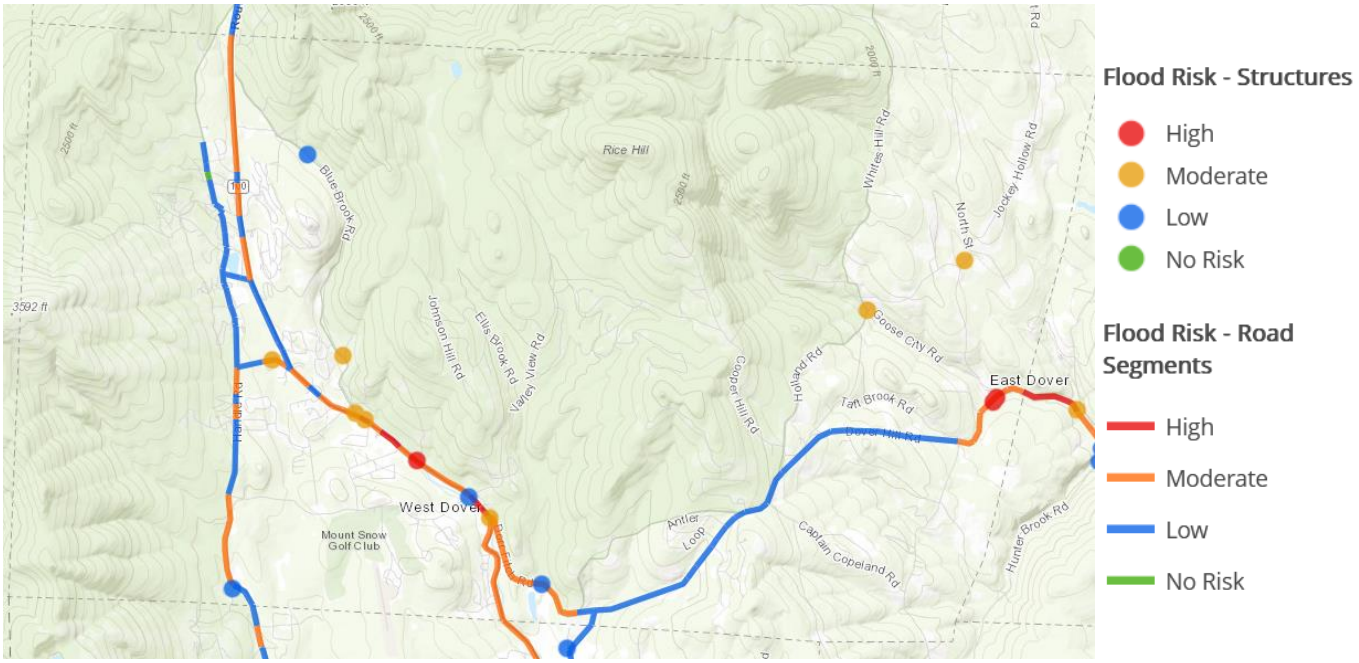
[14] VTrans Statewide Highway Flood Vulnerability and Risk Website: https://vtrans.vermont.gov/planning/transportation-resilience/statewide



The transportation criticality map below provides an analysis of the relative importance of each segment in the roadway network. Only segments of Route 100 are highly critical. Segments of Route 100 Tannery Road and Dover Hill Road are identified as moderately critical road segments. The Route 100 bridge just south of Blue Brook Road going over the North Branch of the Deerfield River is identified as a highly critical structure. Several other bridge on Route 100, the bridge on Tannery Road and 2 bridges on Dover Hill Road in East Dover are identified as moderately critical structures.



The flood risk map below provides an analysis based on the average of generalized vulnerability and criticality. Segments of Route 100 are identified as high flood risk roads. The 2 bridges on Dover Hill Road in East Dover between Brick Yard Road and North Street, and the bridge on Route 100 at Windy Hill Road are identified as high risk structures.



Extent

The highest recorded measurement at the nearest stream gauge to Dover on the Deerfield River was 20.17 feet, which was measured both during TS Irene on August 28, 2011 and on September 21, 1938.[15]

Extent for thunderstorms/heavy rain events: The tables below shows the top 10 rain events at two former USGS weather monitoring stations nearby to Dover, 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[16] for Searsburg, VT		
Rank	Value (inches)	Ending Date
1	8.98	1949-01-01
2	8.27	1938-09-22

[15] USGS Stream gauge 01168500 DEERFIELD RIVER AT CHARLEMONT, MA <http://waterwatch.usgs.gov/?id=wwchart_ftc&site_no=01168500>

[16] Data provided by the NOAA, Northeast Regional Climate Center at Cornell University. http://www.nrcc.cornell.edu/. 10/10/18.

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[17]		
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
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 Dover. It is important to remember that precipitation levels vary throughout the region.

The table below is specific for Dover, and has the values associated with the size of an event in order to determine the storm frequency[18]. This is for reference. Dover 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. Looking at the below table in relation to TS Irene, which was about 12 hours, makes it at between a 100- and 200-year event for Dover.

Extreme Precipitation Estimates: Dover, VT							
	1hr	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**

[17] Data provided by the NOAA, Northeast Regional Climate Center at Cornell University. http://www.nrcc.cornell.edu/. 10/10/18.
[18] Northeast Regional Climate Center Extreme Precipitation estimates (inches): Dover, VT <http://precip.eas.cornell.edu/> accessed 4/21/2022.

1yr	0.71	0.98	1.2	1.5	1.89	2.39	2.73
2yr	0.87	1.16	1.45	1.81	2.26	2.81	3.2
5yr	1.08	1.45	1.84	2.29	2.82	3.48	3.98
10yr	1.28	1.71	2.19	2.72	3.35	4.09	4.7
25yr	1.61	2.13	2.77	3.43	4.2	5.07	5.86
50yr	1.91	2.53	3.32	4.1	4.98	5.97	6.92
100yr	2.27	3	3.96	4.88	5.9	7.04	8.18
200yr	2.7	3.55	4.73	5.82	7	8.29	9.68
500yr	3.39	4.45	5.97	7.31	8.75	10.31	12.09

Extent for fluvial erosion:
East Dover – along Goose City Road, about 5900 feet from North Street north to Sherman Road. This section always has trees falling over and there are small slides all through this area. The slope is gradually coming down on a continual basis caused by fluvial erosion along the Rock River. The road is threatened in this area. The area of concern is circled in the below map. This is worst area of fluvial erosion in East Dover.

West Dover – Blue Brook Road there is an area probably 500 feet in length, from the covered bridge up to the next driveway that is sliding into the brook. The road is threatened in this area because of the slide. The below map identifies the area in the red circle. This area is about 1.5 miles up Blue Brook Road. This is worst area of fluvial erosion in West Dover.

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 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 Dover, 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 Dover. With areas of high elevation drainage, Dover is subject to flash flood events that erode stream banks and adjacent areas. There are generally events that cause at least minor washouts every year, especially during spring snow melt and late summer season rains.

Past Occurrences

There have been 19 Presidential Disaster Declarations in Windham County since 1953, with 3 of those occurring since the last Plan update. Of these, 7 were severe storms, 5 were floods, 3

hurricanes, 1 snow event, 1 severe ice storm, and 2 are biological events (both relate to Covid-19 pandemic).[19]

Disaster Declarations for Windham County, VT						
Disaster Number	**Incident Begin Date**	**Incident End Date**	**Declaration Date**	**Incident Type**	**Title**	**Disaster Close Out Date**
3567	8/22/2021		8/22/2021	Hurricane	Tropical Storm Henri	
4532/ 3437	01/20/2020		04/08/2020	Biological	Covid-19 Pandemic	
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	1/14/2020
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 Londonderry and Windham County:
Since 1996, when National Climatic Data Center detailed records start, there have been 45 flood events in Windham County, Vermont. Dover experiences routine spring flooding, but this is not always documented. There have been 10 events added to the detailed records since the last plan update in 2015, with several notable events discussed below[20].

July 29, 2021 rains – Though this was declaration for the county, there was no damage in Dover.

December 25, 2020 - An area of low pressure tracking from the Great Lakes to Hudson Bay advected in an unseasonably warm air mass into the region from Thursday, December 24 to Friday, December 25, 2020. Rain gradually overspread the region from west to east during the day on December 24 with the steadiest, heaviest rainfall during the overnight hours and early

[19] 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 9/15/2021
[20] NCDC data provided on 8/18/2021 by NOAA's National Centers for Environmental Information (NCEI) Center for Weather & Climate (CWC).

morning hours of December 25. Rain showers continued through the day on December 25 and changed to snow showers during the evening and overnight hours of December 25-26 as colder air returned. The region still dealt with nearly the entire snowpack from the blockbuster winter storm from December 16-17 which dropped 9 inches of snow. While the snow compacted over time, very little water was lost from the snow. Observations concluded that between 1.50 to 3.00 inches of water was in the snowpack prior to this event and most if not all of this snow melted. Rainfall totals in Putney were measured at 2.39 inches (Anderson) to 2.54 inches (Mary Quinn) from local spotters. These amounts do not include the additional 1.50 to 3.00 inches of water that melted from the snowpack. The combination of warm air, rainfall and melting snowpack led to areas flooding across the region. Roads were closed across portions of southern Vermont as a result of flooding with one road being washed out. A tree was also downed onto Interstate 91 in eastern Windham County. Key Impacts: road closures, tree damage, damage to structures.

April 15, 2019 – A low pressure system and warm front brought heavy rainfall to the region during the morning hours of Monday, April 15th, 2019. This resulted in a few reports of flooding with some dirt roads washed out. A major disaster was declared by the President of the United States in Bennington County to assist in repairing the damaged roads. Vermont Route 11 was partially closed due to flooding between Route 100 and Derrywoods Road.

January 24, 2019 - Following a heavy snowfall event on January 19-20 over southern Vermont, a strong low pressure system tracking through southern Canada ushered in an unseasonably warm and moist air mass on January 24th. Temperatures surged into the 40s to mid-50s. Steady rainfall occurred during much of the 24th as a secondary low pressure system developed over the Mid-Atlantic and tracked into southern New England. One four inches of rain was recorded over southern Vermont. The combination of the rainfall along with the mild temperatures melting some of the snow resulted in a real flooding over portions of the region along with minor to moderate river flooding on the Walloomsac River. Some flooding due to ice jams also occurred. Several roads were closed due to flooding, there was a mudslide on Route 7A near Manchester, and trailer parks were evacuated in Brattleboro and Pownal. An unoccupied car was stranded in sixteen inches of water on Route 100 at Evergreen Road. The road was closed.

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 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.

Sept. 12, 2013 - A series of cold front 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. As the last in the series of cold fronts crossed during the evening hours, the threat for showers and thunderstorms ended.

September 7, 2011 - A slow moving frontal boundary gradually moved eastward across southern Vermont between Monday September 5th, and Tuesday September 7th, as waves of low pressure traveled northeast along the boundary. The front then moved south and east of the state by Tuesday, as waves of low pressure continued to travel northeast along the boundary. In addition, copious amounts of moisture from the remnants of Tropical Storm Lee, which made landfall along the Gulf coast, interacted with the frontal system from Wednesday into Thursday September 8th, producing additional heavy rainfall. Total rainfall amounts across southern Vermont for the period from Monday into Thursday ranged from 3 to 7 inches. This heavy rainfall, combined with saturated soil from the excessive rains which fell in late August associated with the passage of Irene, led to widespread minor to moderate flooding on rivers, as

well as small streams and creeks across southern Vermont. Roads were closed due to flooding in Marlboro including: Augur Hole Road between 3800 and 5200 cutting off 25 houses, Collins Road, Lahar Road, Gilbert Road, Adams Brook Road, Adams Crossroad, Hunter Brook Road and Stratton Hill Road.

August 28, 2011 – Tropical Storm Irene – 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, and damaging winds across the region, including Dover. 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 North Branch Deerfield River runs along a portion of Route 100 from the Mount Snow area to Wilmington. The town was cut off for a day and a half from transportation access, phone, and electric. This was particularly concerning because there was no way to get an ambulance in or out of town. Shortage of food and fuel began by the time that the roads were restored the following day. Town workers were out working during the storm and prevented a lot of damage.

Along Dover Road, one house was destroyed and floated down the Rock River and other houses were destroyed or significantly damaged. Much of the road was reported washed away, along with power and phone infrastructure that caused almost all of East Dover to be without power and phone for an extended period of time. A woman drowned when the car she was in became trapped by flood waters from the North Branch Deerfield River in 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. FEMA gave $539,057 to Dover for damages from Irene. This reflects a federal order from President Obama to raise the federal match share to 90% from 75% for TS Irene relief, therefore lowering the state and local shares by 7.5% each.

March 6-7, 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. An ice jam on the Rocky River along Dover Road in Town of Newfane caused flooding of some houses.

April 15-21, 2007 – Major spring flooding. Rain and snow caused damage to roads and utility lines across Windham County and Dover. Across, the State, nearly 3.6 million dollars was obligated as part of the FEMA Public Assistance Program. While it is not normal for the town to receive this type of damage from severe flooding and thunderstorms on an annual basis, road washouts and culvert repairs from these associated events have ranged in the ballpark of $200,000 to $400,000 in some communities in Windham County.

March 31 through April 2, 2004 - As much as three inches of rain fell between across southern Vermont. This rain combined with the last of the snow melt to produce an excessive runoff of water.

July 21 through August 18, 2003 nearly constant rain and thunderstorms affected Dover. 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 the city of Londonderry. County Highway 121 was washed out in the Town of Windham. Massive flooding occurred in the city 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. Heavy rains also washed away a small covered bridge in Grafton. FEMA Declaration DR – 1488 was associated with this event. Many roads were washed out and culverts needed replacing throughout town.

August 12- September 12, 2004 - Presidential Disaster Declaration DR – 1559 resulted in severe period of flooding and thunderstorms. Flash flooding resulted in washouts of small bridges at Ames Hill, Hescock and Cook Roads. Canoe Brook Road in Dummerston impassable, with a culvert washed away, and a 20-foot wide by 20-foot deep hole in the road. These two 2004 events allowed for funding from the FEMA Public Assistance Program to flow into Windham County and help pay for the costs associated with debris removal and other emergency protective measures.

In the spring of 1987 there was rapid meltdown of snow over frozen ground with 3" of rain flooding the west end of Reed Road. There were a number of roads in Dover that were damaged by this event. NCDC detailed storm data only goes back to 1996.

During 1976, flooding occurred throughout New England as a result of Hurricane Belle, causing millions of dollars in damage.

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.[21] 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 Dover flooded and there was damage to higher elevation roads, but there was not damage to Route 100. Flooding amounts in Dover are unknown. Photos from newspaper clippings show the water covering the deck of the bridge in Wilmington downtown. This was not as devastating as TS Irene, but there was a lot of damage to basements of buildings downtown, culverts and bridges.

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

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

Sources used

Local town knowledge and town records, National Climatic Data Center storm events database, FEMA's Presidential Disaster Declarations search page

1977 on 1927 Flood

...boro Reformer

...ttleboro, Vermont Saturday, November 5, 1977

50 Years Ago This Week

The Flood of 1927 Overwhelmed Vermont

Ice Storm

Description and Geographic Area of Hazard

The Region has a long history of severe winter storms and blizzards and usually experiences at least one or two Nor'easters each year with varying degrees of severity. There have been approximately 90 winter/ice storms in Windham County since 1996.[22] A typical event begins as a low-pressure system that moves up the Atlantic Coast, into the Canadian Maritimes, dumping heavy snow across parts of Vermont. Snowfall accumulations are generally three to six inches in the valleys and 6 to 12 inches in the mountains. Winter storms and ice storms can cause power lines to fail, damage trees and impede access to homes and businesses. Dover received $205,187 in assistance from FEMA for recovery from several subsequent and severe ice/winter storms in December 2007. Snow events are assumed to affect the entire Town, where differences affect certain areas, they are noted.

Impact

Heavy wet snows of early fall and late spring, as well as ice storms, often result in loss of electric power, leaving people without adequate heating capability. The other threat from winter storms is downed trees, resulting in power failures and impassable roads or driveways. An ice storm crossed the region in December of 2008 causing widespread downed trees and power outages in Windham County. The total cost of damages across the state surpassed the million-dollar threshold triggering Presidential Disaster Declaration DR-1816. Damage across the region consisted of roads being blocked for shorts periods of time due to downed trees and utility lines. Thousands lost power for varying lengths of time and several shelters were opened in Windham County. Compared to neighboring southern New Hampshire communities, Dover and Windham County fared relatively well from the damage inflicted by the ice storm.

Damage from heavy snow and ice storms can vary depending upon wind speeds, snow or ice accumulation, storm duration, and structural conditions (such heavy snow and ice accumulation on large, flat roofed structures).

There are no mapped ice jams in Dover.[23]

Availability of salt and sand has been an issue for Dover in the past. The salt shed was enlarged in 2010. Highway accidents are frequent during winter. Before the salt shed was enlarged sand had to be used because salt was not readily available. Elderly and special needs housing that doesn't have access to generator, including Butterfield Commons, is a concern for the town during each event. There are a lot of inns and lodges in town that don't have backup generation. There is also a large amount of tourists during the winter months that come up for the resorts. This is another concern for the town.

It is also fairly easy for the town's transportation network to get cutoff because of high elevations, East Dover being in low lying area, and Route 100 getting large volumes of tourist traffic. Blowing snow is also an issue for the roadways in Dover. Rice Hill Road and the top of Handle Road, and Route 100 north of Tannery Road always get hit hard. This is because of open fields in these areas allowing snow to blow onto the roads. Additionally, state highway territories create issues with plowing.

[22] 1996-2021 storm events detailed data provided by National Climatic Data Center via email, Oct 2021.
[23] CRREL Ice Jam database < http://rsgisias.crrel.usace.army.mil/apex/f?p=273:9:24828581115982>

The primary concerns with winter weather events is power failure, damage to roofs, trees and power lines, and dangerous or impossible travel conditions.

Power failure is a common event in areas of Dover and a condition as a result of high winds and/or heavy snow or ice that can occur anywhere in town. Power failures are typically the result of power lines damaged by storm events. During ice storms the higher elevation locations in town as well as areas of concentrated development are most susceptible to power failures. Sherman Road in East Dover is particularly susceptible to outages due to transmission lines that are routed off the road in the woods. There are 7 homes with year round residents and a couple of second homes on that Road that are impacted. Power failures may also result from disruptions in the New England or national power grid, as indicated by the widespread power outages in 2003. Dead or dying trees in close proximity to power lines pose a particular threat to power lines when ice loads are added.

Extent

The severity or magnitude of winter storm to occur in southeast Vermont can range from moderate to very severe. The southeastern region of VT typically receives over 60 inches of snowfall per year, and most Vermonters are prepared to handle large amounts of snowfall. Dover experiences significant snow storms every year but according to the town they are manageable. During the major snowfall of winter 2010-2011, where the region received well over 100 inches of snow, the biggest problem was that snow never melted off during the season, only accumulated, making it difficult to find space to store the mounds of snow. But in the season of 2010-2011, the problem arose with finding locations to deposit huge quantities of snow during the season because there wasn't the typical mid-season melt off. Snow amounts are not necessarily a problem for Vermonters, but heavy, wet snow, or the event of rain on snow or frozen ground, are usually very problematic. The 2010-11 was the largest storm in recent history, but as the below graph shows, there were two larger seasons of snow in 1907-71 and 1886-87.

Seasonal
(Jul 1st – Jun 30th)

	Maximum			Minimum	
Rank	Snowfall	Year(s)	Rank	Snowfall	Year(s)
1	145.4"	1970-71	1	31.8"	1912-13
2	132.0"	1886-87	2	32.0"	1904-05
3	128.4"	2010-11	3	37.7"	2011-12
4	122.4"	2000-01	4	38.3"	1928-29
5	120.2"	2007-08	5	38.7"	1926-27
6	116.9"	1992-93	6	39.6"	1979-80
7	113.5"	1887-88	7	40.4"	1988-89
8	111.6"	1965-66	8	40.7"	1948-49
9	108.9"	1971-72	9	42.5"	1990-91
10	107.2"	1993-94	10	43.0"	1903-04

Seasonal Snowfall records per the Burlington, VT Weather Service:

Heavy wet snows of early fall and late spring, as well as ice storms, often result in loss of electric power, leaving people without adequate heating capability. The other threat from winter storms is downed trees, resulting in power failures and impassable roads or driveways. The worst ice storm/ice accumulation event in memory and in records occurred on March 21, 2008 and produced an inch of ice on everything - A strengthening low pressure system tracked northeast from the Ohio Valley on Tuesday March 18th, to a position along the Maine coast by Thursday morning on March 20th. The low then continued to intensify upon reaching the Canadian Maritimes by Friday morning on March 21st. This storm system initially brought a swath of light to moderate snowfall across southern Vermont from Tuesday into early Wednesday, with accumulations of 1 to 3 inches. The snow then changed to freezing rain across the higher elevations of southern Vermont during Wednesday and lasting into Wednesday night. This produced ice accumulation of one half of an inch, to locally up to an

inch. The heavy accumulation of ice led to numerous downed trees and power lines, as well as power outages. The hardest hit areas were mainly confined to the highest elevations within western Windham County. As a cold northwest flow developed in the wake of this storm system, some lake enhanced snow bands developed Thursday night into Friday morning, which produced additional snowfall amounts of 4 to 9 inches, mainly across higher, west facing slopes in Bennington County.[24]

Probability

The plan participants in Dover deem winter storm / ice storms to be highly likely any given year. Every winter there is a weather related incident where people in town will lose power for a few days.

Past Occurrences

The Region has a long history of severe winter storms and blizzards and usually experiences at least one or two Nor'easters each year with varying degrees of severity. There have been 105 winter/ice storms in the Region since 1996.[25] Dover seems to be experiencing more ice storms in recent years, which they believe is due to climate change. There have been three winter storms in recent history in Windham County that were Disaster Declarations:

- Ice Storm (DR-1201) – January 6-16, 1998
- Snowstorm (EM-1358) – December 16-18, 2001
- Winter Storm (DR-1816) – December 11-18, 2008

EVENTS

April 16, 2021 - A pair of low pressure systems brought a mix of rain and high elevation snow to southern Vermont beginning the evening of Thursday, April 15th and ending the evening of Friday, April 16th, 2021. The majority of the heavy, wet snow fell across higher elevations (above 1500 feet) of Bennington and western Windham counties throughout this period, with a mix of rain and snow in the lower elevations of eastern Windham county. Snowfall totals ranged from 6 to 14 inches in the high elevations. Key impacts: tree damage, power outages.

December 29, 2019 - A complex winter storm brought a mix of rain, snow, sleet and freezing rain to the region from the evening of Sunday, December 29th, lingering through the morning of Tuesday, December 31st, 2019. Moderate accumulations of ice impacted portions of southern Vermont during this time frame. There were approximately 3,500 people without power across the state due to a combination of icy conditions and strong winds bringing down trees and power lines.

February 13, 2019 - A winter storm brought widespread wintry precipitation to southern Vermont on Tuesday, February 12th through Wednesday, February 13th, 2019. Precipitation started out as snow but then quickly transitioned to a period of sleet and then freezing rain throughout the event. This mix of wintry precipitation resulted in hundreds of closings and delays. Strong winds followed, especially across the southern Green Mountains, which led to power outages across the region.

January 2-3, 2014 - A long lasting snowstorm occurring across all of eastern upstate New York between the early morning hours of January 2nd and the morning of January 3rd, 2014. A slow moving frontal boundary situated over the mid-Atlantic Region was in place just after midnight

[24] National Climatic Data Center, 1996-2014 storm events database < http://www.ncdc.noaa.gov/stormevents/>
[25] National Climatic Data Center, 1996-2014 storm events database < http://www.ncdc.noaa.gov/stormevents/>

on the early morning of Thursday, January 2nd. An area of high pressure situated over southern Quebec allowed Arctic air to move down into the region. As a weak wave of low pressure developed along the front, moisture moved up and over the frontal boundary into the region. As a result, light snow broke out and gradually spread from west to east during the early morning hours of Thursday, January 2nd. The snow evolved into a moderate snowfall for during the daytime hours and it remained quite cold, with temperatures only in the single digits over much of the region. On the evening of Thursday, January 2nd, a new area of low pressure began to form of the mid-Atlantic coast. This brought some moisture from the Atlantic Ocean into the region, and the steady, moderate snowfall continued over the entire area. The snow gradually tapered off to light snow and snow showers from west to east overnight as the low pressure area tracked east northeast away from the region. By the morning hours of Friday, January 3rd, snowfall amounts ranged from 8 to 17 inches. In addition, temperatures remained very cold and with a cold northwest wind, wind chill values were zero to minus 20 degrees.

Feb. 25, 2011 - A storm system produced a widespread swath of heavy wet snow across southern Vermont during the day Friday. Snowfall rates of 1 to 2 inches per hour occurred, beginning during the early morning hours, and persisting until late afternoon. Snowfall amounts of 12 to 17 inches occurred across much of southern Vermont. The heavy wet snow created treacherous travel conditions for both the morning and evening commutes on Friday, and also led to numerous school and business closings.

Jan. 19, 2011 - Snow and sleet accumulations across southern Vermont varied from 3 to 9 inches, with ice accumulations of up to a half of an inch.

Jan. 12, 2011 - Heavy snow fell across southern Vermont with snowfall accumulations ranging from 14 inches up to 3 feet. A mesoscale snowband set up across the western New England, including southern Vermont, Wednesday morning resulting in snowfall rates of 3 to 6 inches an hour.

January-February 2010 - The snow fall during this time was severe, averaging over 100 inches throughout the region, to include the Town of Dover. There were a number of large storms during this timeframe. No reported dollar amount of damage. Trees were down and back roads were cut off.

March 29, 2008 - A low pressure system tracked east northeast, from the central Plains early Thursday morning on March 27th, into central Pennsylvania by Friday morning on March 28th, to a position well off the New England coast by Saturday morning on March 29th. As colder air filtered southward, a mix of rain and wet snow developed Thursday afternoon across southern Vermont. Across the higher elevations, locally heavy snowfall occurred, with accumulations of 6 to 10 inches. This fell mainly across western Windham County. The snow tapered off by Friday evening. The heavy wet snow led to downed tree limbs and power lines across the higher elevations of Windham County. In addition, approximately 11 accidents were reported Friday morning on Interstate 91 due to slippery road conditions. The heaviest snowfall fell in West Dover and Londonderry.

December 13, 2008 - A significant mix of snow, sleet and freezing rain occurred from Thursday afternoon into early Friday afternoon. Snow and sleet amounts of 1 to 3 inches fell, along with ice accretion of one half to three quarters of an inch from freezing rain. This led an inch and a half of ice buildup. Higher elevations, such as Dover, were particularly hit hard. Damage across the region mostly consisted of road being blocked for shorts periods of time due to downed trees and utility lines. Thousands lost power for varying lengths of time and several

shelters were opened in Windham County. Dover was out for five days. Phone lines didn't work in East Dover. Fire, Police and Highway departments went door to door to check on residents. The total cost of damages across the state crossed the million-dollar threshold which allowed for a Presidential Disaster Declaration DR-1816.

December 2007 - Snow developed during the early morning hours of Sunday, December 16th, and persisted intermittently before ending early Monday morning on December 17th. The snow was heavy at times, and also mixed with a bit of sleet Sunday afternoon and evening. Total snow and sleet accumulations ranged from 8 to 11 inches, with 10.8 inches reported at Townshend, and 9.6 inches reported at Putney. The heavy snow and sleet resulted in numerous school and business closings Monday morning, and also created treacherous travel conditions for the Monday morning commute.

Snow developed during Sunday evening on December 30th, and ended during the mid-morning hours of Monday December 31st. Snowfall amounts ranged from 7 to 9 inches, with 8.5 inches reported at West Wardsboro. The heavy snow led to hazardous driving conditions during the Monday morning commute. Several accidents also occurred Monday morning, including a fuel truck rollover in Londonderry on Route 11, which occurred at 3:30 AM LST. In addition, many businesses were closed, or had delayed openings due to the snowfall. Most schools were already closed due to the Holiday break.

March 2, 2007 - A significant mixture of snow, sleet and freezing rain began early Friday morning, and ended Friday evening. Snowfall accumulations of 6 to 10 inches fell during this storm, with 10 inches reported at Athens, and 6 inches at Brattleboro. In addition, ice accretions of up to one half inch occurred from freezing rain, mainly within sheltered valley locales.

November 22, 1997 - A low pressure system south of Long Island on November 22, 1997 produced heavy wet snow across southern Vermont. Snowfall averaged 4 to 8 inches in Bennington and Windham Counties. The heavy wet snow downed trees and power lines, which produced scattered power outages. The power outages were most widespread in Windham County.

On November 13 and 14, 1997, a winter storm tracked from the southeast coast north to the coast of southern New England and then out to sea. Heavy snow fell across southern Vermont, with an average snowfall of 7 to 10 inches. Some specific snowfall totals included: 9 inches at Townsend and 6 inches at West Dover in Windham County and 8 inches at Manchester Center in Bennington County.

March 31-April 1, 1997 - A classic late season nor'easter tracked from the Chesapeake Bay area northeast to central coastal New Jersey then slowly out to sea. This system produced rain across Bennington and Windham Counties during the morning hours of March 31. The rain changed to heavy wet snow by early afternoon. Snowfall amounts were highly elevation dependent. Some specific snowfall totals included: 12 inches at Shaftsbury and 13 inches at Peru in Bennington County and 23 inches at West Wardsboro and 12 inches at Grafton in Windham County. The wet snow brought down many trees and power lines causing widespread power outages and road closures. Some areas remained without power for several days. Route 9, between Bennington and Brattleboro was closed for much of the night.

Nov. 26, 1996 - On November 26, a low pressure system brought a combination of snow and freezing rain to southern Vermont. Over Bennington and Windham Counties, snow and heavy

freezing rain downed trees and power lines and caused numerous accidents. Across southern Vermont approximately 10,000 customers lost power.

March 8, 1996 - Heavy snow fell across Bennington and Windham Counties of southern Vermont with 8 to 10 inches common over the area. Some specific snowfall totals included: 9 inches at Dorset and 7 inches at Pownal in Bennington County, 10.5 inches at West Wardsboro and 9.5 inches at West Dover in Windham County.

Jan. 2, 1996 - A major winter storm developed over the Gulf coast states on January 2nd and tracked northeast along the eastern seaboard during January 3rd. Heavy snow fell across southern Vermont with the average snowfall ranging from 10 to 12 inches.

Great Blizzard of '78 - This storm is more well known for its impact on coastal New England and Long Island, but it still had quite an impact on eastern New York and western New England. The Green Mountains of Vermont were hit hard, with many areas reporting around two feet of snow. East Wallingford, near Rutland had 30". The Catskills also had quite a bit, with Prattsville reporting 25". Wind also caused quite a bit of drifting of the snow. On the coast, Boston received 26.7" of snow, their largest storm total on record. The storm also produced strong winds...Logan Airport reported an 83 mph gust...and there was a report of 92 mph on Cape Cod.

Sources used
Local town knowledge and records, National Climatic Data Center, CRREL Ice Jam Database, FEMA's Presidential Disaster Declarations search page, Burlington, VT Weather Service historic weather events page, Albany National Weather Service – major winter storms page

High Winds

Description and Impact

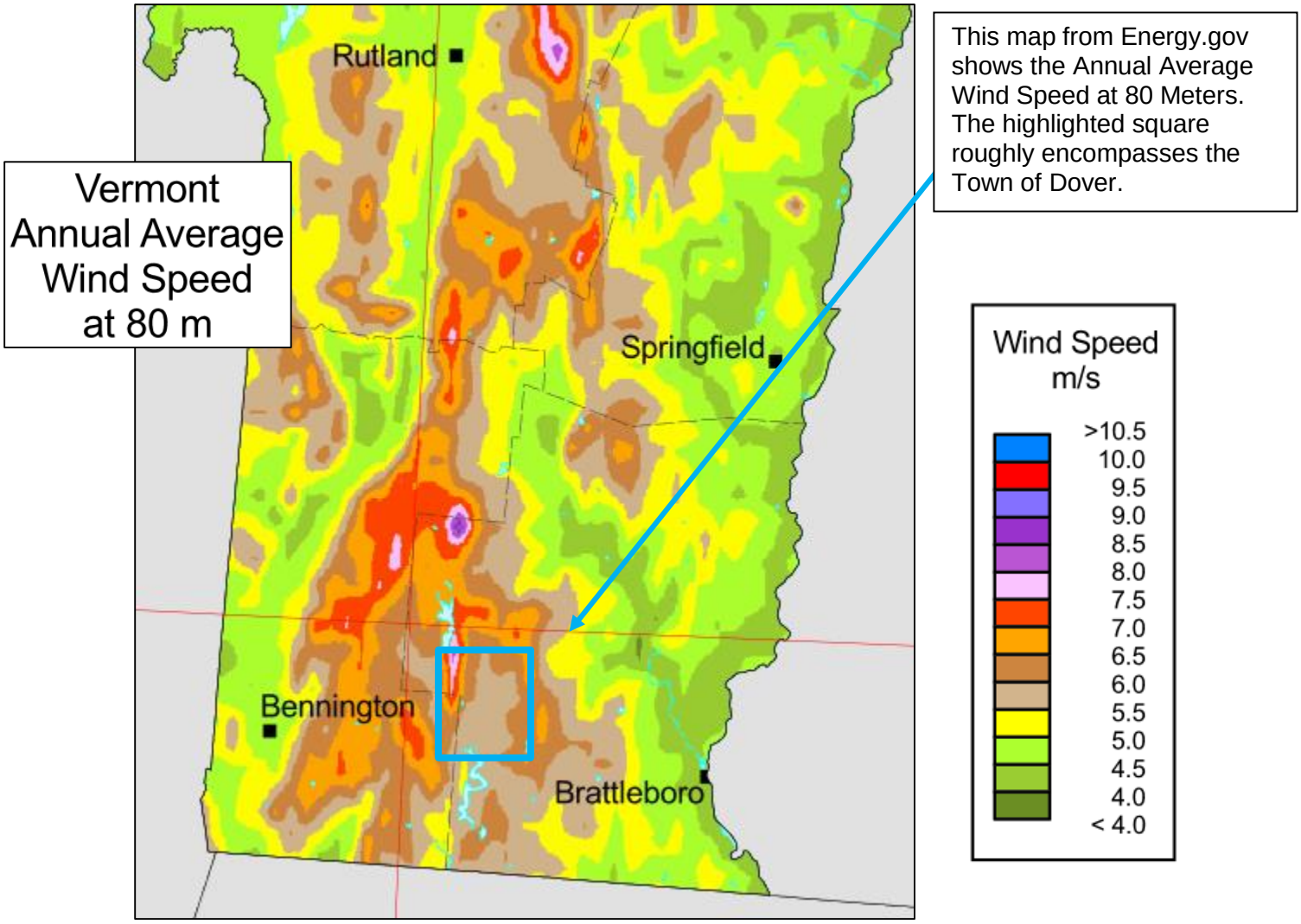
High winds are fairly common in Vermont all across the state. High wind events that are sufficient enough to cause damage to property and taking down trees can occur at any time of year. High wind can damage roofs, uproot trees, break branches from trees and take down power lines anywhere in Town. High winds can be associated with thunderstorms, snowstorms, hurricanes, tropical storms, or just wind storms. High winds tend to sweep through the region after the passage of a weather front. The National Climatic Data Center data indicates that 121 high wind events have occurred in Windham County since 1957, some of which involve thunderstorms[26].

Power outage is the risk primarily to do with high winds. Wind causes more trees on wires than ice, although ice does weaken or weigh down trees. Wind after ice causes real damage. Trees downed by high winds can block roads, and down power and communications lines. Mobile home parks and houses on ridge lines are at greater risk from wind damage. Blowing snow is also an issue of winds during winter months for the roadways in Dover. Rice Hill Road and the top of Handle Road, and Route 100 north of Tannery Road always get hit hard. This is because of open fields in these areas allowing snow to blow onto the roads. Highly susceptible locations for damage in Dover include manufactured homes. There are 18 manufactured homes in Dover.[27] Most high winds events in Dover have resulted in minor damage from downed trees and power lines. There hasn't been public assistance for any wind damages in Dover.

Geographic Area of the Hazard

High wind events are not localized and can affect any part of the Town. Higher elevations are more susceptible. Dover has a mountainous rough topography, along with valleys where much of the settlement is located. Average wind speeds correspond with the highest elevations, though Plan participants noted that strong gusts do sweep through the valleys, as well. The map on the following page shows annual average wind speeds for southern Vermont south of Rutland. This gives an idea of wind speed in the town in comparison to its surroundings. The purple area to the north of the highlighted square is Stratton Mountain, which gets particularly high winds and can serve as a point of reference or comparison to the highlighted square indicating Dover.

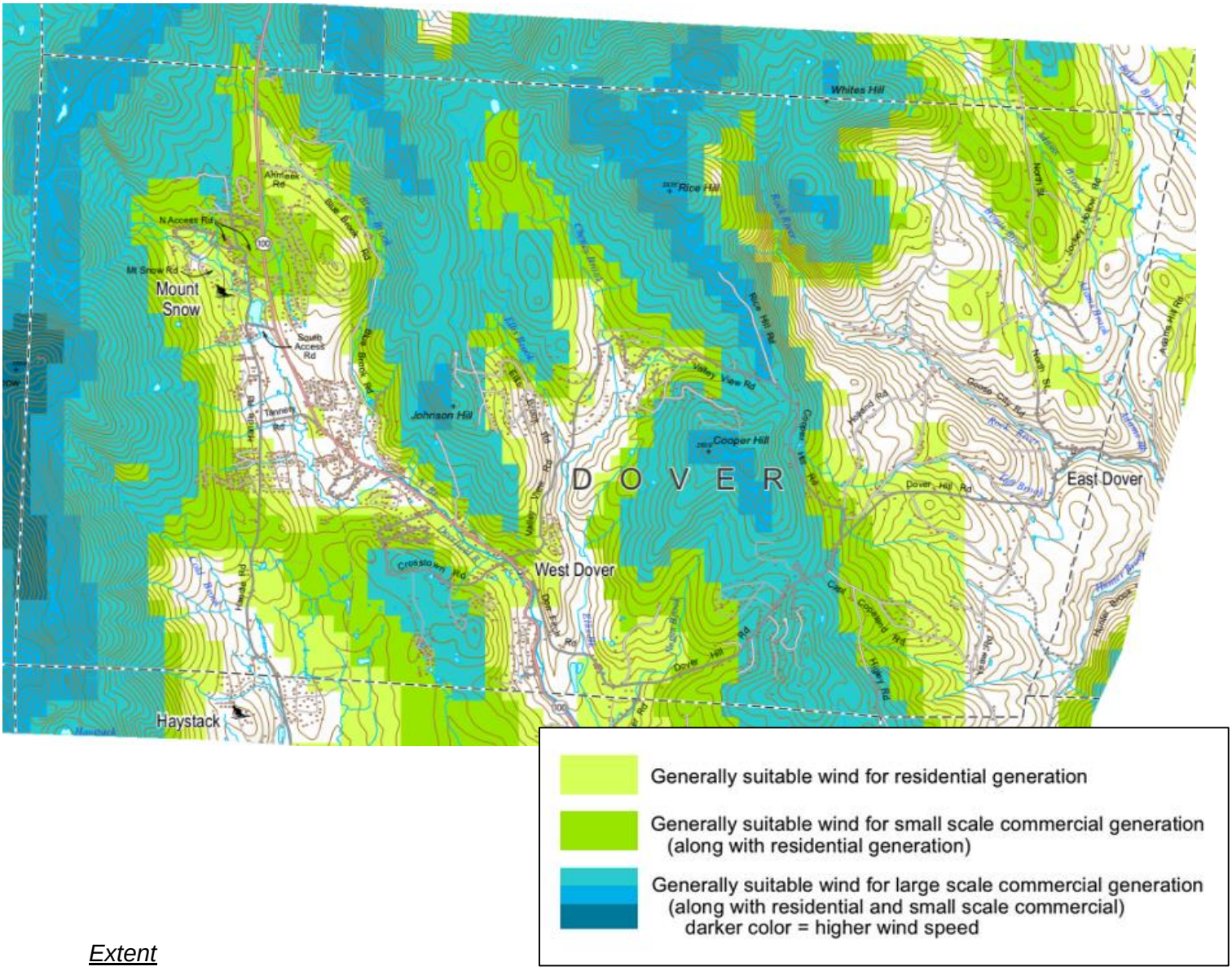
[26] NCDC storm event database provided 10/15/19.
[27] According to the 2014 Dover Grand List



For a more localized look at wind speed, the below map shows wind power opportunity correlated only to wind speed[28]. The higher elevations in town, areas such as the Rice Hill,

[28] This map was developed by the Windham Regional Commission for use by the Town and Region in energy planning efforts. It is available online at: https://drive.google.com/drive/u/1/folders/0B2c_6utSGstLZjMtSHFHU3JlRnM.

Cooper Hill, Johnson Hill and the slopes of Mount Pisgah and the western ridgeline of the Green Mountains have the highest wind speeds in the Town.



Extent

Winds are brought into the region mainly due to low pressure systems coming out of the Canadian zone, or high pressures coming off the Gulf Coast.

Extent/magnitudes of Hurricanes and Tropical Storms are ranked using the Saffir-Simpson Scale in the Western Hemisphere, as follows: CAT1=74-95 mph winds, CAT2=96-110 mph winds, CAT3=111-129 mph winds, CAT4=130-156 mph winds, Tropical Storm=39-73 mph winds, Tropical Depression=0-38 mph winds.

Dover experiences a variety of wind events, not simply hurricanes, so the Beaufort scale is also included here for reference[29]:

Force	Speed		Land Conditions
	knots	mph	
0	<1	<1	Calm, smoke rises vertically
1	1-3	1-3	Light air, direction of wind shown by smoke drift only
2	4-6	4-7	Light breeze, wind felt on face, leaves rustle, vanes moved by wind
3	7-10	8-12	Gentle breeze, leaves and small twigs in constant motion, wind extends light flag
4	11-16	13-18	Moderate breeze, raises dust, loose paper, small branches move
5	17-21	19-24	Fresh breeze, small trees in leaf begin to sway
6	22-27	25-31	Strong breeze, large branches in motion, umbrellas used with difficulty
7	28-33	32-38	Near gale, whole trees in motion, inconvenience felt walking against the wind
8	34-40	39-46	Gale, breaks twigs off trees, impedes progress
9	41-47	47-54	Strong gale, slight structural damage occurs
10	48-55	55-63	Storm, trees uprooted, considerable damage occurs
11	56-63	64-73	Violent storm, widespread damage
12	64+	74+	Hurricane, extreme destruction

Probability

The Hazard Mitigation Plan participants ranked wind as being highly likely, or having a 100% probability of occurring within any given year. Wind storms of varying degrees are experienced every year.

There are many trees in close proximity to roads, buildings and power lines throughout the town, though there are no specific areas susceptible to trees on wires. The EMD noted during this planning process that 'GMP has been really good lately with their tree maintenance'. Route 100 is managed by GMP most often compared to side roads. There are areas where power lines go through the forest, so tree trimming is not practical. That being said, otherwise in Dover trees on power lines is an issue at times during and after wind events or ice and snow events, meaning power outages are a secondary effect and a hazard to vulnerable populations.

Past Occurrences

There have been 49 events in Windham County since 1996 that are notated by the National Climatic Data Center as being High Wind, Strong Wind, Thunderstorm Wind or Tornado events. There have been five recorded tornados in Windham County since 1950.

October 31, 2019 – Intense Halloween wind event left many trees and limbs down, taking down many power lines and snapping a couple of poles. Power outage lasted a couple of days in some places, as restoration efforts were needed region-wide.

May 4, 2018 - A powerful low pressure system formed on May 4th, pushing a strong cold front across New York and New England. A line of thunderstorms developed along this front and

[29] NCDC: Beaufort Scale for Land. <https://www.ncdc.noaa.gov/sites/default/files/attachments/Land_Beaufort_Scale.pdf>

pushed into southern Vermont in the evening, resulting in dozens of downed trees and wires. Over 2,500 customers lost power as a result of the storms. There was high wind and branches came down in the road all over town.

August 22, 2017 – Strong to severe thunderstorms developed along and ahead of a cold frontal boundary as it moved through eastern New York and western New England. Prior to convective initiation, a Tornado Watch (#461) was issued for the western Adirondacks and Mohawk Valley and a Severe Thunderstorm Watch (#463) was issued for much of eastern New York and western New England. These storms resulted in reports of trees down across southern Vermont. Trees and wires were downed throughout Dover.

June 17, 2014 - A warm and humid air mass was in place during the late evening hours of Tuesday, June 17th into the early morning hours of Wednesday, June 18th. A strong cold front moved across the region from west to east right around midnight. Along and just ahead of this boundary, a line of severe thunderstorms in the form of a squall line raced from west to east across the area. These storms produced significant wind damage across eastern New York. The thunderstorms weakened somewhat as they reached the border with western New England as instability started to wane, but still caused damage to trees in a few locations. The threat for thunderstorms ended with the passage of the cold front by the late night hours, as drier and less humid air worked into the region. Trees were reported down in West Dover as a result of thunderstorm winds.

October 29, 2012 - Strong and gusty winds in association with Hurricane Sandy caused damage to trees and power lines across the region. Although not quite as widespread as areas across southeastern New York and New Jersey, power outages occurred throughout the region. Most of the outages in Vermont were primarily in the western part of the state. Wind gusts of 40 to 60 mph were common from the afternoon of the 29th until the early morning hours of the 30th. The highest wind gust in southern Vermont occurred in Woodford, where a wind gust to 58 mph was reported. Route 9 was closed to traffic due to power lines down in the road near the Molly Stark Motel just west of Brattleboro. Two trees were reported down on Interstate 91 in southern Vermont.

Aug. 28, 2011 - Tropical Storm Irene tracked north northeast across eastern New York and western New England during Sunday, August 28th, producing widespread flooding, and damaging winds across the region. Strong winds occurred across southern Vermont, with frequent wind gusts of approximately 30 mph in Grafton. 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.

May 26, 2011 - A nearly stationary frontal boundary was draped across western and northern New York State as several waves of low pressure moved easterly along the boundary. In addition, a warm front lifted northeastward across southern Vermont during the morning hours of Thursday, May 26th. The passage of the warm front ushered in a warm, humid and unstable air mass. A large bowing segment of thunderstorms tracked east from the Catskills and Schoharie Valley of east central New York across western New England including southern Vermont during the late evening hours. There were numerous reports of wind damage and power outages.

July 20, 2008 - The interaction between a nearly stationary frontal boundary across central New York State and northern New England, and a very warm, moist and unstable air mass, led to the development of numerous showers and thunderstorms Sunday afternoon and evening on July 20th. Some of the thunderstorms were severe. A pole was snapped along Lower Handle Road in Dover due to strong thunderstorm winds. Trees were reported down on Valley View Road near Dover due to strong thunderstorm winds. Trees and a pole were reported down along Route 101 near West Dover due to strong thunderstorm winds. In addition, a tree was also reported down on Blue Brook Road in Dover at approximately 1803 LST due to strong thunderstorm winds.

December 1, 2006 - A low pressure system developed along the trailing end of a cold front over the lower Mississippi Valley on Thursday, November 30th, before moving northeast and intensifying rapidly. The low reached the eastern Great Lakes by Friday morning, and then moved across northern New York State by Friday evening. |A strong cold front trailing from this low swept across southern Vermont late Friday afternoon into the evening hours, preceded and accompanied by several lines of severe thunderstorms. Trees were reported down in West Dover, and many other places within Windham County between 1900 EST and 1915 EST due to thunderstorm winds.

June 5, 2002- Thunderstorms, that initially developed in New York, and produced a macro burst in extreme eastern New York, moved into southern Vermont during the evening of the 5th. The storms spawned two tornados, one in Woodford Hollow, Bennington County and the other one near Wilmington, Windham County. The first touchdown, one-mile north from Route 9, produced a swath 150 yards wide and a path length of one half mile. Many trees, as large as a foot in diameter, were either knocked over or ripped apart. Trees also fell on three automobiles. This tornado was assessed to be a F1 intensity, with winds estimated between 80 and 100 mph. The second tornado, 4 miles northeast of Wilmington, was even stronger despite a narrower swath of 50 yards. The path length was also about a half mile. This tornado, in addition to blowing some trees down, mostly destroyed a sturdy house on Haynes Road. The garage of the house was blown off its foundation. The family room was ripped off the end of the house, nearly killing the owner. Luckily the owner escaped without any injuries. However, antiques in the attic of the home, as well as numerous other possessions from throughout the house, were spread out for miles downwind, and a propane tank was missing. The winds with this tornado were estimated between 125 and 150 mph. Non-tornadic thunderstorm winds blew some trees down in the town of Pownal. Lightning struck a home in North Bennington causing a very small fire with minimal damage to the structure of the house.

Mar. 10, 2002 - The pressure gradient between deep low pressure over Ontario, and high pressure off the southeast coast, produced a strong southerly flow across southern Vermont on the evening of March 9. Then, a strong cold front moved across the region shortly after midnight, early on March 10th. A line of showers and embedded thunderstorms accompanied the front. Strong winds ahead of and along the front produced some damage across Windham County. Law enforcement personnel reported a large number of trees and power lines down throughout the county.

Nov. 27, 1997 - The passage of a cold front produced strong winds across southern Vermont during the early morning hours of November 27. Winds gusting to 40-50 miles an hour downed trees and power lines in Bennington and Windham Counties. Approximately 1,500 customers lost power for a six to eight-hour period.

Jul 20, 1996 - An unusually intense low pressure system tracked across the northern Great Lakes to Quebec, Canada during July 19 and 20. The system generated strong northwest winds, which downed trees and power lines over parts of Windham County in southern Vermont.

Feb. 24, 1996 - A rapidly deepening low pressure system moved from southern New Jersey northeast to northern Maine by the morning of February 25. This system brought damaging winds to southern Vermont including Bennington and Windham counties, which downed many trees across the area and produced scattered power outages.

Jan 19, 1996 - An intense area of low pressure located over the Mid-Atlantic Region on Friday morning January 19th produced damaging winds across southern Vermont. This storm was associated with a strong southerly flow which resulted in scattered reports of downed trees, limbs and power lines.

July 15, 1995 - A widespread severe weather outbreak hit Vermont during the morning hours of July 15th. A long lived squall line, known as a Derecho, crossed Vermont during the morning hours. Southern Vermont was hardest hit especially across Windham, Windsor, Rutland and Bennington Counties.

July 14, 1988 - Tornado in Windham County (exact location not known). Traveled 10 yards. Caused $250,000 in damages.

July 5, 1957 – Tornado in Windham County (exact location not known). Traveled 33 yards. Caused $2,500 in damages.

Sept. 21, 1938 - A hurricane Igor hit the region of Southeast Vermont to include the Town of Grafton, paralyzing it for weeks. As it was coming, packing winds over 100 miles an hour, authorities were unaware of the magnitude so no evacuation procedures were instituted and very few precautions were taken. As a result, over 600 people lost their lives and tens of thousands were left homeless. Wind, rain and flash flooding wiped out trees, church steeples and buildings, leaving behind nearly $400 million in damage.

Sources used
Local town knowledge and records, National Climatic Data Center

Invasive Species: Plants and Insects

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

Invasive plant 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.

An invasive species can be defined as **an exotic species whose introduction into an ecosystem in which the species is not native and causes or is likely to cause environmental or economic harm or harm to human health**[30]. Another definition is **an exotic species that colonizes both disturbed and undisturbed habitats**[31]. For an example of the second definition not being met, Coltsfoot (*Tussilago farfara*) is usually only found in disturbed areas, mainly on the edges of unpaved roads. Thus, it is not considered invasive here, since it is rare in undisturbed woods.

In contrast, Burningbush (*Euonymus alatus*), an invasive shrub often planted in local yards, has its seeds carried by birds to nearby woods, where they grow well in those undisturbed areas, crowding out native plants. The homeowner with them in their yard may not realize this spread is happening. (See photo)

Keep in mind that “exotic” may be hard to define. For example, Black locust (*Robinia pseudoacacia)* is native to the US, mainly in and near the Ohio River Valley, but it is not native to Vermont. It was brought here by settlers who planted it mainly to use for fence posts. It spreads rapidly to undisturbed woods, so it is considered invasive in Vermont.

[30] (USDA) https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ct/technical/ecoscience/invasive/?cid=nrcs142p2_011124
[31] CT Invasive Plant Working Group, https://cipwg.uconn.edu/criteria-for-listing/

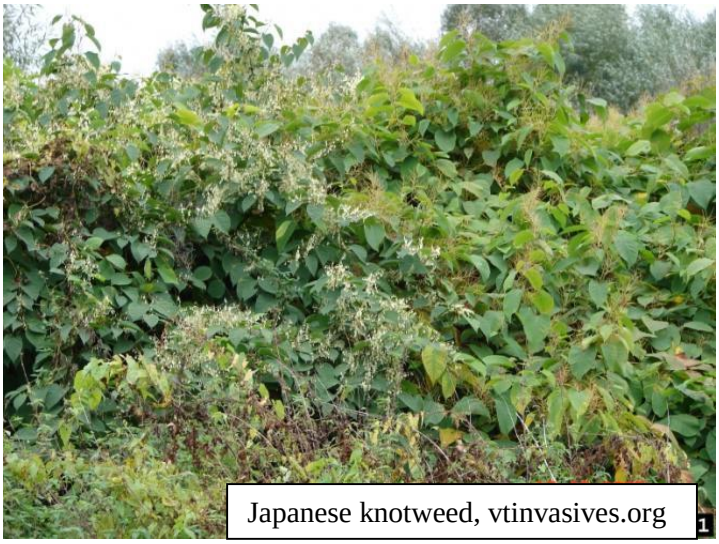
Invasive Plant Species

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.

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)

Heavy travel corridors like VT Route 100 are also highways for the spread of invasives. Waterways and riparian areas are also corridors that invasives can overtake and spread along.

Particular invasive plant concerns for Dover are listed in two groups based on their estimated threats to natural and hard infrastructure. All (except spindle tree) are quarantined, Class B Noxious Weeds in Vermont[32].



Japanese knotweed, vtinvasives.org

Group A—Higher threats to infrastructure

1. There are heavy infestations of Japanese Knotweed (*Fallopia japonica*) along the North Branch of the Deerfield River and the Rock River, as well as the lower reaches of several brooks. It leaves shorelines susceptible to erosion because there is no other vegetation stabilizing the stream bank (Basin 11 Management Plan, Preliminary Draft 2007). TS Irene both (1) eroded stream and river banks, removing many riparian trees, and (2) moved fragments of knotweed to

[32] Vtinvasives.org is the primary website for information. This list was developed by Peter Bergstrom of the Rockingham Conservation Commission. Email dated 8/21/2021.

new areas, thus allowing knotweed to flourish on the bare soil left in its wake.

2. Asiatic (Oriental) bittersweet (*Celastrus orbiculatus*), an aggressive climbing vine that can smother trees, utility poles, and buildings. Gaining a foothold in Dover.
3. Amur, Morrow's, Tartarian, and Bell's honeysuckle (*Lonicera mackii, morrowii, tatarica, x bella)*
4. Japanese & Common barberry (*Berberis thunbergii & B. vulgaris)*, which promote Lyme disease by harboring high populations of deer mice, one of the intermediate hosts of deer ticks.
5. common and glossy (European) buckthorn(*Rhamnus cathartica & R. frangula*), which slow forest regrowth.
6. Burningbush (*Euonymus alatus*)—still a common ornamental in yards, spreading to woods via birds that eat the low-value fruit, little wildlife value, should be excavated.


Burning Bush, vtinvasives.org

Group B—Lesser threats to infrastructure

7. Mile-a-minute vine (*Persicaria perfoliate*), on Federal invasives list that is included in state list. Considered a "watch list" species in VT, but can cover other plants as well as hard infrastructure.
8. Garlic mustard (*Alliaria petiolate*) is common along roads and in fields and riparian areas in Londonderry, and can invade forests.
9. European spindle tree (*Euonymus europaeus*)-locally problematic, not on VT invasives list; suggested for addition to it. Very hard to control. You can buy seeds on eBay.
10. Goutweed (*Aegopodium podagraria*)—Highly invasive, has solid green leaves, or variegated green & white leaves. Very hard to control.
11. Norway maple (*Acer platanoides*)— inhibits growth of nearby plants spread widely by seeds to nearby woods, little food or habitat value to wildlife. Should not plant any new ones. Provides good breeding habitat for Asian long-horned beetles (ALB).
12. Purple loosestrife (*Lythrum salicaria*)
13. Yellow flag iris (*Iris pseudacorus*)—wetland plant, not sure how much we have.
14. Amur maple (*Acer ginnala*)-- not sure how much we have.
15. Tree-of-heaven - not sure how much we have. Looks very similar to sumac and walnuts (black and butternut) but has smelly leaves when crushed, and smooth leaf margins except at the base.
16. Wild Chervil *(Anthriscus sylvestris)* - This invasive plant can be seen starting in May alongside roads, and is notable in our rolling Vermont fields. Often confused for Queen Ann's Lace which blooms later in the summer.

Five groups of invasive plants found in Dover, listed below, are thought to pose the highest threat to native and/or hard infrastructure. Barberry is also a human health threat (Lyme disease).

Common name	Latin name	Locations	Threats	Control
Japanese Knotweed	*Fallopia japonica*	Banks of all rivers and many brooks	Can grow through asphalt, into basements, and block trails; more likely to wash out than natives	Mowing (endless), repeated cutting & digging (3-10 years), mesh?
common and glossy (European) buckthorn	*Rhamnus cathartica & R. frangula*	Clearcuts, woodland edges	Prevents regrowth of native trees	Excavation including roots
Japanese & Common barberry	*Berberis thunbergii & B. vulgaris*	Planted shrub, escapes to woods	Increases deer mice which harbor deer ticks with Lyme disease	Excavation including roots
Burningbush	*Euonymus alatus*	Planted as ornamental, birds spread seeds to woods	Displaces native shrubs	Excavation including roots
Amur, Morrow's, Tartarian, and Bell's honeysuckle	*Lonicera mackii, morrowii, tatarica, x bella*	Planted as ornamental, birds spread seeds to woods	Displaces native shrubs	Excavation including roots

Elevations generally below 1,500 feet (luckily most of Dover is above 1,500 feet) are most susceptible to invasive species, although 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. Below are some examples of how invasive plants are impacting Dover:

Natural infrastructure

1. Japanese knotweed has taken over significant sections of streambank on the North Branch of the Deerfield River and its tributaries. It is also becoming more common along roadsides and other disturbed areas. Common & Glossy buckthorn, Morrow's honeysuckle, Japanese barberry, and burning bush are colonizing disturbed forest areas and forest edges, and may be preventing regeneration of other species.
2. Invasive vines such as Oriental bittersweet can cover and eventually kill a tree.
3. Invasive tree pests are killing some of our valuable trees such as ash and hemlock.

Hard (human) infrastructure

1. Any human structures near Japanese knotweed are vulnerable to invasion by its stems. It can spread up to 30 feet underground, and come up through asphalt. Roadside trees

killed by invasive insect pests can fall and damage roads, utility lines, and human structures, and cause accidents. Some towns are mapping their roadside ash trees and identifying the ones that are highest priority of removal due to these risks. This would be a good idea for Dover to also do.

2. Invasive vines can cover utility poles and make servicing the lines, transformers, and junction boxes on them very difficult.

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[33].

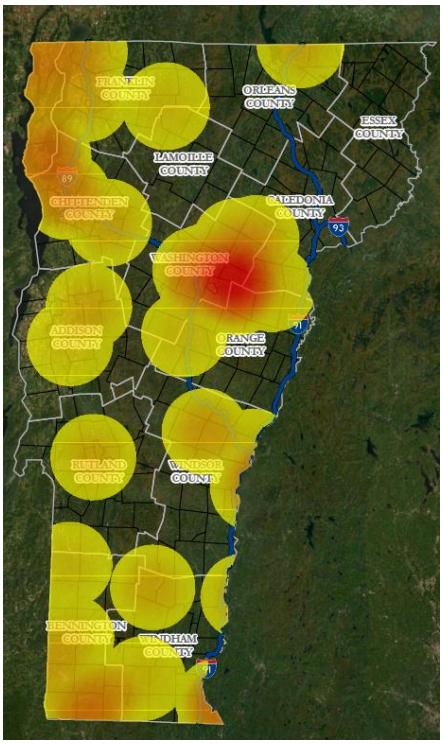
VTinvasives.org is a great resource for towns interested in engaging in activities around invasives, including using their template to develop a custom invasive species plan for your town. The idea is to continue to create as much awareness as you can so residents know who to call when they see things. 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, members of the Conservation Commission, arborists and foresters.

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 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.[34]

[33] 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_ex otic_and_pest_species.pdf

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



Map provided by VTinvasives.org and current as of 3/28/22.

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. While Emerald ash borer has not yet been confirmed in Dover, it was confirmed in adjacent Wilmington and nearby Londonderry. The town is entirely within an area considered likely or probable to have EAB. The town is not seeing any tree damage yet, but the town has been planning for Ash tree removal along the roads. Due to town's elevation there is not a huge amount of Ash, compared to lower elevation towns in the region. From a forestry standpoint, there is an impact on the sale of Ash wood to allow it only to go to USDA approved receiving sawmill facilities and only be transported during the non-flight season of winter. Before that, EAB ash could be moved more freely. The town is not actively removing ash yet to see what GMP does first that threaten their utility lines.

EAB has been confirmed in other towns within the Windham Region. Dover is entirely covered under what VTinvasives.org calls the "Slow the Spread Movement". Carefully planning 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.[35]

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. Purple traps have been placed in Londonderry by the Conservation Commission to catch the EAB for early detection; none have been detected thus far.

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.

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 not yet known to be present in Dover. 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 yet been found in Weston, Winhall, Somerset, Searsburg or Readsboro. HWA is moving south to north in lower elevations first, and is mostly throughout southern

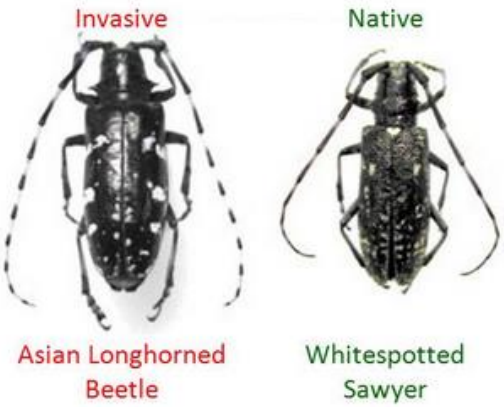
[35] University of New Hampshire Cooperative Extension – Blonding on Ash trees information sheet. <http://extension.unh.edu/resources/files/Resource004103_Rep5824.pdf> Accessed 3/2/15.

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[36]

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 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. And they have an active quarantine and public notification campaign about the pest.[37] They are having to destroy every host tree, infected or not, and will be replanting in the oaks. Boston had a small outbreak which they believe was caught in time. New York and Ohio also have quarantines in affect in their boundaries to prevent the spread. ALB has not been detected in upstate NY or in NH. It

[36] http://www.maine.gov/dacf/php/caps/ALB/ALBdamagepics.shtml
[37] http://www.worcesterma.gov/city-manager/asian-longhorned-beetles. Accessed 3/2/15.

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 some large trees in Dover, but overall it is not a significant part of the tree cover. Dover 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 concern in Dover is impacts of hazard trees to roads and power lines.

The loss of maple trees to ALB, could mean a devastation to the maple industry, which is a big industry in Vermont, including in Dover. A lot of people sugar, 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 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 not currently known to be present in Dover. Asian longhorned beetle has been found within fifty miles of Vermont's border. EAB and HWA have been confirmed in 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/maple forest stands. Southeastern Vermont has primarily white ash and green ash, while black ash is 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.

Ash 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 (may be lower for white ash). 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. The EMD has done an ash tree inventory town wide in right of ways. There are removal plans in place but they have not been acted on yet.

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 Dover. Invasive plants are present in Dover. Long-standing and spreading forest threats in the Windham Region are glossy buckthorn, purple loosestrife, Japanese barberry, Morrows honeysuckle, 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 Dover as approximately 3,666 acres in Dover are in the Current Use program, this includes 43 parcels. Current use qualification requires 25-acres minimum to be enrolled in the forestry program. Many parcels are in the range of a hundred acres or more. Forestry is the dominant enrollment in Londonderry (which allows for up to 20% to be open land in the property). Logging is recognized as an important industry in Dover 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.[38] 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.

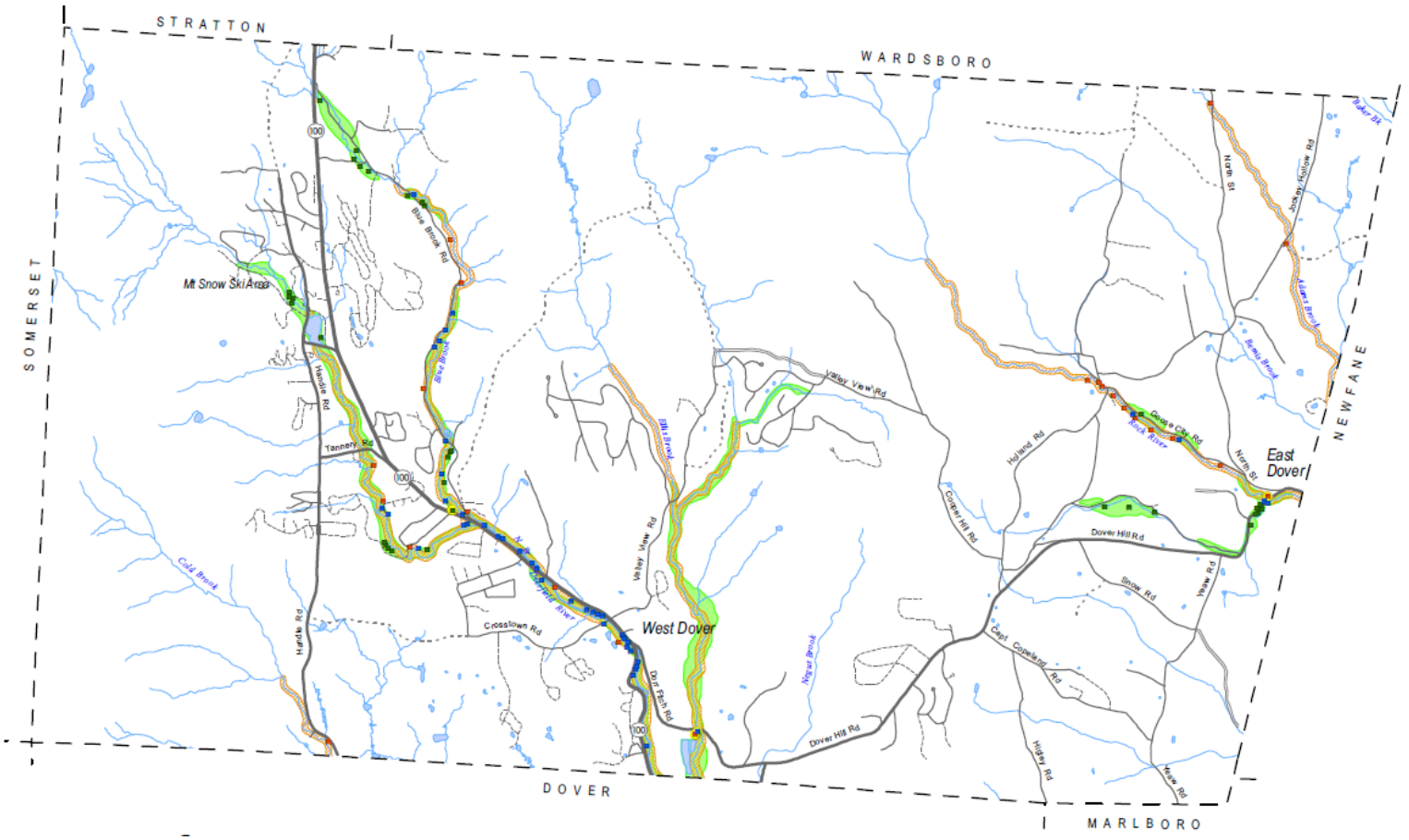
Sources Used
Review and input from Andy McLean (Conservation Commission Chair and Town Clerk in Dover); Invasive plant lists from Peter Bergstom of the Rockingham Conservation Commission, send 8/21/2021; Email with VT State Forester Jim Esden on 2/21/20 (802-885-8822 or jim.esden@vermont.gov); Email 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[39]; Images courtesy of Google images and Maine Forest Service

ASSESSING VULNERABILITY

Structures in the SFHA or River Corridor

The numerical details of vulnerable structures are discussed earlier in this plan. The below maps show where the structures lie, with two inset maps showing the areas of concentration in East and West Dover villages. The affected structures in East Dover are primarily along Goose City Road and Dover Hill Road. In West Dover they are primarily along Route 100 and Blue Brook Road. Public infrastructure vulnerabilities in Dover are primarily to roads and other associated infrastructure.

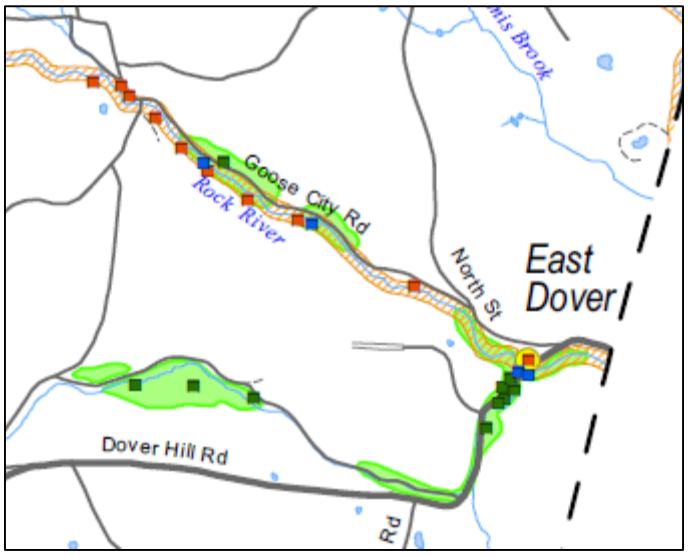
[38] < http://www.vtinvasives.org/tree-pests/community-preparedness>
[39] http://www.maine.gov/dacf/mfs/forest_health/invasive_threats/index.htm



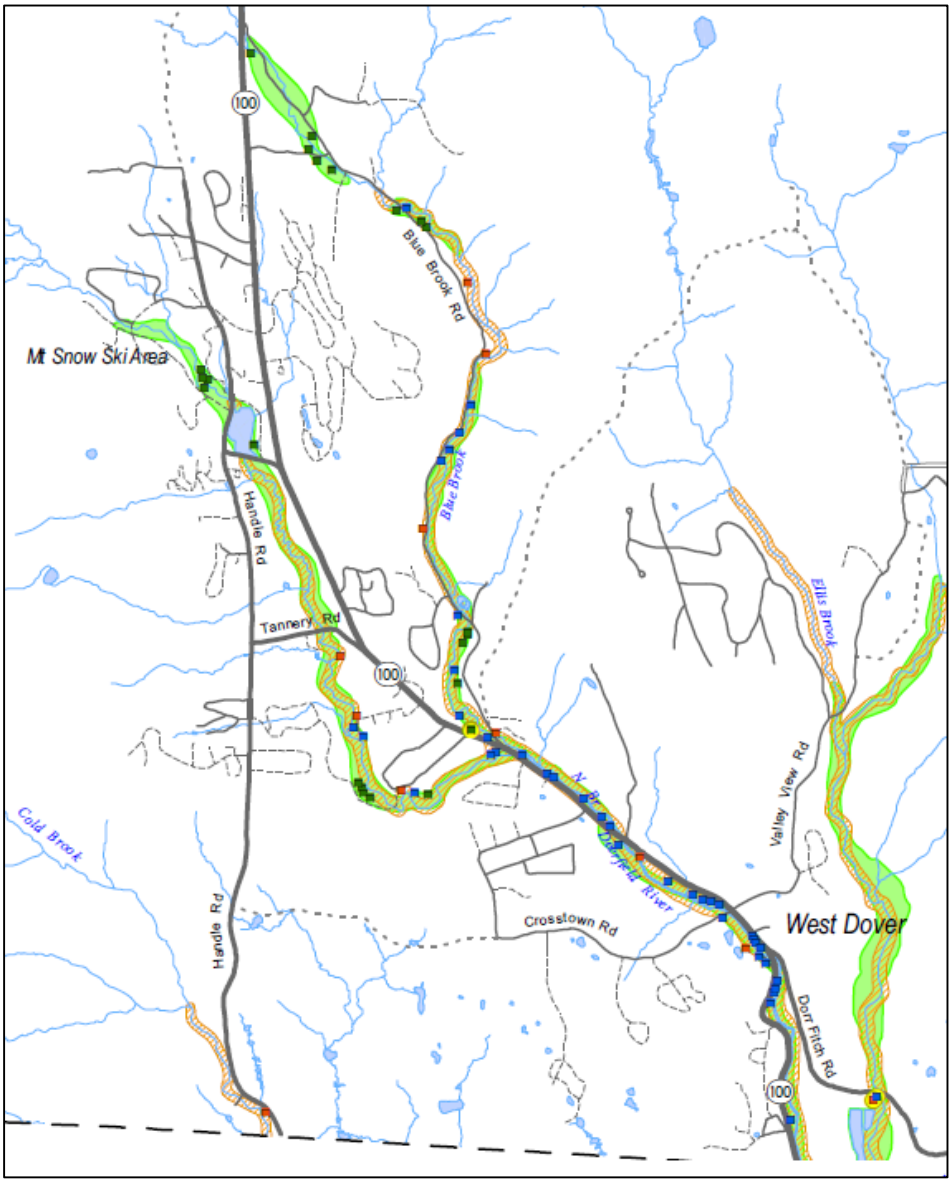
Mapped River Corridor

Special Flood Hazard Area (SFHA)

Major building in Mapped River Corridor, SFHA, or both



Inset maps of the village areas of East and West Dover show the majority and concentration of structures in the SFHA and/or River Corridor



Repetitive Loss Structures

One repetitive loss property exists in Dover, a non-residential property in downtown along Route 100[40]. 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 1978.41 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:

[40] Data provided by Vermont Emergency Management on 10/17/2022.
[41] https://www.fema.gov/national-flood-insurance-program/definitions

- 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 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. Dover joined the NFIP on July 1, 1991 and is a member in good standing (CID 500127). 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 (portions of the town are undergoing map updates as of this Plan writing).

The latest record indicates that there are forty (40) active NFIP policies in Dover. These policies have a total value of $7,980,300. There have been thirteen NFIP claims paid in Dover since 1978, totaling $199,853.[42] Dover 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

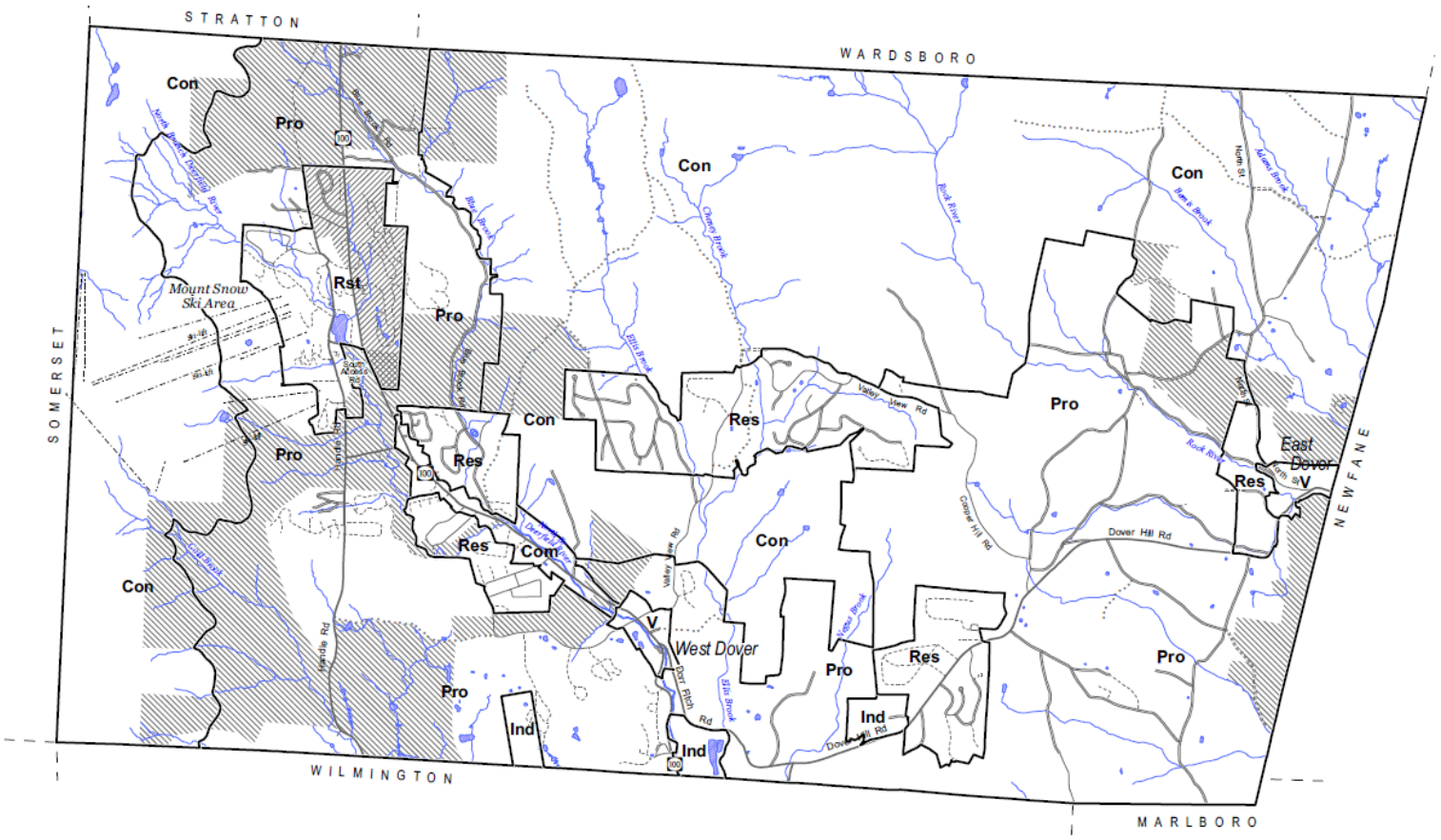
[42] FEMA NFIP Insurance Report, Nov 2014
<http://floodready.vermont.gov/sites/floodready/files/NFIP%20Insurance%20community-report%209.26.14.pdf>

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.

Structures within SFHAs, that are under a mortgage, are required to purchase flood insurance. Dover'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 Dover's floodplain regulations, which is part of their zoning ordinance and was most recently adopted in 2016. The Zoning Administrator will review the permit applications and visits the sites as needed. Dover noted during this planning process that based on their knowledge and experience in their town, the SFHA maps are inaccurate when compared to their flooding realities. Disagreement between property owners and SFHA mapping is handled with letters of map amendments, which requires hiring an engineer to gather data and complete the request to FEMA. The Town not only feels that the SFHA includes areas that should not be covered, but there are also areas that should be in the SFHA that aren't currently mapped. The Town is advised to work with FEMA to communicate these specifics during the next map update cycle.

Proposed Land Use Map from 2016 Dover Town Plan

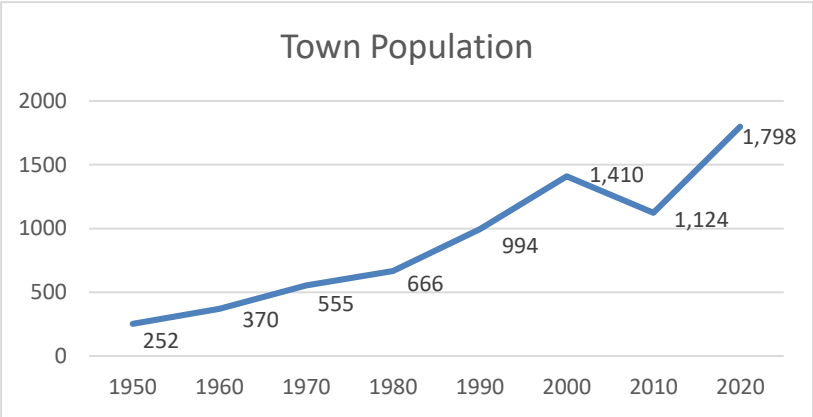


Con - Resource Conservation
Pro - Productive Residential
V - Village
Res - Residential
Com - Planned Commercial
Ind - Light Industrial
Rst - Resort Center

Sensitive Wildlife Habitat overlay district

Vacation overlay district

Development Trends



Dover's population grew by 60% between 2010 and 2020. This significant gain is likely partially due to Covid-19 and second homeowners moving to those homes temporarily before returning to their primary home out-of-state. By 2022 at this writing, some had left and some had stayed so there is a real population increase that has occurred in recent years. There was a big bump in school enrollment because of the Covid-19 impact and it has receded some recently, but not back to the pre-Covid levels. The rise in permanent residents is a mix of second-homeowners moving to Dover full-time, retirees moving in and new local business owners.

In 2020, Dover had the highest number of home sales to out of state buyers of any town in the state, with 230 sales in 2020. Ludlow (219 sales) and Stowe (176 sales) were next line in the state for top home sales. This is likely attributed to Vail Resorts recent purchase of Mount Snow in Dover, Okemo in Ludlow and Stowe Resort in Stowe[43].

Development pre-2008 was very high in Dover with many new large condo developments being built. Mount Snow resort did a lot of new development in the early 2000s. Since that time there has been less development. However, according to the Town Clerk, development prior to 2008 was so massive that even though there is less in more recent years, there is still a significant amount of new development taking place. It's just not to levels of the past in the early 2000s. There have been a couple of new condo developments and numerous single family high-end homes built since 2008. The housing market now is very high with homes selling for twice their assessed value at times. Lack of affordable housing is a big issue in the town and the larger region. Decreasing housing availability and affordability for existing or low and moderate income residents has increased vulnerability in Dover. There are many new ownerships of local businesses as prior owners leave and sell the business. Short term rentals make business for inns more difficult. The Covid-19 pandemic made business even more difficult for restaurants.

Since the prior Local Hazard Mitigation Plan, Dover has made a number of changes to lower vulnerability. 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. Dover can expect to experience future damage primarily to the buildings and infrastructure that remain in the floodplain and fluvial erosion hazard areas.

[43] Property Transfer Data Analysis <https://ptt.mapvt.com/>

MITIGATION STRATEGY

Local Hazard Mitigation Goals for this Plan
The below Hazard Mitigation Goals, which were contained in the prior Dover 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. The fourth bullet was slightly updated with the name of the Local Emergency Management Plan replacing the prior name for this plan, and removing "Capital Improvement Plan", which Dover does not have. The Town also added the last bullet for this update, as they recognize the importance of having dedicated funding for hazard recovery. The reiterated and updated goals are:

- 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.
- Encourage hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan and the Local Emergency Management Plan.
- Ensure that members of the general public continue to be part of the hazard mitigation planning process.
- Maintain capital reserve funds and capital funds to restore essential services after hazard events.

Town Plan Policies and Recommendations that Support Mitigation

The 2016 Dover Town Plan presents an indirect focus on mitigation, which is highlighted by several 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:

Natural Resources

Policy 1.2 Maintain or enhance the chemical, physical and biological quality Dover's surface waters.

Strategies

a. Support surface water classification and management strategies that will maintain or enhance existing water quality.
b. Use road maintenance methods and materials that will maintain or improve water quality, such as those described in the *Vermont Better Backroads Manual.*
c. Limit development in designated floodplains. Continue to administer and enforce the standards in the Flood Hazard Area Regulations in the Dover Zoning Bylaw. Update as necessary to maintain eligibility in the National Flood Insurance Program.

d. Encourage the State to undertake Basin Planning on Basin 12.

Policy 1.5 Retain wetland areas in their natural state for wildlife habitat protection, as retention areas of surface runoff, and for recreational and resource values.

Strategies

a. Conduct field studies to identify and better understand wetlands.

Goal 2: To protect and enhance the ecological integrity of Dover's diverse wildlife species and their habitats.

Policy 3.2 Protect Dover's fragile features and open spaces.

Strategies

a. Revise the Zoning Bylaw to prohibit development on slopes with a grade in excess of 25% (excluding facilities necessary for the operation of downhill skiing)
b. Maintain the Sensitive Wildlife Overlay District and the Transfer of Development Rights Overlay District.
c. Create an Open Space Plan and support and encourage land conservation organizations to work with the Town to identify and preserve lands identified in the plan as conservation priorities.

Community Facilities

Policy 1.5 Maintain a quality level of police, fire, and ambulance services

Strategies

a. Continue to provide financial support to both fire departments so that an effective fire protection and fire prevention system can be maintained.
b. During site plan review require that all new development provide adequate water availability and additional equipment or infrastructure needed for effective fire protection.
c. Ensure adequate police services for the town by periodically reviewing the police protection available to residents.

Flood Resilience

Goal 1: To reduce the loss of life, injury and economic impacts resulting from all flood hazards

Policy 1.1 New development in identified Special Flood Hazard Areas and River Corridors should be avoided. If new development is to be built in such areas, it should not exacerbate flooding or fluvial erosion.

Strategies:

a. The Town will regulate any new development in identified flood hazard areas and River Corridors to ensure that development does not exacerbate flooding and fluvial erosion, and extend these provisions to development activities that might increase the amount and/or rate of runoff and soil erosion from upland areas.
b. Built development in floodplains is prohibited unless a special permit is granted by the Development Review Board.

c. Built development on steep slopes should be avoided if it will increase the amount and/or rate of runoff and soil erosion from upland areas.

Policy 1.2 Protect floodplains and River Corridors through adoption and administration of flood hazard area regulations, in order to reduce the risk of flood damage to infrastructure, improved property, people, and the environment.
Strategies:

a. The Town will update the Flood Hazard Areas Overlay District to include regulation of River Corridors, and include provisions for advance notification of and specific limits on new development activities in identified flood hazard areas and River Corridors, based on regulatory templates developed by the ANR DEC Rivers Program.

Policy 1.3 Encourage flood emergency preparedness and response planning.

Strategies:

a. Pursue the mitigation projects outlined in the Dover Local Hazard Mitigation Plan.
b. Update culvert assessment and upgrade culverts identified in Dover's Local Hazard Mitigation Plan.
c. The town will continue to participate in the National Flood Insurance Program (NFIP) which gives residents access to discount flood insurance.
d. The Town will be familiar with Flood Insurance Rate Maps (FIRMs) that delineate the 1% annual chance flood area, as defined by FEMA.
e. The Town will be familiar with ANR River Corridor maps that delineate the River Corridor, or land area adjacent to streams and rivers (with drainage basins greater than two square miles) required to accommodate a stable channel. The Town will also note that unmapped River Corridors, in drainage basins less than two square miles, are protected in the area 50 feet from top of bank on either side.
f. Ensure that members of the general public continue to be part of the hazard mitigation and flood resiliency planning process.

Goal 2: To reduce the impact of flood hazards on the town's water bodies, natural resources, and historic resources

Policy 2.1 Foster the protection and restoration of river corridors, floodplains, wetlands, and upland forested areas that attenuate and moderate flooding and fluvial erosion.

Strategies:

a. Pursue completing projects outlined in the River Corridor Management Plan for the North Branch of the Deerfield River.
b. Pursue preservation efforts on public/Town land.
c. Promote conservation easements on private lands.

Past and Ongoing Mitigation and Maintenance Efforts

Below is an update on prior identified hazard mitigation projects that were listed in the 2015 Dover LHMP. The planning participants reviewed these actions 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 change of hazards that the community is focused on mitigating.

MITIGATION ACTION	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE	PROJECT PRIORITY	CURRENT STATUS AS OF 2021
Generator-Police Department – critical facility power generation	Emergency Management Director	Pending grant funds; start Summer 2015 complete Summer 2016	HMGP potentially, and town funds	High	Completed
Generator-West Dover Fire Department – critical facility power generation	Emergency Management Director	Pending grant funds; start Summer 2015 complete Summer 2016	HMGP potentially, and town funds	High	Not yet complete and remains a need pending grant funding.
Generator-Highway Garage - critical facility power generation	Emergency Management Director	Pending grant funds; start Summer 2015 complete Summer 2016	HMGP potentially, and town funds	High	Completed
Generator- East Dover Fire Department - critical facility power generation	Emergency Management Director	Pending grant funds; start Summer 2015 complete Summer 2016	HMGP potentially, and town funds	High	Completed
Purchase portable storage for emergency preparedness supplies for emergency shelter	Emergency Management Director	Start Fall 2015; Finish end of 2015	FEMA grant; DEMHS grant	High	The EMD is going to get a box trailer and get one-gallon jugs that can be filled at the school, which is the town shelter. The money is in the budget so the EMD will purchase soon.
Purchase and stockpile gallon containers for distribution during disasters	Emergency Management Director	Start Winter 2016; Finish Spring 2016	FEMA grant; DEMHS grant	Medium	This is not complete and remains a need. The plan is that this will be done after a trailer is purchased.
Material Availability - Salt, sand, gravel, ledge, stone all need stockpiled to allow for quicker recovery time after disaster.	Road Commissioner	Started Fall 2014; Finish Fall 2017	HMGP Grant Funding or VTrans funding	Medium	Completed in Fall 2019
Replace Bridge with larger bridge on Dover Hill Road by the East Dover Fire House	Road Commissioner	Pending funding start 2016; finish fall 2017	HMGP Grant Funding or VTrans funding	High	Not yet completed and remains a high priority.
Update culvert assessment	Road Commiss. / WRC	Start spring 2015; finish Summer 2015	Town budget; Better Back Roads	High	Completed in Fall 2019
Culvert upgrade at Taft Brook Road 1/5 mile north east of Town Hall	Road Commissioner	Start and Finish Spring/Summer 2016	HMGP Grant Funding or VTrans funding	Medium	Completed
Culvert upgrade at Barlett Residence on Holland Road	Road Commissioner	Summer 2015, start and finish	Town funding	Medium	Completed in 2017
Develop program for assessing and removing potentially hazardous tree limbs near power lines	Road Commissioner and Power Company	Annually check each fall and spring	Town budget and power company	Medium	Ongoing
Fill Salt Shed	Road Commissioner	Start and end winter 2015/2016	HMGP Grant Funding/ VTRANS	Medium	Completed in 2016 and ongoing

MITIGATION ACTION	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE	PROJECT PRIORITY	CURRENT STATUS AS OF 2021
Install pressurized water supply for firefighting in West Dover – needed to allow for quicker response – piping about three miles	Road Commissioner	Start Summer 2015, Complete 2020	Town budget; potentially grant funded	Medium	The original plan was not completed, but Mount Snow's piping for West Lake does now provide a connection for pressurized line on Handle Rd.
Bank stabilization - Rock River - Trees are sliding into river; banks need stabilized - road is at risk	Road Commissioner	Start Spring 2018 / complete within 1 season	Town funding; potentially grant funded	Low	Completed
Bank stabilization - Bluebrook - particular area just above the covered bridge - landslide issue	Road Commissioner	Start Spring 2018 / complete within 1 season	Town funding; potentially grant funded	Low	Not completed and no longer a priority because the Road Foreman feels the impact is not primarily to the roadway, but to private property.
Bank/Road stabilization - Dorr Fitch Road - Road itself is sinking because the bank is eroding - Road in a landslide , but no alternative road	Road Commissioner	Start June 2017 / Finish Fall 2017	Vtrans grant funding	Low	Stabilization completed 2017
Fire Chief and Police Chief to get VTAlert training; subsequently do outreach to residents through the town website and tax bills to sign up for VTAlert for town notifications	Fire Chief / Police Chief	Start June 2015 / Finish Fall 2015	Town budget	Medium	Completed for Police and West Dover Fire, in addition to dispatch being trained. East Dover Dept has training planned
Bylaw update to include River Corridors in the Floodplain bylaw	Planning Commission	Start prior to Town Meeting Day 2016 / Vote for approval TMD 2017	Town budget	High	Planning commission has begun Town Plan Review and River Corridors will be included in Town Plan and then added to the zoning bylaw.
Floodplain Administrator will get further training	Floodplain Administrator / WRC	Summer / Fall 2015 attend training series	Town budget	High	FPA signed up for additional training courses toward becoming a Certified Floodplain Administrator.

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 school, but the hotels are usually used for overnight sheltering in a severe emergency. There is no formal agreement with the hotels but it works.

4. Dover participates in the National Flood Insurance Program (NFIP) which gives residents access to discount flood insurance. SFHA maps are at the town office.

5. Dover has a yearly fire prevention program at the elementary school to educate students about what fire smells like, how to prevent fires, and what to do if they find themselves in a fire.

6. A yearly fire protection reminder is sent with funding request from both fire departments to residents.

7. The town maintains hazard prevention information that residents need to be aware of on the town website.
8. The Planning Commission has revised floodplain regulations in the zoning ordinance to be more restrictive than the state minimums for preventing development in the floodplain. Built development in floodplains is prohibited unless a special permit is granted by the Zoning Hearing Board.

9. One disaster drill is held per year between East and West Dover Fire Departments and Deerfield Valley Rescue.

Identification of Mitigation Actions

The Dover 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?

This table was shared to assist in consideration of action types:

Mitigation Action	Description of Category	Examples of Mitigation Actions
1 **Local Plans and Regulations**	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Building codes and enforcement • Capital improvement programs • Open space preservation • Stormwater management • regulations and master plans
2 **Structure and Infrastructure Projects**	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.	• Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits. • Floodwalls and retaining walls • Detention and retention structures • Culverts • Safe rooms
3 **Natural Systems Protection**	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements
4 **Education and Awareness Programs**	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.	• Radio or television spots • Websites with maps and information • Real estate disclosure • Mailings to residents in hazard-prone areas. • StormReady • Firewise Communities

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 / PREPARED-NESS	PRIORITY	Notes / Status
1	Flooding and Fluvial Erosion	Bridge should be upgraded.	Upgrade bridge on Dover Hill Road by the East Dover Fire House.	Road Commissioner	2022-2023	FEMA or Vtrans grant	M	High	Remains a high priority carryover item from the prior Hazard Mitigation Plan.
2	Flooding and Fluvial Erosion	Training is vital for the Floodplain Administrator to carry out the role properly.	Further training for the Floodplain Administrator.	Floodplain Administrator	Goal of CFM by end of 2023	Town budget	P	High	The FPA is signed up for additional training courses toward getting her CFM certification.
3	Flooding and Fluvial Erosion	Approximately 80% has been done thus far to meet state guidelines for stone line ditching	Stone-line ditches and bring them up to current state standards	Road Foreman	complete by 2025/26	Town budget	M	High	
4	Flooding and Fluvial Erosion	The grant for this scoping study was awarded in April 2022 with deadline of 12/31/24. If the study shows the expected flood resilience and water quality benefits, the dam removal project can be pursued.	Complete scoping study for the removal of the Snow Lake Dam. Goal is 90% design and full permitting for the South Access Road structure and NBDR channel restoration.	Town Administrator, Select Board, WRC, Mount Snow, VEM	underway; aim is to complete by end of 2023	FRCF	M	High	Mount Snow and VHB assisted with the project application; WRC has MOU for project management services for the town. This project is underway currently.
5	Flooding and Fluvial Erosion	Pending the results of the scoping study. This is a high priority project in the North Branch of the Deerfield River Water Quality Remediation Plan.	Removal of Snow Lake dam and channel restoration of NBDR. Structure to support South Access Road with dam gone.	Town Administrator, Select Board, WRC, Mount Snow, VEM	Ideally apply for funding in 2024 / goal is completion by 2025-2028	HMGP or other grant funding / private funding from Mount Snow	M	High	Pending the scoping study which will bring project to pre-design.

HAZARD(S) ADDRESSED		ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPARED-NESS	PRIORITY	Notes / Status
6	Flooding and Fluvial Erosion	This culvert overtopped in TS Irene and its perch is blocking AOP. Project is supported by DEC.	Upgrade of the culvert under Handle Road that transports Jacks Brook	Road Foreman	Complete by 2025	Vtrans grant	M	High	Road Foreman is working on this project.
7	Flooding and Fluvial Erosion	NBDR connection blocked to headwaters due to perched undersized culvert in need of upsizing. Culvert constricts NBDR.	Replace culvert on north end of current Snow Lake under Handle Road with a structure matching what's designed for dam removal structure on south end of current Snow Lake.	Road Foreman	Complete by 2028	Vtrans grant	M	High	Road Foreman is waiting to see what is engineered for dam replacement and will base design and size on that before pursuing funding.
8	Flooding and Fluvial Erosion	VTrans recommends a different type of structure here.	At the Holland and Robin Road intersection, upgrade stone structure to what VTrans recommends.	Road Foreman	2028	VTrans grant	M	Medium	A hydraulic study needs to be completed to advise on structure size and type.
9	Fluvial Erosion	Planning commission has begun Town Plan Review and River Corridors will be included in Town Plan and then added to Bylaw.	Floodplain bylaw update to include River Corridors	Planning Commission and Zoning Administrator	2023-2024	Town budget	M	Medium	In progress.
10	Flooding and Fluvial Erosion	The bridge is not bank full width; structure above it was just replaced	Convert small concrete bridge on Taft Brook Road into a box culvert	Road Foreman	2025-2026	town/grants	M	Low	Hydraulic study not done; met with ANR Streams about this project
11	Flooding and Fluvial Erosion	Hydraulic study showed that this culvert should to be upgraded.	Culvert upgrade on Taft Brook, just below Morse Road	Road Foreman	2024-2025	town/grants	M	Low	Hydraulic study completed
12	Flooding	Preparations need to be considered for dam failure if the Snow Lake dam will remain beyond this planning cycle.	Updating emergency action plans for dam failure at Snow Lake dam.	EMD and Mount Snow	2024/2025	Town budget; Mount Snow	P	Low	Mount Snow does have a plan for dam failure.

HAZARD(S) ADDRESSED		ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPARED-NESS	PRIORITY	Notes / Status
13	Ice Storm and High Winds	GMP has an initiative to underground wires and bring more lines to the road.	Support GMP initiative with local permissions for burying lines and moving lines to roads	GMP; Selectboard; Road Foreman	As needed	Town budget	M	High	
14	Ice Storm and High Winds	Town office functioning for public safety	Install a permanent generator at the town office.	Town Clerk; Select Board	2028	Town funds or grant funding	M and P	High	
15	Ice Storm and High Winds	During power outages the large doors at the transfer station can't be closed and this is a hazard during high winds.	Wire the transfer station to connect to the generator at the Town Garage.	Town Clerk; Transfer Station rep; Selectboard	2027	Town budget	M and P	High	Road Commissioner to get a price and present to the Selectboard.
16	Ice Storm and High Winds	During power outage Town Hall cannot function and the Town did use Town Hall for a FEMA center during TS Irene. Town Hall also could fill in for an East Dover gathering place, as there is a commercial kitchen there, however there is not potable water.	Install a generator for the Town Hall	Selectboard; Road Foreman;	2024/25	Town funds or grant funding	M and P	High	The Town Hall is used for Emergency Operations Center purposes and has a kitchen for distribution of food.
17	Ice Storm and High Winds	Trees on lines and in roads is a continual maintenance issue.	Develop program for assessing and removing potentially hazardous tree limbs near power lines	Road Commissioner and GMP	Annually check each fall and spring	Town budget and power company	P	Medium	This is ongoing and each spring and fall the Road Commissioner checks on his roads tour and notifys GMP of anything he finds.
18	Ice Storm and High Winds	Trees on power lines is a danger	Educate residents about what to do when they see tree hazards over lines.	EMD	Put information on the town website by fall 2022	Town budget	P	Medium	

HAZARD(S) ADDRESSED		ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPARED-NESS	PRIORITY	Notes / Status
19	Ice Storm and High Winds	The day care and library that share a building in East Dover cannot function without electricity.	Install a generator for the library/daycare center.	Select Board; Library Director	2023/2024	Town funds or grant funding	M and P	Medium	This is not a shelter or an EOC currently.
20	Ice Storm and High Winds	During situations when there is a lot of debris, it is helpful to have a contract in place.	Develop standing contractual relationship with a tree removal service.	Selectboard; Road Foreman;	2025	Town budget	P	medium	Town does have equipment- but no one to climb, cherry picker, etc
21	Invasive Species	Removal of invasive plant species is necessary in some cases.	Inventory locations where there is severe presence of invasive species. These locations can be ranked for removal efforts.	Conservation Commission	2027/2028	Town budget	M	High	Japanese knotweed survey is a known need.
22	Invasive Species	With the close proximity of EAB, an Ash tree survey is smart to understand the hazard of falling trees.	Ash tree inventory along roadways	Conservation Commission	2023/2024	Town budget	M and P	High	Sharing results with GMP is recommended as they pursue removal efforts based on highest risk areas.
23	Invasive Species	Early detection helps prevent as much damage, and also helps to keep what is special about Dover special	Update the Town Forest Management Plan to include needed invasive species management actions.	Conservation Commission	2024/2025	Town budget	M	High	
24	Invasive Species	EAB early detection relies on people knowing what to look for.	Education to citizenry on Ash Tree identification	Town Staff and/or Conservation Commission	2023/2024	Town budget	M and P	Medium	
25	Invasive Species	Early detection helps prevent as much damage	Using school kids and or other volunteers for invasive species management projects	Dover School in conjunction with Town	School year 22-23 try to start annual program	School and Town budget	M	Medium	Conservation Committee needs to approach the school administration.
26	Invasive Species	There are a number of active trails groups in the area that may be interested in assisting.	Training for existing outdoor volunteer groups on identification of invasives and possible control measures	Town Staff and or Conservation Commission	2023/2024	Town budget	M	Medium	Conservation Committee and Trails Committee should work

HAZARD(S) ADDRESSED		ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPARED-NESS	PRIORITY	Notes / Status
									together to develop this plan.
27	Pandemic	COVID-19 forced the Town to develop measures to allow for remote operations. These measures should be documented and any other additional needs should be considered and put in place for when they are needed.	Develop a Continuity of Operations Plan (COOP) for the Town.	Town staff and Select Board; WRC; VEM support	2023/2024	Town budget	M and P	Medium	Like much of small town Vermont, there is a lot of institutional knowledge that is held by those who have "been through it". Some of this needs to be documented for the future.
28	Water supply contaminati on	The Town is trying to identify the source of PFA contamination now. Once the problem is understood, a new water source will be determined.	Monitor the known PFA contamination at the Library/Day Care/Town Hall well (1 shared well) and determine and install a new safe water source.	Health officer; state agency support?	2023/2024	Town budget	M	High	PFA has been identified in numerous wells and public Water Systems in Dover. EPA is coming out with new ruling in 2023 and the level will be lowered, unknown how low, that may have even more systems be in serious need of assistance. Perhaps this should this be part of a community water system discussion.
29	Water supply contaminati on	Uncapped wells could allow for contamination into the aquifer.	Conduct a survey to understand the number of older non-capped wells in order to develop a program for capping them.	Health officer; state agency support?	2024/2025	Town budget	M	Medium	Some of the data may be in the water study conducted several years ago.

HAZARD(S) ADDRESSED		ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPARED-NESS	PRIORITY	Notes / Status
30	Drought	Inadequate potable water, aquifer is not properly managed	Develop framework for institution of impact fees for future planned unit developments to create fund for municipal water supply	Select Board; Planning Commission; Town staff	2024/2025	ARPA	M/P	High	should this go to the Planning Commission? SB to decide responsible entity.
31	Fire safety	There is a need for pressurized water line for quicker response.	Install pressurized water supply for firefighting in West Dover along Route 100 and in all the developments in Dover.	Fire Chief	2022-2023	Town budget; potentially grant funded	M/P	Medium	Not complete yet, but piping for West Lake did allow for the connection to pressurized line on Handle Road.
32	All Hazards	When power goes out the Fire Department needs to get into the firehouse and generator shed to start generator before they can pull trucks out for an emergency. The current generator only serves less than 50% of the property/ building.	Install a generator at the West Dover Fire Department.	EMD	Pending grant funding; applying 2022 or 2023	HMGP or BRIC; town match funds	M/P	High	This remains a need pending federal or state funding.
33	All Hazards	Currently cots, MRE's and blankets are stored at the Dover School. If there is not as large a need we could use other buildings as an evacuation center, but need a way to get the equipment there.	Purchase portable storage for emergency preparedness supplies for emergency shelter.	EMD	2022/2023	HMGP or BRIC; town match funds	M/P	High	Road Commissioner to get pricing and EMD will bring to the Selectboard.
34	All Hazards	All those with a need for VTAlert training should have it to be able to send emergency alerts to the public. Getting the public to sign up is also key.	East Dover Fire Chief to get VTAlert training; subsequently do outreach to residents through the town website and tax bills to sign up for VTAlert for town notifications	East Dover Fire Chief trained by VEM	2022	Town budget	M/P	High	Police and full time town employees are already trained

HAZARD(S) ADDRESSED		ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION / PREPARED-NESS	PRIORITY	Notes / Status
35	All Hazards	There is a public water supply at the school which has back up power- so potable water should always be available- this will give us a way to supply water to anyone who needs it.	Purchase and stockpile gallon containers for distribution during disasters	EMD	2023/2024	HMGP or BRIC; town match funds	M/P	Medium	Remains a need; will be done when mobile trailer is purchased

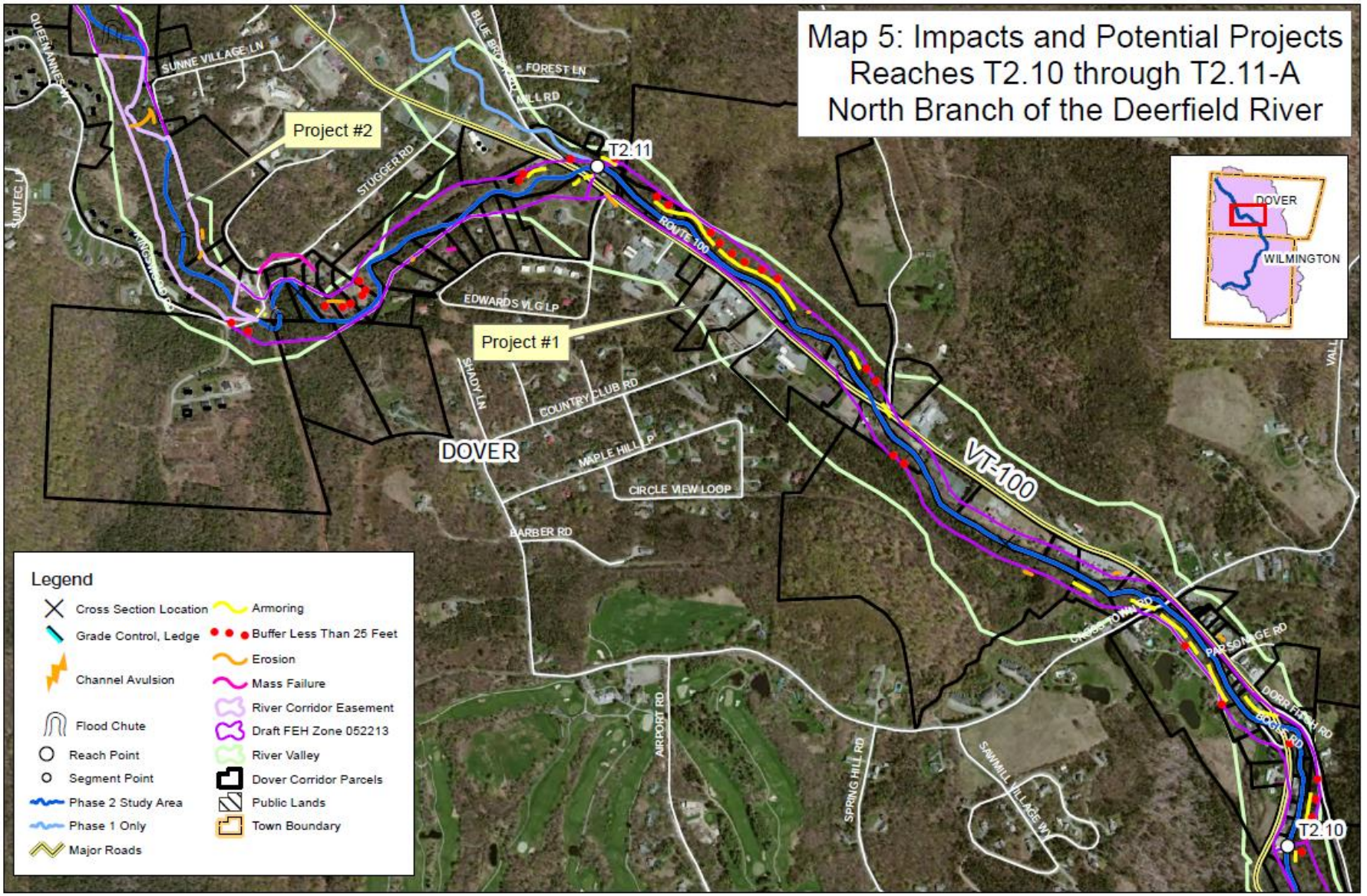
Figure 5.3. The Route 100 bridge in Dover (ID: 200013005813042) is poorly aligned and causing deposition.

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. The *Corridor Plan* identifies projects in Dover that would improve the health and stability of the North Branch of the Deerfield River. Following are three maps showing project locations and three tables of project actions are following each associated map. The tables and graphics shown below were taken directly from the *Corridor Plan*, and thus align with their organizational methodology. The 'Potential Partners/Programs' category of the tables speaks to responsible entity and potential funding sources. Dover will aim to implement these actions within the next five years.

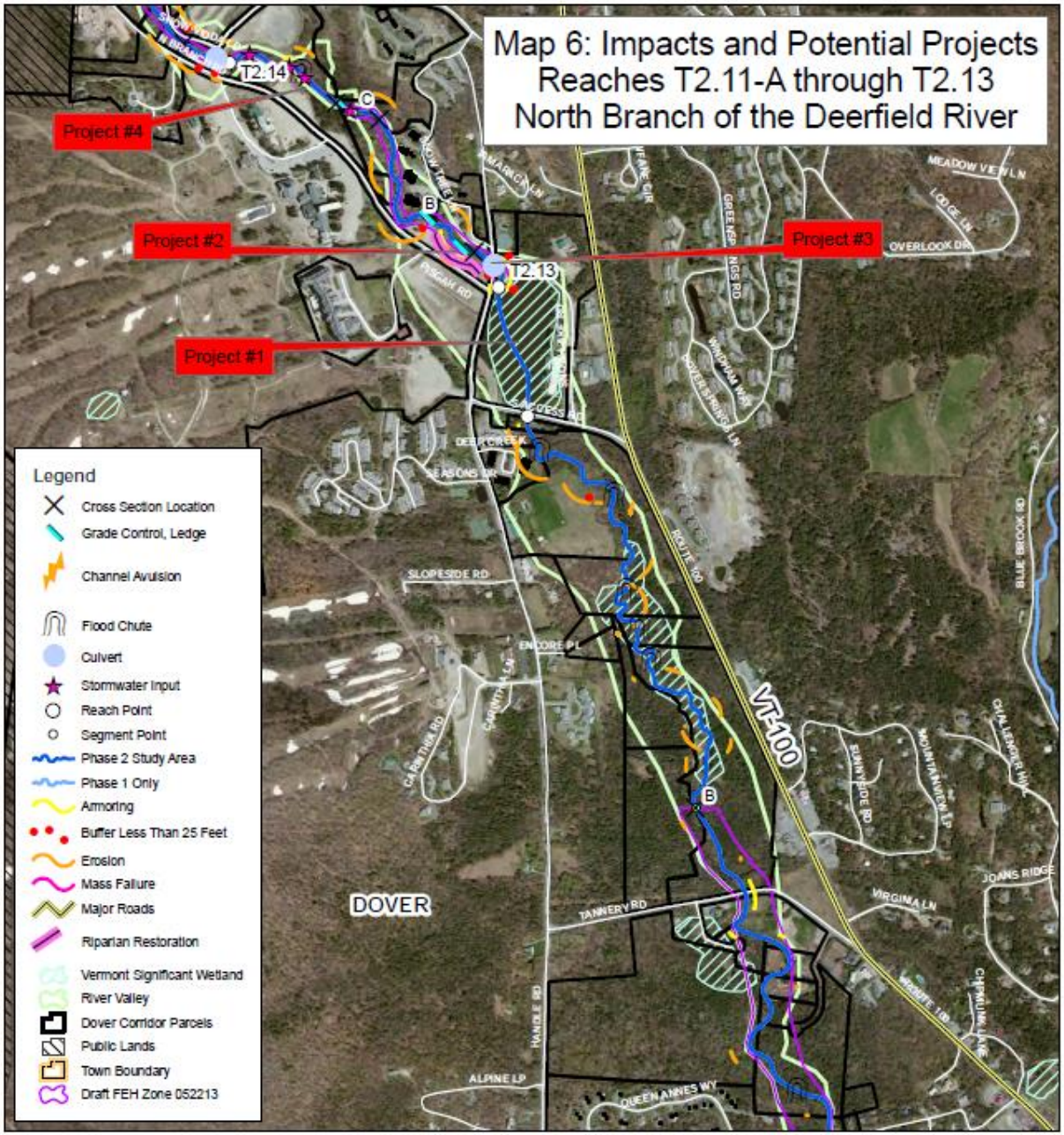
Figure 5.4. The Handle Road culvert is perched.

Figure 5.5. North Access Rd. culverts are causing deposition.


Map 5: Impacts and Potential Projects
Reaches T2.10 through T2.11-A
North Branch of the Deerfield River
Project #2
Project #1
T2.11
T2.10
DOVER
WILMINGTON
VT-100
ROUTE 100
SUNNE VILLAGE LN
FOREST LN
MILL RD
STUGGER RD
EDWARDS VLG LP
SHADY LN
COUNTRY CLUB RD
MAPLE HILL LP
CIRCLE VIEW LOOP
BARBER RD
AIRPORT RD
SPRING HILL RD
Legend
Cross Section Location
Grade Control, Ledge
Channel Avulsion
Flood Chute
Reach Point
Segment Point
Phase 2 Study Area
Phase 1 Only
Major Roads
Armoring
Buffer Less Than 25 Feet
Erosion
Mass Failure
River Corridor Easement
Draft FEH Zone 052213
River Valley
Dover Corridor Parcels
Public Lands
Town Boundary

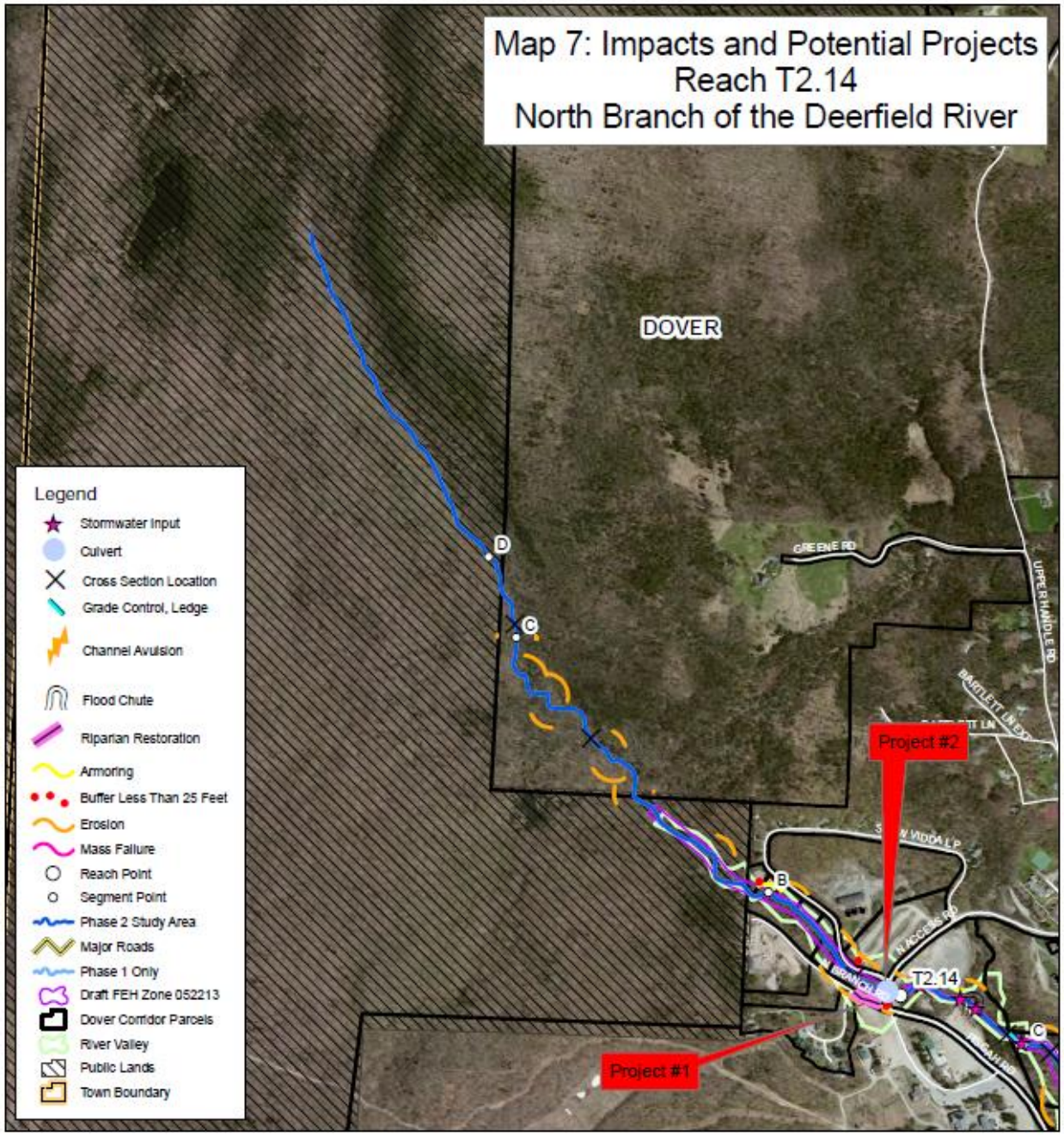
The projects for the map above are here:

Table 5. North Branch of the Deerfield River Main Stem Map 5: T2.10 through T2.11-A (lower section) Site Level Opportunities for Restoration and Protection Dover, Vermont							
Project # 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**
Project #1 T2.10	Stormwater Management	Multiple stormwater inputs were identified along the stream channel in central Dover	Evaluate stormwater management practices	Low Priority	Improved water quality	Unknown	Landowners, WRC, VANR, Town of Dover ERP
Project #2 T2.11-A	Passive Restoration	Forested area with 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 Dover RCE


Map 6: Impacts and Potential Projects
Reaches T2.11-A through T2.13
North Branch of the Deerfield River
Project #1
Project #2
Project #3
Project #4
T2.13
T2.14
A
B
C
DOVER
VT-100
ROUTE 100
Legend
Cross Section Location
Grade Control, Ledge
Channel Avulsion
Flood Chute
Culvert
Stormwater Input
Reach Point
Segment Point
Phase 2 Study Area
Phase 1 Only
Armoring
Buffer Less Than 25 Feet
Erosion
Mass Failure
Major Roads
Riparian Restoration
Vermont Significant Wetland
River Valley
Dover Corridor Parcels
Public Lands
Town Boundary
Draft FEH Zone 052213

Actions associated with the above map are:

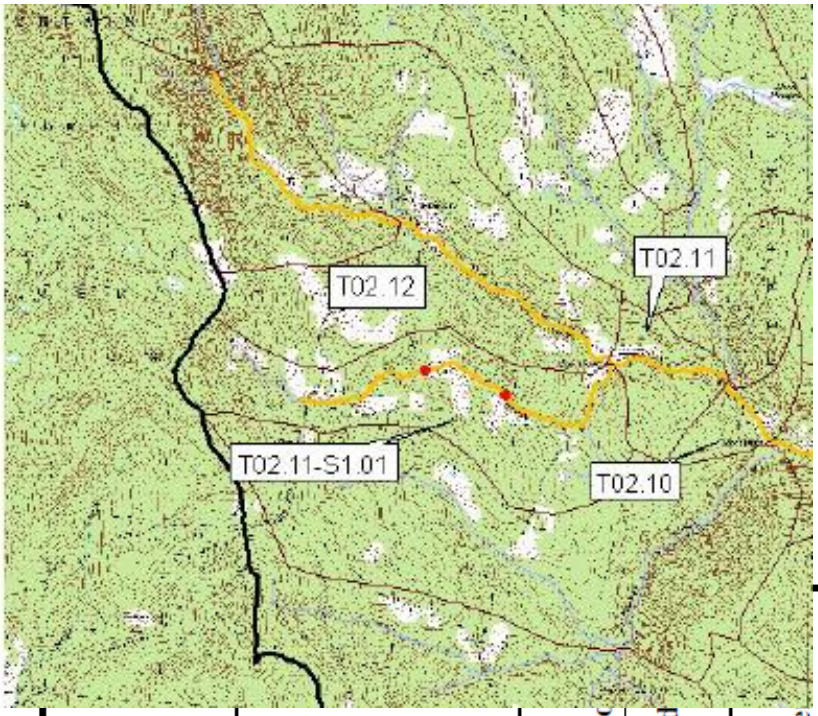
Table 6. North Branch of the Deerfield River Main Stem Map 6: T2.11-A (upper section) through T2.13 Site Level Opportunities for Restoration and Protection Dover, Vermont							
Project # Segment	**Type of Project**	**Site Description Including Stressors and Constraints**	**Project or Strategy Description**	**Technical Feasibility and Priority**	**Other Social Benefits**	**Costs**	**Potential Partners/Programs**
Project #1 T2.12	Active Restoration	Snow Lake impoundment is resulting in geomorphic instability in downstream segments	Reestablish natural channel	High Priority	Improved habitat, water quality, and geomorphic stability	High Cost	Landowner, WRC, CRWC, VCF, VANR, Town of Dover ERP
Project #2 T2.13-A	Active Restoration	Elevated floodplain along parking lot is limiting floodplain access	Riparian restoration (improve floodplain and stormwater management)	High Priority	Improved habitat, water quality, and geomorphic stability	Unknown	Landowners, WRC, CRWC, VCF, VANR, Town of Wilmington ERP
Project #3 T2.13-A	Active Restoration	The Handle Road culvert has a "mostly incompatible" geomorphic rating and is limiting all aquatic organism passage.	Investigate culvert replacement	High Priority	Improved habitat and geomorphic stability	Cost of culvert design and replacement	Landowners, WRC, CRWC, VANR, Town of Dover
Project #4 T2.13-C	Stormwater Management	Multiple stormwater inputs flowing down from parking lot, observed in 2005 and 2012. Filling in pools with sediment	Evaluate stormwater management practices	High Priority	Improved water quality	Unknown	Landowners, WRC, VANR, Town of Dover ERP


Map 7: Impacts and Potential Projects
Reach T2.14
North Branch of the Deerfield River
DOVER
GREENE RD
UPPER HANDLE RD
BARTLETT LN
Project #2
Project #1
T2.14
B
C
D
Legend
Stormwater Input
Culvert
Cross Section Location
Grade Control, Ledge
Channel Avulsion
Flood Chute
Riparian Restoration
Armoring
Buffer Less Than 25 Feet
Erosion
Mass Failure
Reach Point
Segment Point
Phase 2 Study Area
Major Roads
Phase 1 Only
Draft FEH Zone 052213
Dover Corridor Parcels
River Valley
Public Lands
Town Boundary

Actions associated with the above map are :

Table 7. North Branch of the Deerfield River Main Stem Map 7: T2.14 Site Level Opportunities for Restoration and Protection Dover, Vermont							
Project # 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**
Project #1 T2.14-A	Active Restoration	Southern bank adjacent to parking has no buffer and receives runoff from parking area.	Riparian restoration (improve floodplain and stormwater management)	High Priority	Improved habitat, water quality, and geomorphic stability	Unknown	Landowner, WRC, CRWC, VCF, VANR, Town of Dover ERP, WHIP
Project #2 T2.14-A	Active Restoration	The North Access Road culvert has an AOP rating of "No AOP except adult salmonids" and is causing upstream deposition that may lead to further problems	Investigate culvert replacement	High Priority	Improved habitat and geomorphic stability	Cost of culvert design and replacement	Landowners, WRC, CRWC, VANR, Town of Dover

Actions from the Rock River Stream Geomorphic Assessment



The Rock River Watershed Stream Geomorphic Assessment was completed in 2007. It is less detailed than the North Branch Corridor Plan and its actions are more generalized for reach stretches than particular projects at set locations. The relevant section of the watershed is shown in the map and the relevant reach actions are listed in the table. The reader is referred to the Assessment for more information. The Town will consider these projects for completion over the next five years.

River Segment	Project Type	Reach Pri	Watershed Priority	Independe Reach Restoration	Next Steps & Other Project Notes
T02.10-	Corridor Conservation (Right Bank)	Medium	Low	Yes	Talk with landowners.
T02.11-	Corridor Conservation	Low	High	Yes	Talk with landonwer.
T02.11-	Replace Structure (new box culvert)	Low	Low	Yes	Talk with Town.
T02.11-S1.01A	Replace Structures (5!)	High	Medium	Yes	Talk with town and landowners.
T02.11-S1.01B	Replace Structure	Medium	Low	Yes	Work with town.
T02.11-S1.01B	Corridor conservation with buffer establishment at horse farm.	High	High	N/A	Work with landowners
T02.11-S1.01C	Replace Structures (2 w/abutments)	High	Medium	Yes	Work with town.
T02.11-S1.01C	Best Management Practices (stormwater inputs) for all of Taft	High	High	Yes	Work with towns and landowners.
T02.12-	Replace Structure (second one)	High	Medium	Yes	Work with town.

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 Dover:

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. Dover does not currently regulate development in the River Corridor through its zoning, which limits control of this hazardous area.
4. Limited participation in emergency response training for town staff and volunteers.
5. It takes so long to get hydraulic studies which lengthens time to decrease vulnerability.
6. Transportation projects can get drawn out for 2-3 years between getting an engineering study, getting engineering design work completed, and getting funded.
7. Difficult to get new volunteers for the fire departments.
8. Funding is difficult to get and it is difficult to get staff to apply for grants.

Capabilities to build upon for implementation:

1. 9 full-time road crew staff
2. 8 full-time town staff, 2 of which are part-time
3. Town police department with local dispatch
4. Well-functioning fire departments. Good number of volunteers on the force. The West Dover has 15 volunteers, and 20 if you count search and rescue. The West Dover Fire Department sponsors a search and rescue department, specific to Dover but they do mutual aid as well. The East Dover Fire Department has 15 volunteers.
5. Staff has capability to write grants, but this is not a position.
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 Emergency Operations Center
9. Windham Regional Commission assistance when needed
10. Floodplain ordinance in place. Town will work with FEMA in the updating of the SFHA maps during the next map update cycle.
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, Dover 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. Dover is not struggling financially and there has been an increase in population. Dover is located along Route 100, which is a major travel corridor 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 Dover 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, Dover 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 Dover. The Hazard Mitigation Planning participants analyzed these programs for their effectiveness and noted improvements needed. Dover uses all of the tools listed below to help plan for current and future activities with the town.

As Dover 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. There is no timeframe for updating the below referenced plans and regulations, 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.

The timing of the current 2016 Dover Town Plan did not allow for full incorporation of the 2015 Dover Local Hazard Mitigation Plan, though there are policies that relate to mitigation. Going forward the Town will consider their current Hazard Mitigation Plan as the Town Plan is updated. Town documents and their status are outlined in the below table:

Plans and Studies

Capability	Description	Improvement Opportunity
Town Plan	Plan for coordinated town-wide planning for land use, municipal facilities, etc.	Town Plan was adopted in 2016. A more comprehensive integration of the Local Hazard Mitigation Plan should occur with updates of the Town Plan.
Local Hazard Mitigation Plan (LHMP)	Plan that identifies hazards in community and proposes actions to reduce or eliminate risk to people, property, and the natural environment.	None identified.
Stormwater Plan	Plan that identifies stormwater improvements for municipal roads.	Town received a General Permit to discharge stormwater from municipal roads
Local Emergency Management Plan (LEMP)	Municipal procedures for emergency response.	None identified.
Invasive Species Management Plan	Plan that provides guidance on effective management of invasive species.	Identified as an action item in LHMP
Culvert Inventory	An inventory of the size, material, condition and location of culverts. Updated annually by Public Works Department.	None identified. Culvert Inventory last updated in 2018.
School Emergency Response Protocol	School procedures for emergency response	None identified

Administrative Capacity and Capability

Capability	Description	Improvement Opportunity
Emergency Management Director	Prepares plans and procedures for responding to natural disasters other emergencies and leads response efforts.	None identified
Planning Commission	Municipal body responsible for planning for the community, including maintaining the town plan, zoning bylaws, and subdivision regulations.	None identified.
Development Review Board	Municipal body responsible for evaluating and deciding on proposed development.	None identified.
Zoning Administrator	Administrative officer responsible for administering zoning bylaws.	None identified.
Tree Warden	Responsible for trees on public property, including town properties, schools, and within public right-of-way.	None identified.
Selectboard	Legislative body of the town for all purposes required by the state.	None identified.
Mutual Aid Agreements – Emergency Services	Agreement for regional coordinated emergency services.	None identified. Keene (NH) Mutual Aid – written agreement/contract for

		Fire/Ambulance; State police for local backup; local dispatch
Mutual Aid Agreements – Public Works	Agreement for regional coordinated emergency highway maintenance services.	None identified. Recommended to formalize agreements with adjacent towns.
VEM Training	Training provided by state to ensure emergency responders are adequately prepared to respond to emergency incidents.	Identified as an action item in LHMP
Highway Department	Municipal department responsible for overseeing all aspects of municipal road network, including maintenance and construction.	None identified
Town Clerk & Treasurer	Responsible for receiving and recording town archives, recording deeds, filing vital statistics information, running treasury.	None identified

Financial Resources

Capability	Description	Improvement Opportunity
Town Budget	Annual municipal operating budget, approved at Town Meeting	Ensure adequate emergency management funding is included in each annual budget, guided by recommendations of EMD
Taxing Authority	Ability to assess and collect property taxes.	None identified

Zoning and Regulations

Capability	Description	Improvement Opportunity
National Flood Insurance Program (NFIP)	Provides ability for residents to acquire flood insurance.	None identified. Member in good standing (500127).
SFHA bylaws	Regulates development in FEMA identified SFHAs.	None identified. Included in Dover zoning bylaw. Consider including River Corridor regulations in next update.
Zoning	Regulates the development and division of land, standards for site access and utilities	None identified
Road Standards	Design and construction standards for roads and drainage systems.	None identified. State road and bridge standards adopted.
Wetland Protections	Protection of environment, water resources, wildlife, biota. Protected by 1990 Vermont Wetland Rules	None identified.
River Corridor bylaws	Regulates development in River Corridors as identified by Vermont ANR.	Consider including River Corridor bylaws in zoning bylaws.
Sewage Regulations	Regulates on-site sewage systems.	None identified. Governed by state sewage regulations; Town used to have local regulations but those were eliminated in 2007.

Outreach and Education

Capability	Description	Improvement Opportunity
Town Website	Municipal website providing relevant information to residents and businesses about public meetings, resources, etc.	Provide additional information on emergency management and preparedness, and invasive species on town website.

PLAN MAINTENANCE PROCESS

Monitoring and Updating the Plan – Yearly Review

Once the plan is approved and adopted, the Emergency Management Director (EMD), 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 EMD in Dover 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 town will appoint a team to convene a meeting of the hazard mitigation planning committee. The town's EMD 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 EMD 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 EMD 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 EMD, 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 EMD, 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.

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 8/16/22 to town staff and Hazard Mitigation Planning Committee for review of the draft
5. Web ad on town website for comment on draft plan
6. March 25, 2021 Meeting agenda
7. Meeting flyer that was posted around town and on the town website

Certificate of Adoption
Town of Dover, VT
Selectboard

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

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

WHEREAS, the Town of Dover, 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 Dover, 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 Dover, 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 Dover, VT adopts the *Town of Dover 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 15th day of November 2022.
date *month, year*

Selectboard

Victoria Capitani, Chair

Sarah Shippee, Vice-Chair

Joseph Mahon

Daniel Baliotti

Scott Salway

ATTEST

Jeanette Eckert, Town Administrator

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

Thu 9/1/2022 4:18 PM

Alyssa Sabetto <asabetto@windhamregional.org>

Dover Local Hazard Mitigation Plan for review and comment

To 'townclerk@townofstrattonvt.com'; 'dupe67@myfairpoint.net'; 'wardsborotownoffice@myfairpoint.net'; 'pds@myfairpoint.net'; 'tclerknewfane@newfanevt.com'; 'townclerk@marlborovt.us'; 'tfitzgerald@wilmingtonvt.us'; 'stucker@wilmingtonvt.us'; 'mstaloff@wilmingtonvt.us'; 'AngelaLSanbornNewfaneSB@gmail.com'; 'kenestey@thing.net'; 'tsegar@marlboro.edu'; 'juliaselectboard@gmail.com'; 'searsburgtc@gmail.com'; 'hitecrednecktony@gmail.com'

Dover_ 2022 Haz Mit Pl... 6 MB

Hello towns adjacent to Dover,

Attached please find a draft of the updated Dover Local Hazard Mitigation Plan. The Windham Regional Commission has recently worked on updating this plan with the help of the town. It is now being sent to you as an opportunity for review and comment per FEMA requirements. Please share this draft with your town Planning Commission and Selectboard. **Please provide any comments back to the Windham Regional Commission by September 16, 2022.** Please use the contact information in my signature.

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 Sabetto, CFM
Senior Planner
Windham Regional Commission

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

Dover Local Hazard Mitigation Plan

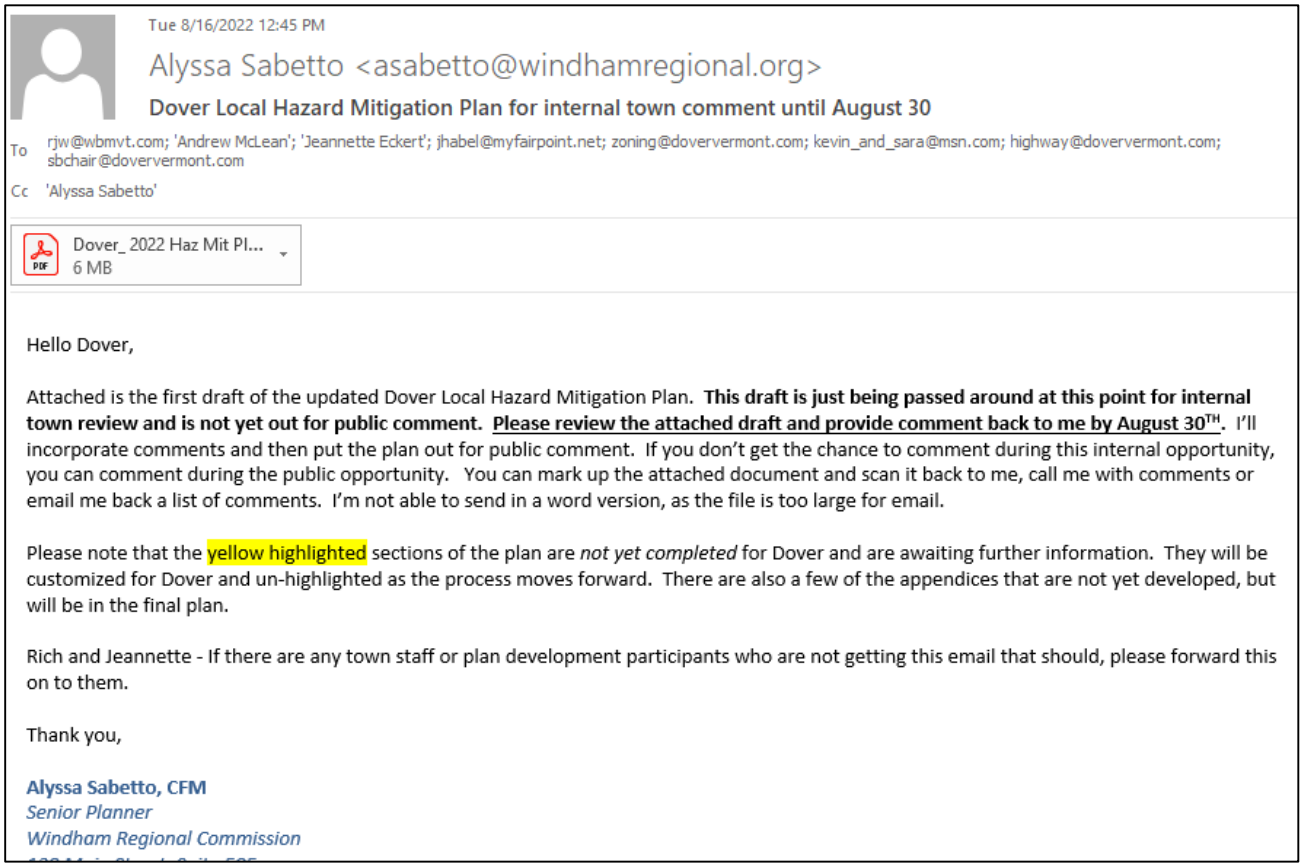
PUBLIC COMMENT PERIOD

The draft Dover Local Hazard Mitigation Plan is now available for public review on the town website: www.doververmont.com. A hard copy is available at the Town Office.

The Plan will be available for comment until September 16, 2022.

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 8/16/22 to town staff and Hazard Mitigation Planning Committee for review of the draft



Tue 8/16/2022 12:45 PM

Alyssa Sabetto <asabetto@windhamregional.org>

Dover Local Hazard Mitigation Plan for internal town comment until August 30

To rjw@wbmvt.com; 'Andrew McLean'; 'Jeannette Eckert'; jhabel@myfairpoint.net; zoning@doververmont.com; kevin_and_sara@msn.com; highway@doververmont.com; sbchair@doververmont.com

Cc 'Alyssa Sabetto'

Dover_ 2022 Haz Mit Pl... 6 MB

Hello Dover,

Attached is the first draft of the updated Dover 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 August 30TH.** 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.

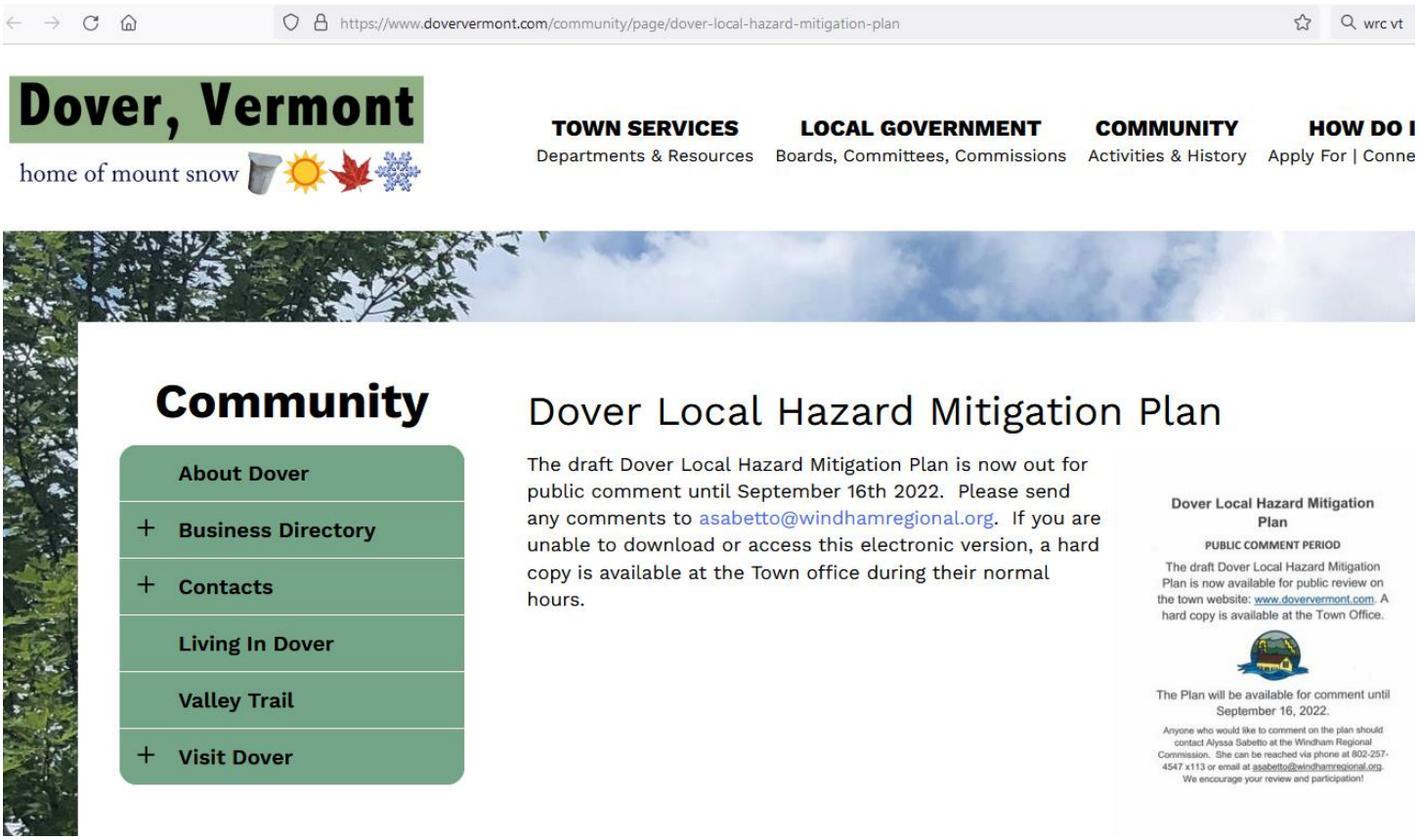
Please note that the yellow highlighted sections of the plan are *not yet completed* for Dover and are awaiting further information. They will be customized for Dover and un-highlighted as the process moves forward. There are also a few of the appendices that are not yet developed, but will be in the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

Rich and Jeannette - If there are any town staff or plan development participants who are not getting this email that should, please forward this on to them.

Thank you,

Alyssa Sabetto, CFM
Senior Planner
Windham Regional Commission

5. Web ad on town website for comment on draft plan



6. March 25, 2021 Meeting agenda

Dover Hazard Mitigation Plan Update
Development Meeting
Via Zoom – March 25, 2021

Agenda

1. Update of the current Dover Local Hazard Mitigation Plan

a) Purpose
b) Process

2. Hazards

a) Discuss hazard events that have occurred since the last Plan
b) Instructions briefly and then take online survey
c) Discuss meeting participant survey results
d) Discuss public survey results
e) Brief review of existing/expired Dover Local Hazard Mitigation Plan
f) Decide what the updated Plan will address
g) Mark up the Atlas with local hazard notes

3. Mitigation Goals and Actions

a) Review/edit Mitigation Goals
b) Brief review of the current Mitigation Actions Table that the EMD/Town 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. Meeting flyer that was posted around town and on the town website

Update of the Dover
Local Hazard Mitigation Plan
Public Meeting Announcement

Meeting Date: March 25, 2021

Time: 3:00-6:00 PM

Via Zoom
See Town website for meeting access details

Come learn about and help to update Dover'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