

# **Town of Chester, Vermont: Local Hazard Mitigation Plan**

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***2021-2026***

**September 17, 2021**

Adopted by the Town of Chester  
October 6, 2021

*Prepared by  
Town of Chester  
and  
Mount Ascutney Regional Commission*

Town of Chester 2021-2026 All Hazard Mitigation Plan  
October 6, 2021

**CERTIFICATE OF ADOPTION**

Town of Chester, VT  
Selectboard

**A Resolution Adopting the  
Town of Chester 2021-2026 All Hazard Mitigation Plan**

WHEREAS, the Town of Chester has worked with Mount Ascutney Regional Commission to prepare an updated hazard mitigation plan for the town to identify natural hazards, analyze past and potential future damages due to natural and man-made caused disasters, and identify strategies for mitigating future damages; and

WHEREAS, duly-noticed public meetings were held by the Chester Selectboard on August 18, 2021 to present and receive public comment on the draft Plan; and

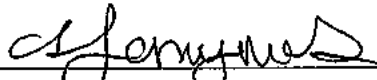
WHEREAS, the updated Town of Chester 2021-2026 Local Hazard Mitigation Plan demonstrates the community's commitment to implementing the mitigation strategies and authorizes responsible agencies to execute their actions; and


WHEREAS, the updated Town of Chester 2021-2026 Local Hazard Mitigation Plan was submitted to Vermont Emergency Management and the Federal Emergency Management Agency for review on September 19, 2021; and


NOW, THEREFORE BE IT RESOLVED that the Town of Chester Selectboard hereby adopts the 2021-2026 Chester Local Hazard Mitigation Plan for municipal use and implementation.

Duly adopted this 16<sup>th</sup> day of Oct, 2021

Selectboard

  
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Chair, Chester Selectboard

  
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Member

  
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## 1. INTRODUCTION

This Local Hazard Mitigation Plan is intended to assist the Town of Chester in identifying and understanding the risks of natural hazard events to the community and developing strategies and actions that can be taken to improve the resiliency of the local community to hazard events.

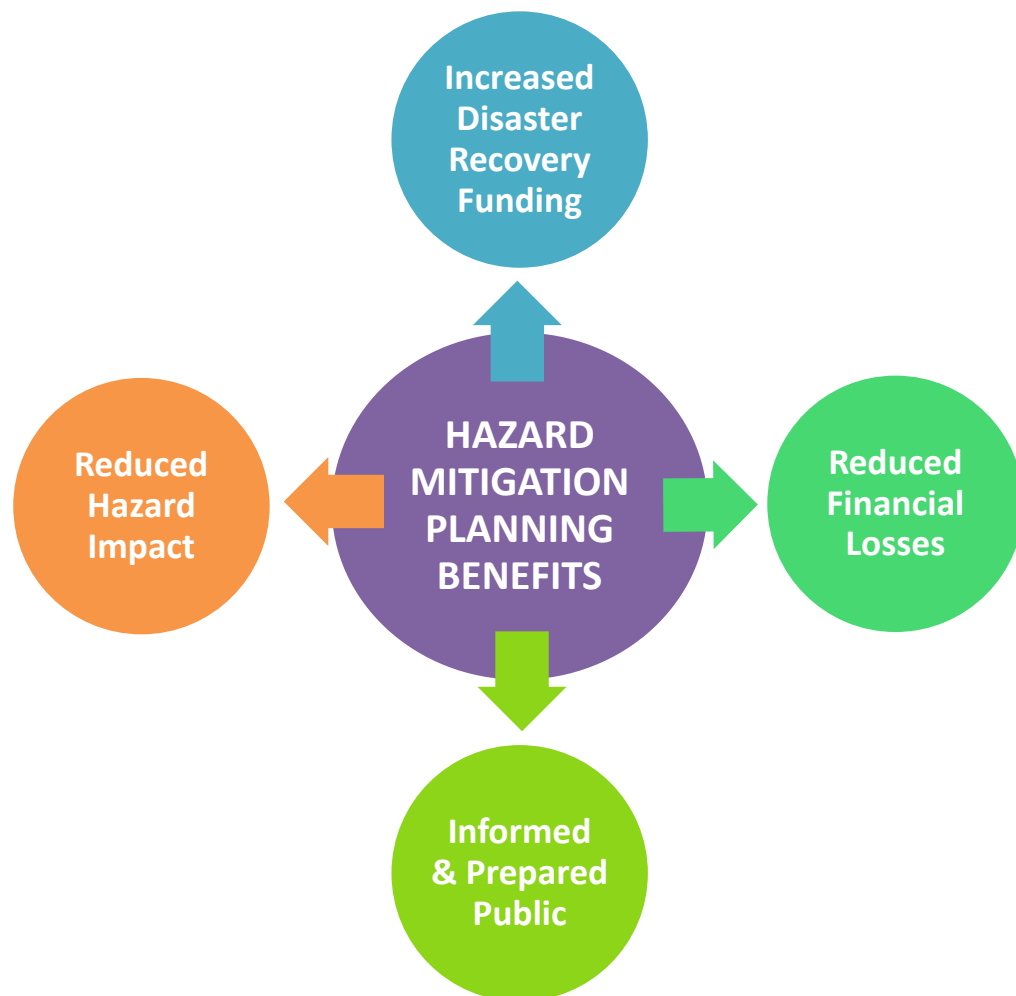
Local Hazard Mitigation Planning is the process of identifying strategies and policies in order to develop a long-term plan of action that will reduce or remove future risk and losses to a community caused by natural or man-made hazard events. This planning effort involved an assessment of local capabilities and resources, an awareness of historical and future hazard occurrences, an understanding of the potential impacts to life, local economy, infrastructure and the environment; and a determination of vulnerable areas and assets within the community. These efforts concluded with a list of actions that can be found in **Table 12** at the end of this plan that are to be monitored for progress over the next five-year period.

This plan will focus on assessing natural hazards and mitigating actions. The Chester community has provided input to this plan in the form of local and historic knowledge and experience.



## 2. PURPOSE

The Federal Emergency Management Agency (FEMA), Vermont Emergency Management (VEM), and local towns have come to recognize that it is less costly to take action to minimize the impact of natural hazards than to repeatedly repair damage after a disaster has struck. Hazards cannot be eliminated, but it is possible to determine what the hazards are and which are more likely to occur and tend to have the greatest impact on a community. With some research and outreach, a local community can determine the extent and impact of these hazards and which assets and areas are most at risk. A culmination of these efforts is a working dynamic list of specific strategies and actions that can be taken to reduce the impact of these hazards on the community. This plan also recognizes and has identified opportunities for mitigation measures during all of the other phases of emergency management: preparedness, response, and recovery.



### 3. TOWN PROFILE

The Town of Chester is a small rural New England town located within Windsor County in southeastern Vermont. It is bordered by the Towns of Springfield, Baltimore, Cavendish, Ludlow, Andover, Windham, Grafton, and Rockingham.

The Windsor County region is comprised of 24 towns and is the largest county by area in Vermont, encompassing 977 square miles. It is influenced by both the Connecticut River, which runs along the eastern edge, and the Green Mountains which dictate the physiology of the western edge of the region with a landscape of ridges and mountain peaks, steep rugged slopes and narrow stream valleys. From the eastern slopes of the Green Mountains, the terrain is generally hilly with areas of relatively flat rolling land as it transitions to the Connecticut River with steep slopes on the river valley.

Chester has a total area of 56 square miles, the majority of which is forested with steep slopes, undeveloped ridgelines, numerous rivers, streams and brooks, and large wetland areas which add to the scenic beauty of the town and serve as important habitat areas for wildlife. Elevations in Chester range from a low point of approximately 700 feet along the Williams River in the southeast corner to a high point of 2,309 feet at the summit of Steadman Hill. Working farms, fields, and agricultural pasture lands are important assets to the town and help to define its rural character. The most prominent feature in Chester's landscape is the Williams River. Five separate tributaries of the Williams converge within the town to a single main stem which continues southeast to the Connecticut River. The residents use these waters extensively for recreation; especially fishing and swimming and are enjoyed by visitors alike.

Current land use follows traditional settlement patterns of New England villages. The village areas of Main Street, Chester Depot, and the Stone Village have a mixture of commercial, industrial, and residential uses, as well as services such as a post office, fire and emergency facility, town highway garage, health care, schools, and town offices. The village center is served by municipal water and sewer service, while areas outside of the downtown are served by private wells and on-site septic systems. Residential areas outside the village centers are primarily rural in nature and low or moderate in density. The ongoing growth and expansion of the Okemo Mountain Resort in Ludlow and other nearby ski areas continues to put some residential and commercial development pressure on the Town of Chester. The current zoning map designates uses and areas of development which are sufficient to handle current development trends. **(See Appendix A: Map 1 – Existing Land Use)**

Chester is served by four state roads which provide a number of alternative evacuation routes. These major thoroughfares also bring of out-of-state travelers through town on their way to other south centrally located tourist destinations. The Green Mountain Railroad runs through Chester on the route that extends from Bellows Falls to Rutland. Currently the tracks are used mainly for freight traffic, although an excursion train, the Green Mountain Flyer, runs from Bellows Falls to Ludlow during the fall foliage season.

The 2010 U.S. Census indicated a population of 3,154 and a growth rate of 3.4% between 2000 and 2010. This growth rate is comparable with the Vermont state population growth rate, but significantly higher than the -1.3% rate for Windsor County. Within Chester, the positive growth rate indicates the possibility for future development increasing the value and importance of regulatory tools such as flood

hazard regulations and zoning regulations. These tools allow for the town to deter growth away from areas deemed unsafe and potentially prone to hazards.

Windsor County's population of 46,720 (2010 U.S. Census Bureau) experienced uninterrupted growth since 1950 averaging 7.9%. However, according to the Census, the most recent decade has seen a substantial decrease in the rate of population growth at 0.6% from 2000 to 2010, compared to Vermont State at 2.8%. This was primarily the result of substantial drops in the two highly populated towns of Rockingham and Brattleboro, offset by modest increases in smaller towns. Windsor County population has been decreasing since 2000 from 57,481 to 55,275 in 2019. Conversely, over the same period, the median age and household income for the county have been trending up; now at 47.7 years of age and \$60,987, respectively.

As shown in the Table below, the population of Chester has grown about 28% since 1970, according to the U.S. Census, but has held steady over the past 20 years. Over the same period, the population under 18 years of age has halved while over 65 years of age has almost doubled, with ages 18 to 64 holding steady. As is true for the state, the overall population for the county and for Chester is aging. The most recent statistics show the fastest growing age group is over 65 which grew from 16% to 25% over the past 10 years which is now slightly greater compared to 22.7% for Windsor County.<sup>1</sup> Median income for Chester in 2019 was \$57,250, below that of Windsor County.

**TABLE 1: Chester Population and Age Distribution – 1970-2019<sup>2</sup>**

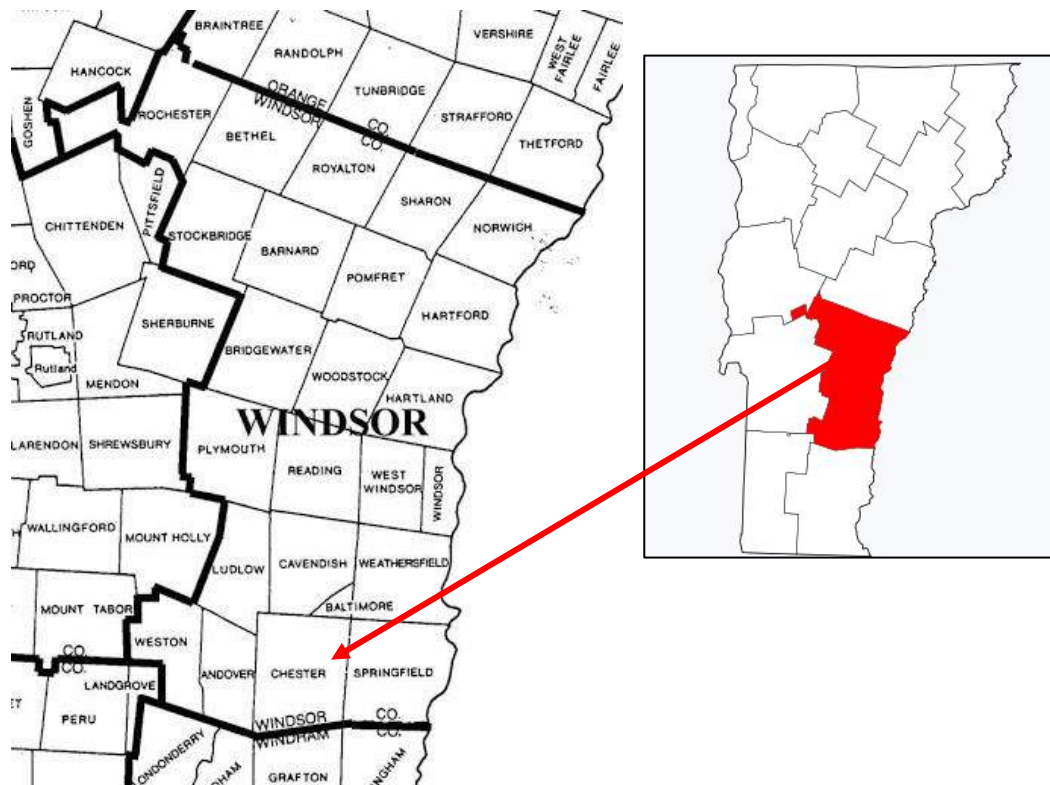
Year	1970		1980		1990		2000		2010		2019	
Population	2,371		2,791		2,832		3,044		3,146		3,047	
Age	Number	% of total	Number	% of total	Number	% of total	Number	% of total	Number	% of total	Number	% of total
<5									148	4.7%	152	5%
<18	804	34%	793	28%	782	28%	731	24%	478	15.2%	549	18%
18-64	1,285	54%	1,659	59%	1,659	59%	1,822	60%	1,998	63.5%	1,577	52%
>65	282	12%	339	13%	391	13%	491	16%	522	16.6%	769	25%
Totals	2,371	100%	2,791	100%	2,832	100%	3,044	100%	3,146	100%	3,047	100%

As in all of Vermont, the climate is generally temperate with moderately cool summers and cold winters. Average annual precipitation is around 40 inches, and snowfall generally ranges from a minimum of 70 inches to as much as 200 inches in the mountains. The weather can be unpredictable at times, with large variations in temperature, precipitation, and other conditions occurring both within and between seasons, particularly during fall and spring. This variation continues to grow with the effects of climate change.

<sup>1</sup> [U.S. Census Bureau](#)

<sup>2</sup> [U.S. Census Bureau](#)





### Development Trends and Impact on Hazard Risk

Chester is currently experiencing increased growth, primarily in second homeownership. This is in large part to the COVID-19 Pandemic when an influx of interested buyers flooded the local market looking for both permanent and second residences to escape the crowded cities and suburbs.

Development over the previous plan period has not negatively impacted the community's vulnerability to the hazards addressed in this plan. Over the past 5 years, from 2015 to current, there have been 410 zoning permits issued, 33 of these permits issued for new homes. There has been little new commercial development and no permit approvals in the Special Flood Hazard Areas (SFHA).

It can be surmised that residential flooding and fluvial erosion risk has been substantially reduced since the prior plan due to actions taken during this period. The Town has completed four (4) FEMA buyouts of parcels with homes that had experienced repetitive flooding. In addition, the Town is making steady progress on implementing road and infrastructure resiliency projects suggested in the 2017 Road Erosion Inventory Report and on recommendations from the Williams River Corridor Plan.

For future development, the Town is focused on supporting the existing businesses, revitalizing the Downtown, providing the amenities desired by residents, and attracting new businesses in and around the Downtown where infrastructure exists.

## 4. PLANNING PROCESS

The local planning process used to develop this hazard mitigation plan follows guidance by the Federal Emergency Management Agency (FEMA) and Vermont Emergency Management (VEM). The planning process began in December 2020 with the Chester Town Manager reaching out to municipal staff and local volunteers to participate as members of a Hazard Mitigation Committee. A seven-member Hazard Mitigation Committee was formed to direct the activities of the process with guidance from Mount Ascutney Regional Commission's (MARC) Community Development Specialist. All correspondence was via phone or email and meetings were conducted both virtually and in-person.

MARC staff had initial discussions with the Town Manager of Chester to review the overall planning process. The discussion included the need for town input, the importance of the public participation and public notice procedure, VEM and FEMA review and approval process, and the timeline to complete the update. This information was forwarded to Committee also provided to committee members via email in December.

The Hazard Mitigation Committee was tasked with updating the plan and overseeing the public process. Committee members include representation from a cross-section of town departments and Boards. MARC staff conducted the meetings, provided data for the plan update, drafted the plan and presented a review of the draft plan to the Selectboard during a Selectboard public meeting. Committee Members and participants are listed below.

- Chester Town Manager
- Highway Foreman
- Chief of Police
- Chester Emergency Management
- Chester Ambulance and Emergency Coordinator
- Chester Select Board Member and Water & Sewer Department
- Chester Fire Department-Fire Chief
- Community Development Specialist, Mount Ascutney Regional Commission

The Hazard Mitigation Committee members participated throughout the planning process either by scheduled virtual group meetings or via committee email correspondence and conference calls as outlined below.

The kick-off meeting with the Hazard Mitigation Committee began with an overview of the process with a discussion on the purpose of hazard mitigation planning, the planning process and timeline, and the importance of community outreach and public involvement. Hazard Mitigation Committee members and meeting schedules were determined at that time and a procedure was discussed on how to engage

the local community to participate given State Covid restrictions that were in place at the time. The process proceeded with the tasks and timeline as depicted in **Appendix C: 2021-2026 Chester Local Hazard Mitigation Plan Process Flow Chart**. The sign-in sheets of attendees and public notice can be found in **Appendix B: Sign-in Sheets and Agendas**.

Throughout the process, members and the public were encouraged to provide information either during the virtual meetings or through Town website notifications and on the MARC Chester Hazard Mitigation Planning webpage. Public input on past hazard events and the impact of those events on the Town as recollected was incorporated into the hazard profile section to provide a local perspective and basis for local data research. Hazard data was updated by MARC staff, presented to the Committee members, and posted for public review following each planning meeting.

Early in the process each hazard was assessed for the probability of future occurrence and the potential impact each would have on life, infrastructure, the local economy and the environment. Vulnerable areas and assets were identified during the hazard assessment as part of the discussion on historical impact (**Section 5.1: Hazard Probability of Occurrence and Impact Assessment**).

As part of the update process, the Hazard Mitigation Committee conducted a review of the status of prior plan actions and other progress made in mitigation and preparedness (**Section 4.3a: Previous Plan Period Mitigation Actions**). Municipal capabilities and available resources for hazard mitigation planning and implementation were also discussed and suggestions made for improving effectiveness (**Section 4.3c: Review of Town Progress, Resources and Capabilities**). A thorough review of the Town Plan policies and recommendations identified common strategies which generated ideas for new mitigation actions (**Section 4.3b: Review of Chester Town Plan**).

This is an extensive update to the previous plan and includes a number of revisions and improvements. The following is a partial list of revisions:

- General updates to Town profile and town maps with new graphics and visuals.
- Inclusion of an easy-to-read Process Flow Chart to depict and manage the planning process.
- Reorganization/restructuring of the plan contents to better reflect required FEMA elements.
- Reevaluation of hazards with a new methodology for scoring similar to that of the Vermont State 2018 Hazard Mitigation Plan to better recognize the integral nature of hazard events and hazard impacts and how hazards can impact a community in different ways.
- Update of hazard data using new data sources and more local data.
- Prioritization of mitigation strategies/actions and correlation to plan goals and incorporation of phasing large projects.
- Recognition of specific prior actions completed but not previously identified in prior plan.
- Review and integration of new relevant reports and documents.
- A formalized Plan Monitoring process to maintain focus on plan goals and to encourage progress, annual reporting, recording of local hazard events, identification of new vulnerable assets, and public outreach over the plan period.

## 4.1. Public Involvement

Due to State Covid restrictions and guidelines, all meetings were held virtually. Three monthly planning meetings, in total, were held, and all were publicly noticed. Public Notices can be found in **Appendix B**. The notice was posted on the Town website, as is customary for the Town, and was linked to a dedicated Chester Hazard Mitigation Planning Update page on the MARC website. A link to participate in the virtual meetings was offered. The webpage posted meeting schedule, agendas and planning documents and materials for public access. The notice and webpage encouraged participation and requested public comment on planning topics with templates to provide information on hazard events and local impact. The Town Manager and Selectboard members were tasked with keeping the Town Selectboard and relevant commissions abreast of the planning progress and noticed meetings and to encourage participation to attending public. No public input was received during the planning phase.

### *Public Release of First Draft*

A first draft was released for public review on August 10, 2021. The Public Review Process included:

- An electronic copy posted on the Town website that circulated to individual members of the Board of Selectmen and Planning Commission, requesting comments from the local boards and community.
- An electronic distribution made to adjacent towns (Springfield, Baltimore, Cavendish, Ludlow, Andover, Windham, Grafton, and Rockingham) via email to respective Town Clerks with a request to post the draft on their websites and provide a copy to their Planning Commission and Selectboard members.
- All distributions included the following:

*"The Town of Chester is seeking comment on its 2021-2026 Local Hazard Mitigation Plan draft. The purpose of this planning effort is to improve Chester's resiliency to natural hazards through hazard assessment, recognition of vulnerable assets, and identification of mitigating actions and strategies to reduce the impact of these hazards on the community. The neighboring town communities are also invited to attend the Chester Selectboard meeting of August 18<sup>th</sup> at 6 PM for a review of the draft plan. The meeting will be held both in-person at the Chester Town Hall and virtually. The ZOOM login for the meeting can be found at <https://www.chestervt.gov/>. Please feel free to forward any questions or comments on the draft plan to Julie Hance, Town Manager at [julie.hance@chestervt.org](mailto:julie.hance@chestervt.org) by August 27<sup>th</sup>. We welcome all input."*

- The only comment received from the local community during the public release process on the draft was a positive reception on the recognition and inclusion of new hazard indicative of climate change, such as heat, drought and ice.
- No comments were received from neighboring communities.

The draft plan was presented by MARC staff during the noticed scheduled Selectboard Meeting on August 18<sup>th</sup>, 2021, following public notice a week prior. Subsequently, any comments received were considered and incorporated into the final draft.

The final plan draft will complete the Vermont State Hazard Mitigation Officer review for referral to FEMA for Approval Pending Adoption (APA). Following APA, the Town may then adopt the Local Hazard Mitigation Plan and forward a copy of the adoption resolution for FEMA to complete the plan approval and adoption process. The final adopted Local Hazard Mitigation Plan will also be posted on the Town and Mount Ascutney Regional Commission websites and made available at the Chester Town Offices.

## 4.2. Resources Consulted

A number of plans, studies, reports, and technical information and web data sources were consulted in addition to local input during the preparation of this plan. These sources provided data on hazard extent and historical trends, and ideas for new hazard mitigation actions. A partial listing of these sources includes the following:

- Local Hazard Mitigation Plan, Town of Chester, Adopted April, 2016
- Chester Town Plan, adopted May 6, 2020
- Chester Unified Development Bylaws (effective 4/5/2017)
- Williams River Corridor Plan, September, 2016
- Town of Chester 2015 Road Erosion Inventory
- 2019 Chester MRGP Road Assessment
- Tactical Basin Plan for the West, Williams, and Saxtons Rivers and Connecticut River Direct Tributaries, December 2015
- 2017 Water Quality/Hazard Mitigation Project Readiness Pilot
- Municipal Roads General Permit 2019 Road Inventory Assessment
- Transportation Resilience Planning Tool, Williams River Watershed
- [U.S. Census Bureau](#)
- [NOAA Storms Event Database](#)
- [Vermont Division of Fire Safety](#)
- [U.S. Climate Data](#)
- [USGS WaterWatch](#)
- [FEMA Disaster Declarations](#)
- [Vermont Agency of Natural Resources-Flood Ready](#)
- [State of Vermont 2018 Hazard Mitigation Plan](#)
- [Drought.gov](#)
- Valley News articles
- Chester Telegraph articles
- Mount Ascutney Regional Commission for mapping data

## 4.3. Review of Town Progress, Resources, and Capabilities

### a. Previous Plan Period Mitigation Actions

**Table 2** below lists the mitigation and preparedness projects and actions from the previous *2016 Chester All Hazard Mitigation Plan* and indicate the status of each as determined by the Hazard Mitigation

Committee. It can be seen that most of these actions have been completed. Other actions that are ongoing or uncompleted were reevaluated for inclusion in **Table 12: 2021-2026 Mitigation/ Preparedness Strategies and Actions** at the end of this document. Others were deemed to be ineffective or not necessary and have been dropped.

**TABLE 2: Status of Previous Plan Mitigation Actions**

<b>2016 MITIGATION ACTION</b> (*Indicates Action to be included in this update)	<b>2021 STATUS</b>
Review Town Plan, bylaws to ensure hazards are addressed	Adopted LHMP as part of Town Plan last update.
Stabilize river banks on Williams River*	Stabilized a section South Branch River bank along Route 35. Keep this action for this plan update as additional work needs to be done.
Upgrade drainage ditches and culverts	ongoing
Keep culvert/bridge inventory updated	ongoing
Purchase emergency generators for Town Hall and Pump Station on Elm	Completed. Installed a shared generator
Establish Capital program for equipment replacement	Completed and ongoing
Construct New Emergency Services Facility*	Under construction to be completed in 2021.
Update EOP	ongoing
Attend training on floodplain management and flood regulation administration*	Not completed with change in staff. Keep this action for Zoning Administrator for this plan update.
Conduct additional stream geomorphic assessment work on the Williams River and significant tributaries.	Williams River Corridor Plan was completed in 2016.
Conduct engineering study to assess vulnerability of critical facilities to flooding*	Engineering study is in progress for the stabilization of the riverbank at the Waste Water Treatment Facility.
Increase enforcement of current regulations to reduce speeding, and reduce the likelihood/severity of transportation incidents.	In progress, ongoing
Continue to encourage hazardous materials training and response capability within Chester first response agencies*	First Response Agencies are transitioning from Awareness to Operational responders, adding technical level training.
Public Outreach: distribute FEMA guides and brochures*	Switch action to digital outreach for these materials in plan update.

<b>2016 MITIGATION ACTION</b> (*Indicates Action to be included in this update)	<b>2021 STATUS</b>
Public Outreach: distribute state brochures on fire prevention	Completed digitally through incorporation in Newsletter and Facebook links and ambulance website link.
Public Outreach: provide information on Village Center designation benefits; ie: building owners eligible for tax credits for code improvements	In progress, On-going
Encourage the installation of adequate fire suppression into new construction	Accomplished in updated zoning and state codes.

\*2016 Mitigation Actions included in this plan update in Table 12

### **b. Review of Chester Town Plan**

The Chester Town Plan was updated in 2019 and adopted May, 2020. Compared to earlier plans, the community is making strides in its efforts to address sustainable development, natural resource conservation, flood resiliency, and hazard mitigation. The current Town Plan includes a more comprehensive integration of the local hazard mitigation planning and a commitment to implementing its strategies and actions. Town planning can always benefit from better integration and coordination of hazard mitigation planning goals and strategies in the planning process. To help achieve this, the Chester All Hazard Mitigation Plan has been incorporated in the Town Plan by reference and has identified an overarching goal to encourage flood resilient communities in the plan's Natural Resources section. The future monitoring of this plan will be presented during Town board meetings to encourage further recognition of the need for integration.

The Chester Town Plan has outlined goals, policies and recommendations related to hazard mitigation which can be found in **Appendix D**. Upon review, the Hazard Mitigation Committee has identified mitigation strategies and actions that will meet objectives for both the Town and Hazard Mitigation Plans. These proposed actions can be found as noted in **Table 12: 2021-2026 Mitigation/Preparedness Strategies and Actions**.

### **c. Status of Community Resources and Capabilities**

**Table 3** is a compilation of community resources and capabilities including town authorities, policies, and programs, which can be helpful in reducing hazard risk for the community. Each was evaluated for effectiveness in attaining hazard mitigation goals and for opportunities for improvement. These resources and capabilities are useful in regulating development, building design, environmental conservation, and best management practices to reduce flooding and erosion. They are critical in providing an effective local emergency response.



Chester currently participates in the National Flood Insurance Program (NFIP) and will continue to regulate floodplain use through the Flood Damage and Prevention Regulations (Article 6 of the Unified Development Bylaws) as adopted in March, 2017. These regulations are based on flood elevations and floodway limits and data provided by the NFIP Flood Insurance Study and accompanying maps, or as provided by FEMA when not available through the NFIP. Participation status for Chester can be found on page 46.

Continued enforcement of these regulations by the Chester Administrative Officer will maintain Chester's compliance with the NFIP. The Administrative Officer is charged with implementing these regulations and, in concert with the Development Review Board, advising residents on floodplain development.

**TABLE 3: Status of Community Resources and Capabilities**

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness/Status
2019 Town Plan (updated and adopted 5/6/2020)	Plan for coordinated town-wide planning for land use, municipal facilities, etc., updated every 8 years.	Effective in addressing development in hazard areas, including floodplains. The most recent update adopted the LHMP to become part of the Town Plan to serve as the Flood Resiliency.	Last Town Plan update incorporated, by reference, the LHMP which will increase the effectiveness of the LHMP by drawing town planning and operational efforts to HM goals and actions.
Local Emergency Management Plan (LEMP) (adopted 5/6/2020)	Basic municipal procedures for emergency response Updated annually.	Effectively outlines procedures for call-outs, evacuation, etc.	VEM updated the LEMP process in 2019 to allow towns more planning flexibility and additional planning resources online at <a href="#">VEM/LEMP</a> . No improvements to be made by Town.
Local Emergency Planning Committee 3 (LEPC3)	Volunteer organization involved in regional hazard mitigation efforts	LEPCs create an important partnership between residents, local government, and industries to protect communities from hazardous materials incidents, emergencies, and disasters.	State is in discussion to move forward with a statewide LEPC and transition to (REMC) Regional Emergency Management Committee. The REMCs will act as all-hazards planning committees that are regionally organized and locally controlled. This regional approach will be more effective for HMP in small towns for hazards such as flooding.
LEPC 3 All Hazards Resource Guide	A planning tool and resource to Local Emergency Planning Committee for towns in emergency situations	Effective in providing data and resources to town first responders	Last revised in 2016. No updates are planned at this time but state is considering expanded use by contractors.



Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness/Status
School Emergency Response Protocol	School procedures for emergency response	Utilizes template provided by state; provides a checklist of actions for use by administrators and first responders. Effective to reference during emergency situations.	Coordinating all three (Police, Fire and Ambulance) emergency response services and procedures is in progress and will improve effectiveness.
Mutual Aid – Emergency Services (MAES)	Agreement for regional coordinated emergency services and state assistance if requested. Member of Keene, Connecticut Valley Mutual Aid and Upper Valley Mutual Aid.	Effective in providing additional response capacity for the Town to be able to more effectively respond to a large-scale emergency in Chester.	The Town has added to its Mutual Aid Emergency Services Network, the Upper Valley Mutual Aid. As these partners are not geographically beneficial, the town has put in place a mutual aid agreement with its larger neighboring towns of Springfield and Bellows Falls to improve response time.
State Road & Bridge Standards (last adopted 9/4/2019)	Town complies with State design and construction standards for roads and drainage systems.	Effective through their continued implementation	Continued implementation of State Road standards is critical to effectiveness. No improvements to be made by Town.
Chester Unified Development Bylaws (effective 4/5/2017)	Zoning, Subdivision and Flood Damage Prevention Regulations are now consolidated into one land development bylaw document per state statute.	Effective in regulating, limiting, or guiding development in known hazard areas and in ensuring conformance with Town Plan.	Consolidation has improved effectiveness through integration of all bylaws. No additional updates are planned at this time.
Zoning Administrator	Ensures compliance with zoning codes and Flood Hazard Area Regulations	Effective in implementing zoning bylaws to minimize flood hazard risk	Effectiveness determined by periodic updates in zoning and FHA regulations. Outreach to public to create awareness of regulations and their role in hazard mitigation may improve effectiveness.
National Flood Insurance Program (NFIP) (Compliant since 3/4/1980)	Provides ability for residents in participating communities to acquire flood insurance	Covers damage caused by flooding and informs residents of flood risk and homeowner tools for flood mitigation. Effective in ensuring that future development is safe from flooding.	Town is committed to continued compliance. Public Outreach on program and flood maps, participation in CRS.

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness/Status
Infrastructure & Road Maintenance Programs	Bridge & Culvert Inventory, updated every 3 years.	Effective at tracking and planning for upgrades to most vulnerable infrastructure	Proactive planning to incorporate identified needed upgrades through available clean water and road improvement grant programs can improve effectiveness.
Access Permits	Regulates driveway access along town-maintained roads and in flood hazard areas	Effective in limiting the number of road cuts and in reducing the potential for transportation issues and flooding and erosion with culvert size requirements	Continued enforcement of access permit regulations and incorporating Flood Hazard Area requirements as updated. No improvements planned by Town at this time.
Municipal Roads General Permit (MRGP)	State Standards have been updated to include the MRGP to control runoff and drainage on hydrologically connected road segments. Compliance is being phased in over time.	Effective in controlling road erosion and stormwater run-off from roads with implementation of Best Management Practices. Current update requires prioritization and planned implementation schedule of identified road segments. Provides funding source for compliance.	Work with regional planners to actively pursue available funding opportunities to implement recommended improvements on hydrologically connected road segments. Be proactive in preparing and annually monitoring an implementation plan for compliance.
Mount Ascutney Regional Commission	Regional organization working to further Emergency Management and Hazard Mitigation goals.	Effective in assisting towns in Hazard Mitigation Planning and other municipal planning efforts and with application assistance for project funding.	The RC can improve the planning process and investigate additional sources of historical and statistical data for identified hazards.
<b>Technical Resources</b>			
Chester MRGP Road Segment Inventory (2019)	State Program provides an assessment of hydrologically connected road segments for erosion and requires a local plan for achieving compliance.	Effective in identifying road sections that are vulnerable to erosion and suggests Best Practices to improve resiliency and bring segments up to MRGP Standards.	The Inventory report prioritizes assessed segments and can be used to identify the higher priority or most vulnerable sections.
Town of Chester Road Erosion Inventory Report (2015)	These state funded reports were produced every few years to assess site specific	Identifies and prioritizes road erosion issues and recommended actions with cost estimates	This report is most effective when considered for capital budgeting, infrastructure upgrades and planning. It is no longer produced

Resource	Description	Effectiveness in implementing HM Goals	Opportunities for Improving Effectiveness/Status
	vulnerabilities to erosion.		but some identified sites may still be relevant.
Williams River Corridor Plan, September (2016)	These reports provide detailed analyses of current conditions and watershed-wide and site-specific recommendations.	Recommended actions are prioritized based on effectiveness for improving flood resiliency and water quality in rivers and streams	Effectiveness can be improved if these documents are consulted for project implementation on a periodic basis and incorporate these projects into other town planning activities
<a href="#">Vermont Flood Ready</a>	An online-map tool that provides mapping data to identify areas at risk of flood or fluvial erosion. Provides community risk assessment reports and references for reducing flood risk.	Effective at providing a wealth of public information on everything flood related in a community in a very concise and organized interactive web portal.	Effectiveness can be improved if the website can be better promoted through outreach or possibly offer an instructional webinar for the local community.

## 5. HAZARD IDENTIFICATION and ASSESSMENT

The following assessment addresses all of the hazards identified during the hazard analysis. The probability of occurrence and impact to the town were used to assess the town's vulnerability to each hazard and can be found in **Section 5.1**. Following this assessment, it was determined that only those hazards that were more likely to occur were further examined for historical occurrence and extent of impact, and trends and community risk as outlined in **Section 5.2**.

### 5.1. Hazard Probability of Occurrence and Impact Assessment

A hazard vulnerability assessment for Chester began with identifying all possible natural hazards as addressed in the *2018 Vermont State Hazard Mitigation Plan*. The group performed two assessment exercises, similar to the approach that was used in the State plan. This type of approach was helpful in that it distinguished between hazard events and hazard impacts. For example, **Wind** is a hazard impact from different hazard event types: Hurricanes, Thunderstorms and Winter Storms and **Erosion** can result from Tropical Storms, Ice Jams, Thunderstorms or spring melt during an extreme heat event. This new approach to the assessment allowed for better focus on the probability and risk of the impact of flooding, for example, rather than on the weather event itself.

The first exercise was to generate a **Hazard Event Probability Score** for each hazard event based on the frequency of historical occurrence and the projected occurrence over the plan period, given expected changes in climate. These scores are shown in **Table 4a: Hazard Events Assessment** along with a listing of possible impacts from each event type.

The second exercise listed all possible hazard impacts and generated a **Potential Hazard Impact Score** by considering the potential severity and extent of damage and disruption to the population, property, public services, the economy and the local natural environment. An overall **Hazard Assessment Score** was calculated by multiplying the Potential Hazard Impact Score times the Hazard Event Probability Score. The results are shown in **Table 4b: Hazard Impact Assessment**. The methodology used for each of these exercises is detailed below each table.

A discussion of each of the hazards is given in the proceeding **Subsections 5.2a through 5.2f**. Only natural hazards were further evaluated for this update. The **Hazard Profile and Assessment** in **Section 5** provided a basis for the selected implementation strategies and actions listed in **Table 12: 2021-2026 Mitigation/Preparedness Strategies and Actions**.

**TABLE 4a: Hazard Events Assessment**

Hazard Events	Historical Occurrence	Probability of Future Occurrence	Event Probability Score	Types of Potential Hazard Impacts from the Event
Score Range	1 - 4	1 - 4	Avg.	
Rainstorm/Thunderstorm/Microbursts	4	4	4.0	Inundation & Flash Flooding, Erosion & Fluvial Erosion, Slope Failure, High Wind, Lightning, Hail, Wildfire
Hurricane/Tropical Storm	1	2	1.5	Inundation & Flash Flooding, Erosion & Fluvial Erosion, Slope Failure, High Wind
Winter Storm	4	4	4.0	Heavy Snow, Ice, High Wind, Transportation Incident, Structure Fire
Drought	2	3	2.5	Increases vulnerability to Wildfire, Erosion, Slope Failure, Invasive Species
Wildfire	3	4	3.5	Increases vulnerability to Erosion and Slope Failure
Ice Jams	4	4	4.0	Inundation, Fluvial Erosion
Extreme Cold	3	3	3.0	Increases vulnerability to Structure Fire
Extreme Heat	3	4	3.5	Increases vulnerability to Drought and Wildfire
Earthquake	1	1	1.0	Slope Failure
Tornado	1	1	1.0	Wind, Hail
Dam Failure	2	2	2.0	Inundation, Erosion, Fluvial Erosion, Landslide
Infectious Disease	1	2	1.5	Epidemic, Pandemic
Transportation Incidents	3	4	3.5	Hazardous Spills
Water Supply Contamination	3	4	3.5	Infectious Disease

**Historical Occurrence:** Relative frequency of occurrence experience in the past 10 years

1 = Rarely 0 to 2 occurrences

2 = Few Occurrences 2 to 5 occurrences

3 = Several Occurrences 5 to 9 occurrences

4 = Annual Occurrence 10 or more occurrences or typically experienced at least once annually

**Probability of Future Occurrence:** Probability of occurrence over next 10 years.

1 = Not Likely Not expected to occur

2 = Occasionally Could plausibly occur at least once

3 = Likely Likely to occur in any one year

4 = Highly Likely Highly likely to occur at least once in any one year

**Types of Hazard Impacts:** Examples of types of impacts should a hazard event occur.

Fluvial Erosion/Erosion

Landslides/Slope Failure

Inundation Flooding

Ice/Ice Jam

Heavy Snow

Hail

Extreme Heat/cold

Drought

Wildland/Structural Fire

High Wind

Lightning

Infectious Disease

Invasive Species

Transportation Incidents

**TABLE 4b: Hazard Impact Assessment**

Hazard Impacts	Probability Score*	Potential Hazard Impact (score 1-4)					Hazard Assessment Score**
		Infrastructure	Life	Economy	Environment	Avg.	
Inundation / Flash Flooding	3	3	2	2	3	2.5	7.5
Fluvial Erosion/ Erosion	4	3	2	1	3	2.25	9.0
Slope Failure	2	1	1	1	1	1.0	2.0
Ice	4	3	2	2	2	2.3	9.0
Heavy Snow	3	3	2	2	1	2.0	6.0
High Wind	4	2	1	1	2	1.5	6.0
Hail	1	1	1	1	1	1.0	1.0
Lightning	1	1	1	1	1	1.0	1.0
Extreme Cold	3	1	2	1	1	1.3	3.9
Extreme Heat	4	1	2	1	2	1.5	6.0
Wildfire	4	1	1	1	2	1.3	5.0
Structure Fire	4	3	2	1	1	1.8	7.2
Earthquake	1	1	1	1	1	1.0	1.0
Drought	3	2	1	1	2	1.5	4.5
Dam Failure	2	1	1	1	1	1.0	2.0
Invasive Species	2	2	1	1	2	1.5	3.0
Infectious Disease Outbreak	2	1	3	3	1	2.0	4.0
Transportation Incident	4	3	1	1	2	1.8	7.2

**Potential Impact:** Probability of a Significant Impact defined as ‘Severity and extent of damage and disruption to population property, environment and the economy’

- |                |   |
|----------------|---|
| 1 = Negligible | Isolated occurrences of minor property and environmental damage, minor disruption of critical facilities and infrastructure, potential for minor injuries, no to minimal economic disruption    |
| 2 = Minor      | Isolated occurrences of moderate to severe property and environmental damage, brief disruption of critical facilities and infrastructure, potential for injuries, and minor economic disruption |
| 3 = Moderate   | Severe property and environmental damage on a community scale, temporary shutdown of critical facilities, injuries or fatalities, short-term economic impact                                    |
| 4 = Major      | Severe property and environmental damage on a town-wide or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities, significant economic impact                 |

## 5.2. Hazard Profile

While the assessment scores in **Table 4b** are not intended to prioritize hazard risk, they can be used to get a general sense of which hazards are of greatest concern to the Chester community. The Hazard Mitigation Committee had decided that only those natural hazards which scored over a '4' or greater out of a possible 16 were considered for evaluation and are profiled in this plan. These are highlighted in the **Table 4b** above. For other hazards, the HMC decided that these be excluded given that the likelihood of occurrence is either very low with no account of recent local occurrence or the hazard impact is very isolated or low.

Subsections below provide additional detail of each of the hazards determined to be most relevant to the Town of Chester. and include:

- a description of the hazard and its general impact on a community;
- a discussion of historical local occurrences and extent of the hazard impact based on available data; and
- hazard trend and determination of populations and community assets at risk.

The following hazards were determined to be of lower priority for reasons noted below. For more information on these hazards, the reader is directed to the [2018 Vermont State Hazard Mitigation Plan](#).

**Hail** and **Lightening** do occur but very rarely and have not resulted in reported damage to the Town of Chester. These incidents are very difficult to predict or mitigate and can only be addressed through preparedness and effectiveness of emergency response. Regional weather warnings and safety measures are issued when an extreme event is projected.

Although **Earthquakes** can be significant hazards, the likelihood of occurring in Chester over the plan period would be negligible for New England per the Vermont State Hazard Mitigation Plan. Local regional recollection of this type of hazard occurring has been the sensation of minor tremors felt from distant events.

**Infectious Disease** would likely be addressed at a state or nationwide scale. However, additional evaluations could be done for local opportunities to improve preparedness for emergency response and supplies. This is recognized as a secondary hazard with a new action item in **Table 12**, but the hazard is not profiled in this local plan.

Periods of **Extreme Cold** are part of Vermont's climate tendency to stray above or below expected temperature values. What constitutes 'extreme cold' can vary and is based on what a population is accustomed to and prepared for. Chester's elderly population would be considered most vulnerable but the majority reside in assisted living complexes near town resources that are prepared for such events and can respond quickly. The secondary hazard of Structure Fire, which can be the result of extended periods of extreme cold is addressed in this plan. Cold temperatures can also be a hazard for local farmers and their crops if it occurs during the growing season, but the trend for this region has been more variability towards higher temperatures and extended growing seasons during these months.

**Invasive Species** is a recognized hazard and has increased since the ravaging of Tropical Storm Irene in 2011. Japanese Knot Weed has claimed the barren banks of the Williams and its shallow root system make this invasive prone to wash out during high water flow events causing blockage under bridges and in culverts. However, removal from barren sections of riverbed is not permitted and berm removal and restoration to improve floodplain access would also include removal and revegetation with native species. Infestations of local plant species can be considered here in future planning as the impacts of the Emerald Ash Borer and White Pine Needle Disease progress with regional mitigation efforts. This is recognized as a secondary hazard with risk to town infrastructure and residents. A new action item for this is included in **Table 12**, but the hazard is not profiled in this local plan.

**Slope Failure** is a real threat along the banks of the Williams River as a result of the severe erosion caused by Irene. Should they fail and block an underpass, significant isolated flooding could occur. The scope to mitigate this hazard is beyond the jurisdiction and capability of the Town and is not covered here. Flood mitigation efforts upstream may help to reduce this risk.

**Dam Failure** may occur with small ponds or beaver dams but would cause very isolated flooding issues.

**Transportation Incidents** is not a natural hazard but is referenced as a secondary hazard in this plan.

Chester is a small rural town, and much of the town-specific data for these natural hazards does not exist. Previous occurrence hazard data specific to Chester has been provided where available. Where no town-specific data exists, the most relevant available data or information has been provided, such as county, regional or state data, or data from a neighboring town. Chester will strive to improve the recording and maintenance of local hazard data and has included this as part of the monitoring process for this plan.

### **Changes from Prior Plan Hazard Assessment**

A comparison was made to the prior plan's hazard assessment with notable changes listed below. Changes in the methodology used for the hazard assessment exercise and recent and trending climate extremes in wind, temperature and precipitation events are reflected in these differences.

- Flooding and related erosion continue to be a priority given the Town's geographical characteristics within the Williams River watershed.
- Ice from winter storm events has become a more frequent occurrence, due to a trend towards more extreme variations in temperature during the winter season, while Extreme Cold and Heavy Snow assessments have not changed. This in turn increases the risk of transportation incidents on major thoroughfares through town and of downed powerlines and structure fire incidents



- Structure Fire continues to be a priority secondary hazard risk given a high probability of occurrence from a number of natural and manmade events and risk of death or injury.
- High Wind is now identified separately as a significant hazard impact from winter storms and severe weather events with a high probability of occurrence and prevalence of higher wind gusts.
- Drought is now recognized as a notable and increasing risk to the community with more frequent extended periods of extreme heat and variability in precipitation events.
- Infectious Disease Outbreak has been identified as a notable hazard risk due to the recent COVID-19 pandemic experience. Impact to the community from this type of hazard is widespread and recovery is long. The potential of a new pandemic or likelihood of the continuation of COVID-19 during the plan period exists but was determined to be low.
- Plant Infestations due to climate change is beginning to gain recognition. While more information is needed, the Town recognizes that this could become a hazard for town roads and infrastructure.

The types of hazards having the greatest impact on a regional basis can be gleaned from **Table 5**, a listing of **FEMA Disaster Declarations for Windsor County** since 1990. It can be seen from this table that these are typically severe storms with heavy rains that cause flooding. Severe Winter Storms also occur; however, harsh winters are a ‘way-of-life’ in Vermont and the Chester Town Highway Department is accustomed to operating in heavy snows and low temperatures. Other hazards such as flooding, wildfires, ice jams and landslides are more localized and characteristic of a town’s topography, roadways, infrastructure, location of critical facilities, and land use and less likely to result in a federally declared disaster.

**TABLE 5: Federal Disaster Declarations for Windsor County VT<sup>3</sup>**

Federal Disaster Declarations: Windsor County 1970 – 2020(current)			
FEMA Disaster Number	Date of Declaration	Description	Date Occurred
3567-EM-VT	August 22, 2021	Tropical Storm Henri	August 22, 2021
DR-4532-VT	April 8, 2020	Vermont COVID-19	January 20, 2020
EM-3437	March 13, 2020	Vermont COVID-19	January 20, 2020
DR-4445-VT	June 14, 2019	Severe Storms and Flooding	April 15, 2019
4330	August 16, 2017	Severe Storms and Flooding	June 29, 2012
4207	February 3, 2015	Severe Winter Storm	December 9-12, 2014
4140	August 2, 2013	Severe Storms and Flooding	June 25-July 11, 2013
4022	September 1, 2011	Tropical Storm Irene	August 27-September 2, 2011
1790	September 12, 2008	Severe Storms and Flooding	July 21-August 12, 2008
1715	August 3, 2007	Severe Storms and Flooding	July 9-11, 2007
1698	May 4, 2007	Severe Storms and Flooding	April 15-21, 2007
1488	September 12, 2003	Severe Storms and Flooding	July 21-August18, 2003
1336	July 27, 2000	Severe Storms and Flooding	July 14-18, 2000
1307	November 10, 1999	Tropical Storm Floyd	September 16-21, 1999
1228	June 30, 1998	Severe Storms and Flooding	June 17-August 17, 1998
1101	February 13, 1996	Storms and Flooding	January 19-February 2, 1996
938	March 18, 1992	Flooding, Heavy Rain, Ice Jams	March 11, 1992

<sup>3</sup> [FEMA Disasters Declaration Website](#)

## 5.2a. Wildfire

Probability of Occurrence:	4.0
Average Hazard Impact:	1.25
Hazard Assessment Score:	5.0

**Wildfire** was identified as a notable hazard for the Town primarily because of the high probability of occurrence, although the impact of fire incidents is typically isolated.

**Wildfires**, which for discussion here include forest, brush, crop or grassland fires, are defined as ‘*An uncontrolled burning of woodlands, brush or grasslands.*’<sup>4</sup> While relatively uncommon within Vermont and the Town of Chester, large **wildland fires** are always a threat particularly for rural communities with large tracts of forested and vegetative land and have the potential to damage structures and utilities and croplands. A major wildfire can leave a large amount of scorched and barren land susceptible to erosion for many years, particularly on steep slopes and ridgelines.



A fire in the root system of a forest in Killington is difficult to contain and snuff out. Photo by Murray McGrath

Wildfire hazard can result directly from natural events such as lightning, particularly during periods of extended drought and extreme heat. These conditions provide more surface fuel for combustion and can extend underground along tree root systems following extended periods of drought. More often uncontrolled burns occur from a combination of dry conditions, high winds and human neglect or other

<sup>4</sup> 2018 Vermont State Hazard Mitigation Plan

human influences. Improperly disposed fire ashes and lit cigarettes are common causes. Unintentional human causes would include sparks from downed power lines, railcars and other vehicles or farm equipment. Continued and consistent enforcement of ‘red flag’ warnings is used to restrict controlled burning during the dry seasons.

### Wildfire History and Extent of Impact

The State Hazard Mitigation Plan’s analysis of wildfire threat states that *“Wildfire conditions in Vermont are typically at their worst either in spring when dead grass and fallen leaves from the previous year are dry and new leaves and grass have not come out yet, or in late summer and early fall when that year’s growth is dry”*.<sup>5</sup> Wildfires can be ignited by lightening during a thunderstorm; however, this is rare in Vermont. More typically, brush fires or burning debris are the major causes for for igniting wildland fires, according to the Vermont Department of Forests, Parks and Recreation.

According to the State of Vermont Hazard Mitigation Plan, ‘there has not been a major wildfire in Vermont in the last 50 years. Vermont has a reliable system of local fire suppression infrastructure coordinated at the state level. Vermont’s climate, vegetation type, and landscape discourage major wildfire.’<sup>6</sup>

#### **National Weather Service**

##### **Criteria for Issuing a ‘Red Flag Warning’**

- Winds sustained or with frequent gusts > 25 mph
- Relative Humidity at or below 30% anytime during the day
- Rainfall amounts for the previous 5 days less than 0.25”
- Lightning after an extended dry period
- Significant dry frontal passage dry thunderstorms
- Keetch-Byram Drought Index values of 300 or greater (in summer)

In addition to a wildfire event reported in NOAA’S Storm Events Database in Windham County, just south of Chester, the following incidents have been locally reported:

- 26-acre forest fire in Andover, a neighboring town, caused by a re-kindled brush fire;
- 47-acre forest fire in Brattleboro, sparked by a downed powerline;
- 137-acre forest fired in Norwich, also caused by a downed powerline; and
- 1/3 acre in Killington last summer that continued burning underground for three days.

Both structural and wildland fires have historically been reported in the annual Vermont State Fire Marshal Report, which provides yearly fire statistics from FEMA’s Nation Fire Incident Reporting System (NFIRS). **Table 6: Fire Statistics for Vermont, Windsor County and Town of Chester** shows historical fire

<sup>5</sup> 2018 Vermont State Hazard Mitigation Plan

<sup>6</sup> 2018 Vermont State Hazard Mitigation Plan

reporting data (where available) for Vermont, Windsor County and the Town of Chester as reported to NFIRS.

The fire statistics reported by the State Fire Marshal no longer breakout data for wildfire and structure fire separately. Instead, the NFIRS Series 100 reporting has been used since 2015 and includes both structure and wildfire type incidents, as well as vehicle fires. It can be estimated from **Table 6** that the average annual fire incidents reported for Chester is 5 wildfires and 18 structure fires. Average annual fire incidents reported in Chester has remained relatively consistent at 25.

The average wildfire impact in Vermont between 2012 and 2016 was 109 fires and 317 acres per year, or 2.9 acres per wildfire incident. Using this average to estimate the potential extent of wildfire hazard for Chester gives an estimated annual loss of, approximately, 16 acres.

### Wildfire Trends and Vulnerability

Wildland and brush fires pose a unique danger to local rural communities and controlling them can be challenging given a small town's limited capacity to respond to a major wildfire. The greater hazard for Chester is the smaller, uncontrolled brush fires which may burn between 1 and 10 acres if uncontrolled.

According to the local Fire Chief, two acres is a typical brushfire although five or more acres is not unusual. His experience would surmise that 75% of local wildfires are ignited by logging or brush burns. Fires caused by lightning and careless disposal of cigarettes and smoking debris are less common. Drier conditions combined with higher winds are likely the reason for local incidents becoming more frequent and fires are larger.

Forest management could be a factor, as noted by local fire officials. In addition to lack of precipitation, a particular town's vulnerability to large wildfires is directly related to the proportion and continuity of acreage that is forested, pasture and cropland. Wildfires can threaten people who are living in remote forested areas. Protecting these structures from fire poses special problems, given the longer response time and limited resources. Chester's town forests are particularly vulnerable to wildfire fire as these tracks are maintained to be contiguous for the preservation of wildlife crossings and recreational purposes. See **Appendix A: Map 3-Natural Resources**). The Town encourages new development in or near village areas in order to preserve these natural resources and conserve municipal infrastructure resources. This policy also helps to reduce the risk of structure damage losses to wildfire.

Though wildfires may not be a high hazard, the Hazard Mitigation Committee identified smaller, brush fires as a high hazard due to their frequency of occurrence and lack of warning time. Responses to brushfire calls by the Chester Fire Department are shown below in **Table 6**. Trending drier conditions combined with higher winds may be the reason for more frequent fire incidents as reported to the State Fire Marshall over the past 5 years, although the reports are now based on response to both structure and wildland fires and does not distinguish between them.

Vermont is seeing an increase in the average annual maximum temperature and likelihood of drought (See **Section 5.2f**). These trends are also recognized by the Chester Hazard Mitigation Committee. According to the State Plan, only five statewide burning bans have been issued over the last 55 years since 1965. Four of those were over the last 22 years in 1999, 2001, 2005-2006, and most recently in 2012, supporting the trend toward drier conditions and increasing the risk of a major wildfire.

Community structures are not particularly vulnerable to wildfires because they are typically located in town centers and away from large tracts of forested and vegetative land, though their close proximity to each other increases vulnerability if a structure fire is triggered by accident. Chester's recreational areas, however, are more vulnerable on the outskirts of the town center, including snowmobile and hiking trails and the Town's recreational park on Lover's Lane with an outdoor pool, seasonal ice rink, tennis courts, and sports field.

The Town has recently increased their response capability to address large fires with an expansion of its Mutual Aid Emergency Services Network as noted in **Table 3** and an new Emergency Services Facility under construction to be completed this year. With expectations of more frequent drought conditions and increased wildfire risk, the town will plan to use available resources and outreach programs to educate the community on how to minimize the risk of brush and wildfires and to issue and enforce dry weather alerts when the risk wildfire is high.

## 5.2b. Structure Fire

Probability of Occurrence:	4.0
Average Hazard Impact:	1.80
Hazard Assessment Score:	7.2

**Structure Fire** was identified as a notable hazard for the Town primarily because of the high probability of occurrence. Although the impact of fire incidents is typically isolated, risk of catastrophic loss of life and property is high.

**Structural Fire** is not a natural hazard but an important secondary hazard from natural events with a high probability of occurrence and potential for catastrophic loss. Structure fires are common throughout Vermont during the winter months as residents heat their homes with wood or wood pellet burning stoves and other open flame methods. For this reason, structure fire can be considered a secondary hazard to severe winter weather and extreme cold temperatures together with other state risk factors noted below.

With little or no warning, these fires can affect a single residential structure or spread to other homes, businesses or apartment complexes and can result in loss of property and life. Residential structure fires are common in Vermont. The National Fire Protection Association reports that 25% of all structure fires nationwide are in residential construction. In Vermont, residential-related fires accounted for 74% of



total structure fires statewide in 2020, according to the State Fire Marshall report, with home heating as the leading cause followed by cooking and electrical.

Over the past 10 years, the top cause for residential fires in Vermont has consistently been related to home heating. While the fire problem varies across the country, there are several other common contributing factors such as poverty, climate, education, code enforcement, demographics, rural communities that influence the statistics.

Fires can be caused by improperly disposing of ashes with live coals from wood stoves, misuse of space heaters, failure to clean creosote from solid-fuel heating equipment chimneys, as well as faulty electrical wiring and lit smoking materials.

### **Structure Fire History and Extent of Impact**

Historically, Vermont has had a disproportionately high per capita fire fatality rate due to risk factors contributing to home heating fire related incidents, as compared to other states.<sup>7</sup>

- Age of Housing Structures - 44% of Vermont homes were built before 1950, 2<sup>nd</sup> oldest in the nation behind Maine.
- Vermont is the second least populated state- remote rural communities can be difficult to reach with firefighting equipment in a timely manner.
- Extreme Winter Temperatures – Vermont is the 7<sup>th</sup> coldest state.
- Higher Risk Population - 3<sup>rd</sup> oldest median age where the elderly is at higher risk. Over the past 5 years, 51% of Vermont's fire deaths have been seniors over the age of 65.
- Home Heating Methods - 1<sup>st</sup> for per capita use of wood for heating.

Local fire officials in Chester have identified emergency response calls related to residential fires constitute the majority of responses reporting 18 to 20 per year on average, although the village area is also vulnerable with the close proximity of buildings along the Town green.

It is not unusual for 8 to 10 structures to be severely impacted by fire each year. Historically, structure fires had been more frequent during winter months with wood burning but local incidents seem to have become more consistent through-out the year. This could be due to the higher frequency of brushfires which can be close to barns and other outbuildings.

Statistics from the State Fire Marshal Annual Reports indicate a relatively consistent number of structure fires and total fires (NFIRS Series 100) over the past several years. This is the case for the State, Windsor County and the Town of Chester. (See **Table 6: Fire Statistics for Vermont, Windsor County and Town of Chester**).

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<sup>7</sup> 2020 Vermont Fire Marshal Annual Report

Estimated Dollar Loss compiled for **structure fires** in Vermont is shown here.<sup>8</sup> Reported dollar loss by insurance companies is trending up with \$101,700 per claim in 2019, up from \$48,535 in 2015. Applying the data provided by insurance company claims, the potential annual loss due to structure fire for the Town is estimated to be \$1,800,000 based on an estimated average of 18 structure fires per year.

Year	Fire Departments Reporting	Fires Reported	Estimated Dollar Loss by Fire Departments	Insurance Companies Reporting/ Total	Fire Claims Reported	Reported Dollar Loss by Insurance Companies
2012	194	2,233	\$ 17,840,192	860	839	<b>\$ 44,510,095</b>
2013	194	2,116	\$ 26,485,951	615	878	<b>\$ 50,911,724</b>
2014	228	2,114	\$ 30,412,139	615	1,130	\$ 50,589,356
2015	230	2,198	\$ 25,112,224	606	939	\$ 45,574,673
2016	228	3,138	\$16,919,906	644	706	\$ 57,098,292
2017	172	2,458	\$ 21,029,493	615	1,104	\$ 54,359,205
2018	170	1,708	\$ 22,628,798	611	844	\$ 57,204,711
2019	157	2,302	\$ 21,511,729	<b>557</b>	<b>669</b>	<b>\$ 68,006,719</b>
<b>2020</b>	<b>168</b>	<b>2,678</b>	<b>\$17,889,976</b>	Data not currently available		

<sup>8</sup> NFIRS and Insurance Company Data, 2020 Vermont Report of the State Fire Marshal



**TABLE 6: Fire Statistics for Vermont, Windsor County and Town of Chester<sup>9</sup>**

	Vermont State				Windsor County			Chester			
YEAR	Fire-NFIRS Series 100 <sup>3</sup>	Structure Fire Responses	Wildland Fire Responses	Total	Structure Fire Responses	Wildland Fire Responses	Total	Fire-NFIRS Series 100	Structure Fire Responses	Wildland Fire Responses	Total
2010	-	1956	475	2431	181	70	251	-	12	9	21
2011	-	2366	1144	3369	181	70	251	-	19	4	23
2012	-	2225	667	2892	201	101	302	-	21	4	25
2013	-	2114	625	2739	229	86	315	-	21	3	24
2014	-	2232	470	2702	205	61	266	-	18	7	25
2015	3575	-	-	3575	239	89	328	-	-	-	-
2016 <sup>1</sup>	3269	-	-	3269	-	-	-	50	-	-	50
2017	2458	-	-	2458 <sup>1</sup>	-	-	-	14	-	-	14
2018	2660	-	-	2660 <sup>2</sup>	-	-	-	18	-	-	18
2019	2274	-	-	2274	-	-	-	23	-	-	23
2020	2693	-	-	2693	-	-	-	33	-	-	33
Annual Average <sup>2</sup>								27.6	18.2	5.4	25.7

NA – Not Available / Did not report

<sup>1</sup> As of 2016, the Vermont Fire Marshall Report no longer reports fire statistics by county nor by fire type (structure and wildland). Active Fire departments reporting vary from 68% (2019) to 74% (2017)

<sup>2</sup> Annual Averages are based on available data shown in table.

<sup>9</sup> Vermont Annual Report of the State Fire Marshal, for years 2010 through 2020

## Structure Fire Trends and Vulnerability

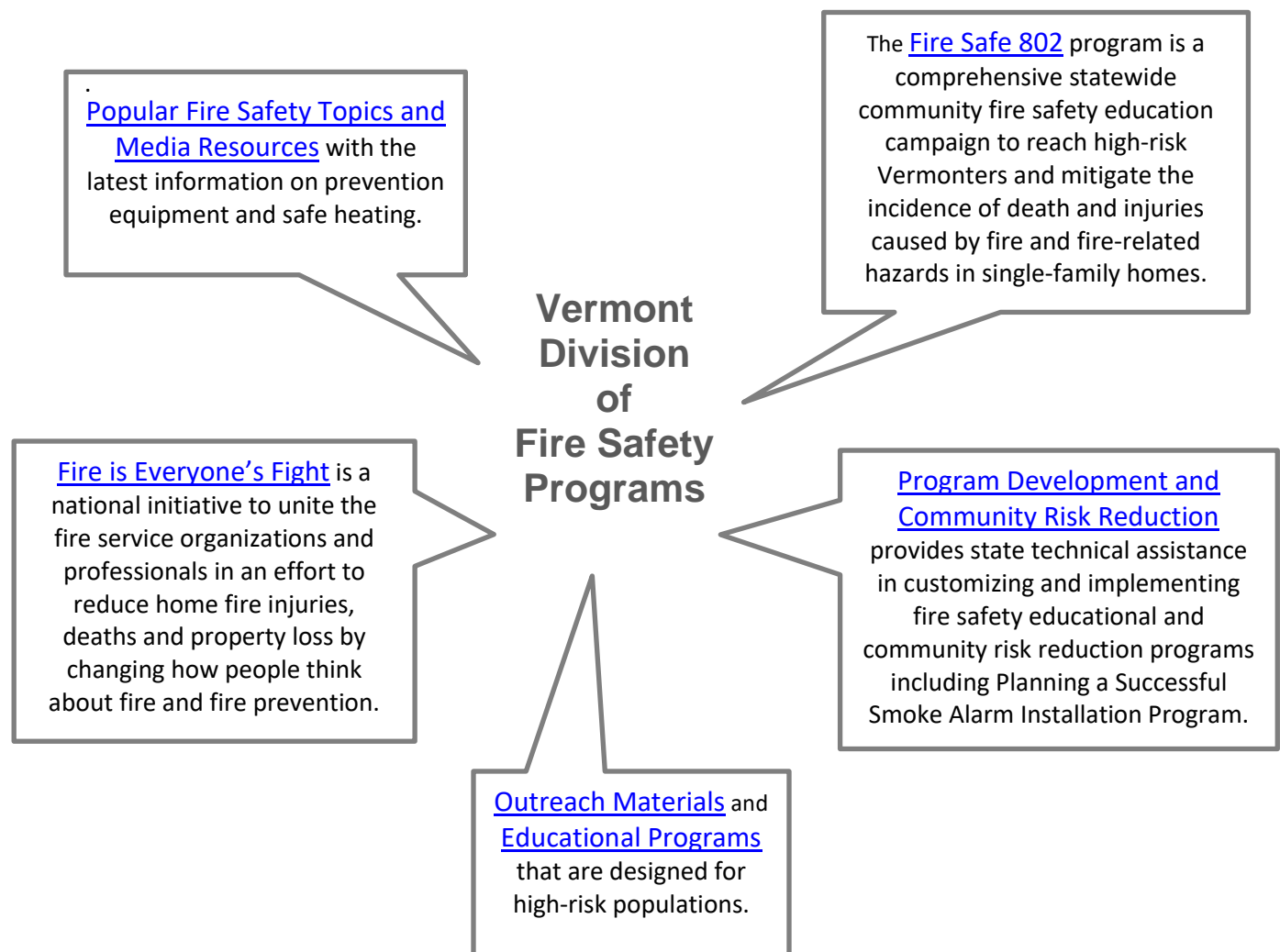
Structure fires are influenced by many factors independent from climate change and can fluctuate from year to year. As a result, the probability of occurrence remains high although it is difficult to project trends over time for Chester. However, it may be reasonable to expect an increase in incidents, as seen over the past few years, if the Town population increases, housing and the population continue to age, and extended periods of extreme cold and drought become more frequent.

A growth in tourism and bed & breakfast accommodations can also increase the likelihood of structure fires from improper operation and maintenance of solid-fuel heating systems and campfires during the dry seasons due to lack of knowledge on the part of residents, renters and campers. The number of log homes in the region, which are more vulnerable, may also be a factor.

An assessment of town assets vulnerable to **structural fire** would be based on age and proximate location to other high-risk structures. Many of Chester's historical structures have been renovated to proper building codes which has reduced their vulnerability to fire. Community structures are not particularly vulnerable to wildfires because they are typically located in town centers and away from large tracts of forested and vegetative land, though their close proximity to each other increases vulnerability if a structure fire is triggered by accident. Improper brush burning is a relatively common cause of structure fires in rural areas. Extended periods of drought and extreme heat, combined with high winds, can be expected to increase this hazard risk.

Chester residents, however, remain particularly vulnerable to **structure fires**, which are more likely to cause physical harm and damage to homes, as many of the residents heat their homes using open flame options, such as wood or pellet burning stoves. The elderly living alone are also more at risk, according to statistics, and the average age of Chester's population has been rising.

Local education and outreach programs continue to be the most effective way to reduce a community's risk to fire. [Firewise](#), is a community outreach program through the National Fire Protection Association that provides guidance, resources, and training on protecting homes and property from wildland fire. [Smokeybear.com](#) provides information for the prevention of wildfire geared towards kids' education, residential home burning tips and campfire safety. The Vermont Annual Fire Marshal Report also offers informational resources for municipalities and property owners regarding fire safety. In addition, the [Vermont Division of Fire Safety](#) conducts a number of public educational events throughout the state and provides a toolbox of resources to educate communities which the town can take advantage of.



## 5.2c. Inundation & Flash Flooding

## Fluvial & Other Erosion

Probability of Occurrence:	3.0
Average Hazard Impact:	2.50
Hazard Assessment Score:	7.5

Probability of Occurrence:	4.0
Average Hazard Impact:	2.25
Hazard Assessment Score:	9.0

**Flooding**, including **flash flooding** and overbank or **inundation flooding**, and **Fluvial Erosion** are significant natural hazard events for Vermont and Windsor County. Both **Flooding** and **Fluvial Erosion** have a high probability of occurrence and directly impact mostly those properties located near or in flood prone areas. However, during severe events they can indirectly impact the whole community. Both hazards are profiled here as they are intrinsically linked.

**Flash flooding** can occur near smaller upstream tributaries in mountainous terrain. It is characterized by intense, high velocity torrent of water moving downstream following a heavy rainstorm. Flash floods are very dangerous and destructive causing severe land erosion and property damage. This type of flooding threatens high-elevation drainage areas call alluvial fans where water transitions from steep grades to flatter terrain. These events typically occur during summer when a single or series of weather events result in excessive rainfall over a short period of time on already saturated soils from a spring melt. Flash floods can also be triggered by a dam breach causing further damage downstream.

The damage from spring flooding events can vary greatly depending upon the amount of precipitation, snow cover, spring melt, soil saturation, existing erosion and topography. Road infrastructure within the narrow stream valleys receive drainage from the higher elevations and are often the most vulnerable to damage from flash flooding.

**Inundation Flooding** occurs in lower lying areas when water levels rise overflowing the banks of a river or lake. In hilly or mountainous areas, drainage from higher elevations flows to the lower reaches or valleys of a watershed causing these waters to rise quickly. Instances of inundation type flooding can occur long after precipitation has ended or when no precipitation has occurred, such as an extreme winter warming event causing river ice to melt resulting in ice jams obstructing the flow of river waters. These waters often carry with it debris which can block culverts or a bridge underpass exacerbating flooding.

Stable river channels naturally meander adjusting with periodic flooding. Floodwaters will rise and enter low lying **floodplain** areas temporarily which lessen the volume and velocity of water flowing downstream reducing the flood risk to downstream properties, villages and town centers. When floodwaters are restricted from their natural corridor, water velocity increases and **fluvial erosion** occurs with the scouring of riverbeds and riverbanks as the river tries to adjust. This action destabilizes nearby roads, bridges, residential properties and other man-made structures built within the river's natural corridor.

### Flood Zones Explained

The Federal Emergency Management Agency (FEMA) has designated flood zones, as defined below. The designated *Special Flood Hazard Areas* (SFHA) have the highest risk of flooding. These areas include the floodway and the river's floodplain. Both the Floodway and Floodplain typically lie within the River Corridor.

Flood Zone Definitions	
Floodway	The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height; also known as the regulatory floodway. As designated and determined by FEMA.
Special Flood Hazard Area (SFHA)	The land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year; also known as <b>floodplain</b> . As designated by FEMA. Key part of the <i>National Flood Insurance Program</i> (NFIP). Includes Floodway Fringe (Zone A and Zone AE).
River Corridor	The land area adjacent to a river that is required to accommodate the dimensions, slope, planform, and buffer of the naturally stable channel and that is necessary for the natural maintenance or natural restoration of a dynamic equilibrium condition and for minimization of fluvial erosion hazards. Generated automatically as a 50-foot buffer on each side of the meander belt width. As delineated by the Agency of Natural Resources in accordance with river corridor protection procedures. (See figure below)
Fluvial Erosion	The erosion or scouring of riverbeds and banks during high flow conditions of a river. Fluvial erosion can be catastrophic when a flood event causes a rapid adjustment of the stream channel size and/or location. These areas are found within the River Corridor.

The land area that a river accesses to meander and overtop its banks to release flood energy without excessive erosion is known as the **River Corridor**. This is a depiction of a typical stream with its River Corridor area highlighted and an example of the meandering pattern of the stream over time within that corridor.

Areas within the river corridor are considered areas of both flood and erosion risk as rivers and streams seek equilibrium in accommodating the high flows causing major flood and erosion damage even outside of SFHAs.



**River corridors** and **floodplains** are different, but related. The river corridor is the area that provides the physical space that the *river* needs to express its energy and meander without causing it to dig down. A floodplain is the area where water flowing out over the *river* bank spreads out.<sup>10</sup>

Vermont Agency of Natural Resources has mapped River Corridors for the Williams River stream segments along with SFHA which are shown in **Appendix A: Map 4- Water Resources** and can be found on-line.<sup>11</sup> River Corridors are currently being modified to more closely reflect the valley topography and will allow for improved identification of elevated fluvial erosion hazard areas.

**Fluvial Erosion**, which often accompanies flood events, is the predominant form of flood damage in Vermont and in mountain valley towns like Chester. Rivers are dynamic and move both water and sediment. As a result, river channels may move vertically or horizontally. High flows can cause sediment to become detached from a riverbed or riverbank, which can range from gradual bank erosion or massive slope failure to catastrophic changes in river channel location and dimension. The sediment and stone that is dislodged can expose tree roots and wash away vegetative buffers which are carried downstream blocking culverts and bridges causing further flood damage.

Vermont is vulnerable to this hazard because of its topography, extreme climate, deep snows, destructive ice jams and intense rainstorms. Centers of commerce in villages and towns became concentrated along river banks, forests were cleared and, over time, many rivers moved or were channelized to accommodate this development rendering them unstable and prone to fluvial erosion.<sup>12</sup> Fluvial erosion can severely threaten mountain communities like Chester as most of rural town development lies in valley areas along rivers and streams.

**Ice Jams** can also cause a secondary event of flooding and threaten many of the same properties located within the FEMA Special Flood Hazard Area. Common in New England, ice jams occur during winter and spring months when river water levels rise or a spring or mid-winter thaw breaks the ice into large chunks which become jammed at manmade and natural obstructions. Ice can build up against bridge abutments and expanses, undersized structures, and other obstructions to create a temporary dam impounding large volumes of water that has the potential to damage infrastructure and flood surrounding areas.



<sup>10</sup> The ANR FLOOD READY link shows river corridors overlays and FEH zones, [http://floodready.vermont.gov/assessment/vt\\_floodready\\_atlas](http://floodready.vermont.gov/assessment/vt_floodready_atlas).

<sup>11</sup> The ANR FLOOD READY link shows river corridors overlays and FEH zones, [http://floodready.vermont.gov/assessment/vt\\_floodready\\_atlas](http://floodready.vermont.gov/assessment/vt_floodready_atlas).

<sup>12</sup> Municipal Guide to Fluvial Erosion Hazard Mitigation, Vermont Agency of Natural Resources

## Flooding and Fluvial Erosion: History and Extent of Impact

Flooding and fluvial erosion are the most common types of natural hazards that occur frequently in Vermont. During the hazard assessment exercises, flooding and erosion hazards were identified as outcomes from various weather events including **hurricanes, tropical storms, microbursts, ice jams, severe thunderstorms or heavy rain events**.

Although **hurricanes and tropical storms** rarely impact Vermont, they have historically caused the greatest state natural disasters. Prior to Tropical Storm Irene in August, 2011, Vermont was impacted by Tropical Storm Floyd in November, 1999, causing major flooding and power outages. However, the Hurricane of 1938 may have been the most powerful tropical storm to hit Vermont in modern times, with sustained winds of 74mph which was claimed to have changed the landscape of the state with the extensive tree damage.

The Flood of 1927 termed ‘the greatest natural disaster’ was a 500-year flood event caused by a tropical system in Vermont with over 9 inches of rain falling on frozen ground that caused the most extensive flooding and structural damage and greatest loss of life in recorded history for the state. Widespread flooding more recently occurred in June, 1973, when up to 6 inches of rain fell resulting in a Disaster Declaration for all 14 counties and \$64 million in damage. In 2011, four regional disaster declarations were issued in Vermont due to flooding and fluvial erosion. The fourth was Tropical Storm Irene, estimated at over a 100-year flood event, occurred in late August when up to 11 inches of rain fell in some areas of the State. The most significant state-wide historical flooding events and their impact on the region are detailed in **Table 7: Vermont Historic Flood Events**.

On a regional level, of the 16 FEMA Disaster Declarations for Windsor County since 1992, 13 were related to flooding, one to a winter storm and the most recent two to COVID-19. Two of the flood related disasters were the result of Tropical Storms; Floyd in 1999 and Irene in 2011. FEMA assistance for the most recent of these Declared Disasters impacting Windsor County is shown in **Figure 1: Regional Impact of Federally Declared Disasters**. These flood damages are associated with inundation flooding and fluvial erosion; however, data indicate that greater than 75% of flood damages are associated with fluvial erosion.

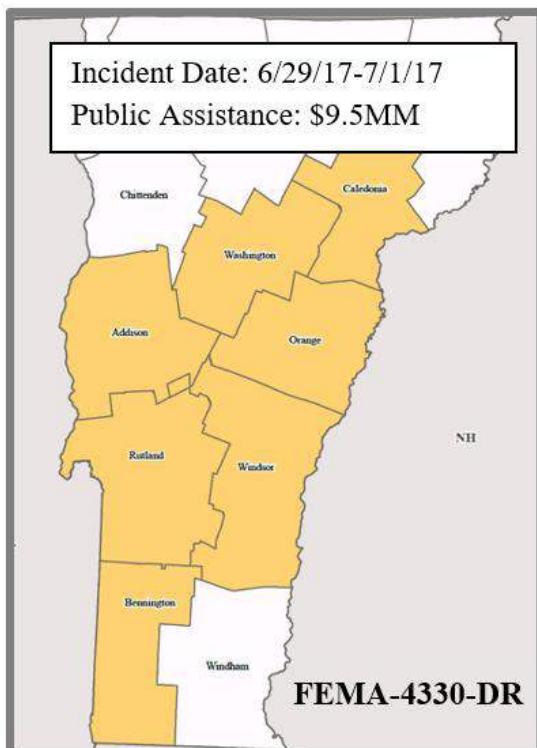
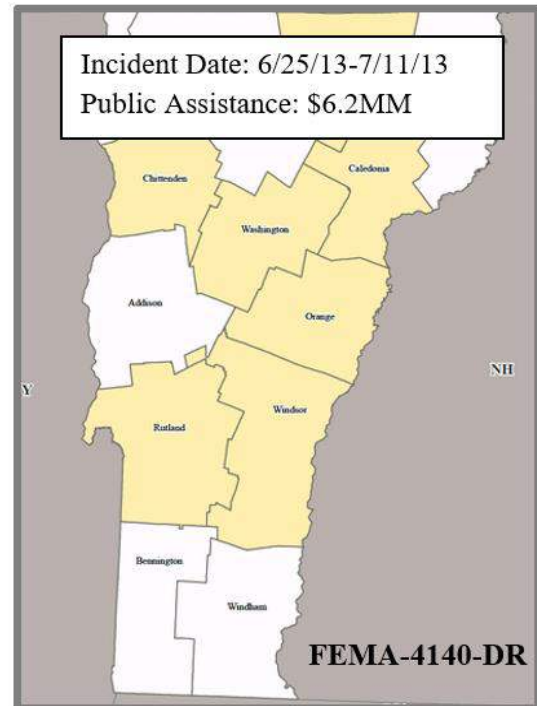
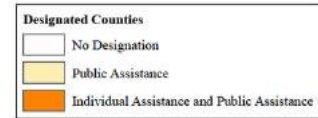


**TABLE 7: Vermont Historical Flood Events.**

Event	Date	Description	Impact or Extent of Damage
Great Flood of 1927	November 3, 1927	After a wet October, rivers were swollen and the ground was saturated. Nine inches of rain fell in a 36-hour period triggering disastrous flooding. The month of October saw 150% greater rainfall than normal and lack of vegetation due to de-forestation may have reduced the ground's ability to absorb water. Though all of New England was affected, Vermont was devastated. The state flooded from Newport to Bennington, with the Winooski River Valley the hardest hit. Deadliest disaster in Vermont history.	<ul style="list-style-type: none"> <li>➤ 84 people perished</li> <li>➤ 9,000 left homeless</li> <li>➤ Many roads, countless homes and over 1,200 bridges washed away</li> <li>➤ Over \$28 MM in damages (\$404 million in current \$s)</li> </ul>
The Great New England Hurricane of 1938	September 21, 1938	One of the most powerful and destructive hurricanes to hit southern New England and the region of Southeast Vermont with winds over 100 mph. Authorities were unaware of the magnitude so no evacuation procedures were instituted and very few precautions were taken. The only tropical cyclone to make a direct hit on Vermont in recorded history. Hurricane-force winds caused extensive damage to trees, buildings, and power lines.	<ul style="list-style-type: none"> <li>➤ 600 people perished in southern New England, only 5 in Vermont</li> <li>➤ Over 2,000 miles of roads were blocked taking months to reopen</li> <li>➤ Vermont maple and sugar groves were damaged</li> <li>➤ Over \$300 MM in damages (\$5 Billion in current \$'s)</li> </ul>
Tropical Storm Irene	September 1, 2011	Tropical Storm Irene tracked north northeast across eastern New York and western New England producing widespread flooding, and damaging winds across the region. The greatest impact across central and southern Vermont was due to catastrophic flash flooding as a result of 4 to 7+ inches of rainfall which occurred across all of Windham and Windsor County, especially in the foothills of the Green Mountains. Several dozen roads (state and local), including Routes 4, 12, 12A, 100, 103, 107 and 131, as well as several bridges were washed out or suffered severe damage. Several communities within Windsor County were isolated due to loss infrastructure. Dozens of homes and businesses experienced severe flooding as well as major losses to farms and livestock.	<ul style="list-style-type: none"> <li>➤ Frequent wind gusts of 55-60 mph, peak gusts at 85 mph.</li> <li>➤ 18,000 customers in Windham County lost power.</li> <li>➤ Greatest single-day rainfall in Vermont's recorded history.</li> <li>➤ Rainfall averaged 4 to 8 inches, and up to 11 inches in some areas over a 12-hour period.</li> <li>➤ There were nearly 2400 roads, 800 homes/businesses, 300 bridges and a half dozen railroad tracks destroyed or damaged from the flooding caused by Irene.</li> <li>➤ \$18.7M estimated in Public and Individual FEMA Assistance.</li> </ul>



**FIGURE 1**  
**Regional Impact of**  
**FEMA Declared Disasters**  
**Severe Storms and Flooding**



Locally in Chester, impacts from Tropical Storm Irene brought much devastation. Several roads were completely washed away, bridges were destroyed and culverts were washed downstream. The sewer main which crosses under the Williams River was washed downstream, allowing sewage to spill into the river. Large tracts of land were eroded and washed away including portions of homes that fell into the Williams River. The total damage sustained by the Town of Chester was estimated at approximately \$1.75 million. Below are photos of the local damage following the storm.



Flooding in Vermont is primarily the result of **Severe Storm** events. Over the past several years since Irene, flooding and fluvial erosion damage have occurred in limited areas of the State from intense, scattered storm events and ground saturation from persistent and excessive rainfall. Extensive damage from more recent localized flooding events impacting Chester is described below. Data on the physical extent of fluvial erosion is not available and is difficult to quantify. The reader can get an idea of the extent from the photos shown here.

- In July 2013, two to three inches of rain fell in two hours over eastern Windsor County. This followed a record spring rainfall and resulted in flash flooding which closed Route 11 in Chester. (Estimated damage: \$25k)



- In July 2014, a stationary thunderstorm developed that dropped three inches of rain an hour resulted in significant damage to transportation infrastructure, residential and commercial properties, and agricultural areas. Main access roads to dozens of homes within the watershed were severed. Routes 11 and 103 were inundated forcing closure from Gassetts to the Stone Village area of Chester. Local gravel road surfaces and culverts were washed out, fields were flooded in Chester Village and bridges were damaged. Floodwaters surrounded a home on Route 11 which was undermined and collapsed and a resident was rescued by emergency responders. (Estimated damage: \$1M)
- In April 2019, neighboring towns of Ludlow and Cavendish, endured a flooding event from heavy rain that had little impact on Chester. (Estimated damage: \$100K)

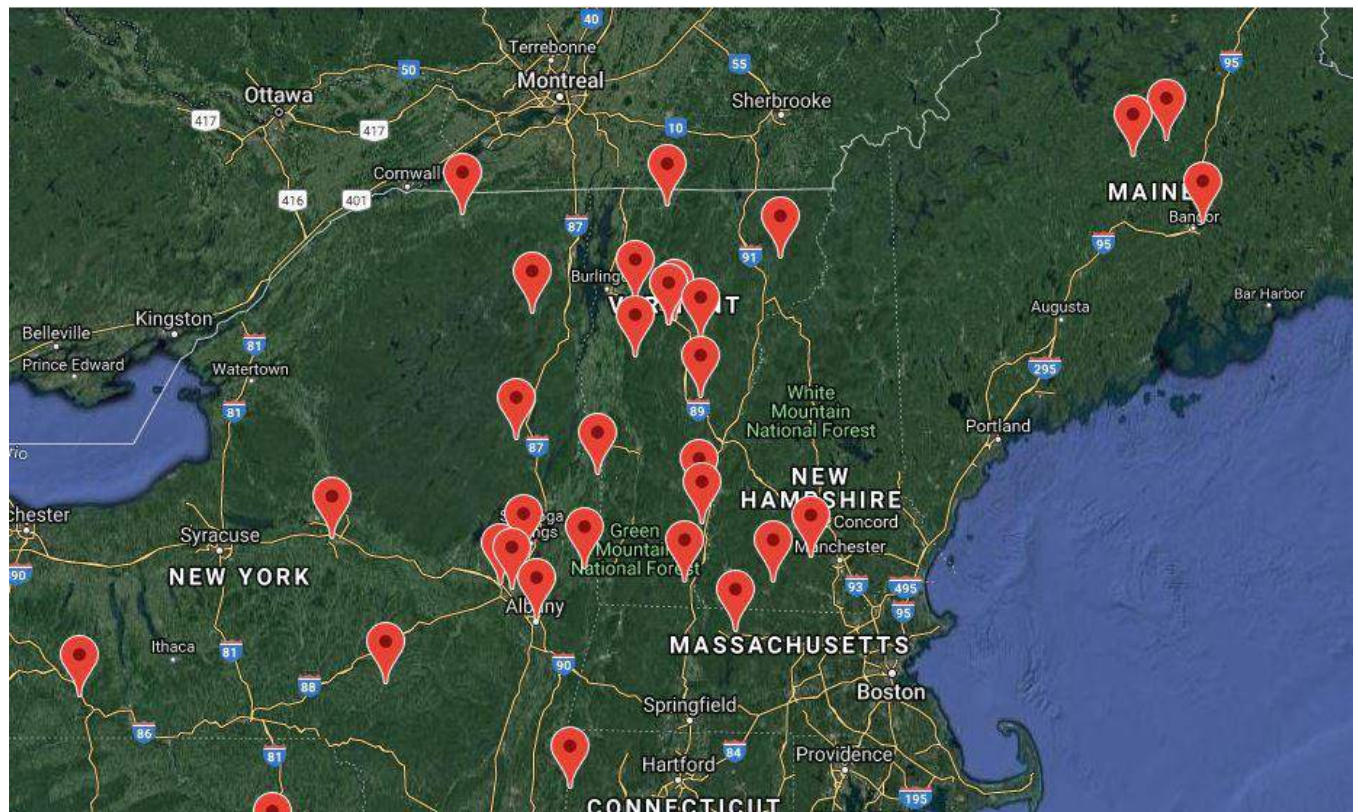


The most devastating winter floods have been associated with a combination of heavy rainfall, warm temperatures, and rapid snowmelt. Winter weather with less than average snowfall can result in greater ice buildup on streams and rivers, potentially resulting in greater ice jam damage.<sup>13</sup>

Vermont ranks tenth with a total of 987 ice jam events in 310 locations between 1/1/1785 and 2/26/2017, according to the US Army Corps of Engineers, Ice Jam Database CRREL State Summary Report. **Figure 2** below identifies the location of ice jam events in the region during 2019.<sup>14</sup> It can be seen that Vermont had experienced more ice jams in 2019 than other New England states.

CRREL has recorded six ice jams in the Williams since 1990. Many additional ice jams have occurred in town, historically, but most have not been recorded. In January 2010, an ice jam on the South Branch of the Williams River sent water around a house and over the road. The house experienced basement flooding, automobiles were moved by the floodwaters, and the residents were evacuated.

**FIGURE 2: 2019 Ice Jam Locations, CRREL Database**



<sup>13</sup> [CRREL Ice Jam Database](#)

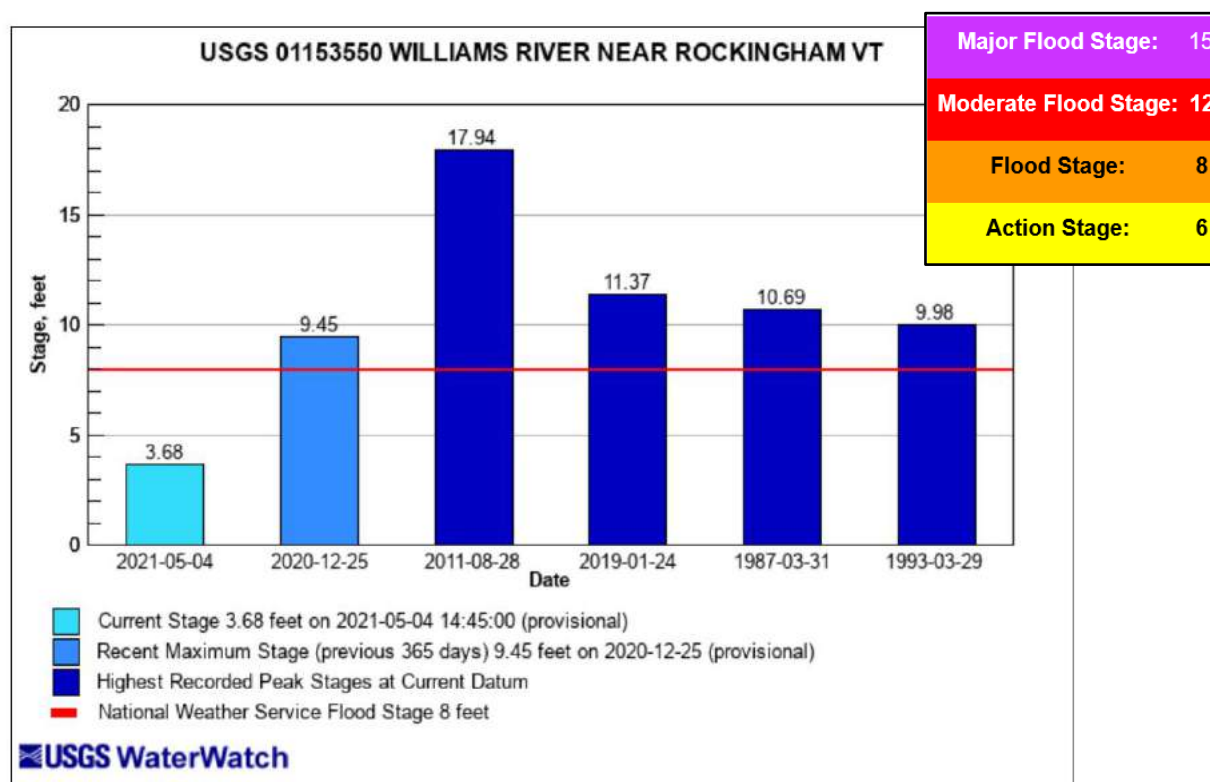
<sup>14</sup> [CRREL Ice Jam Database](#)

## Flooding and Fluvial Erosion: Trends and Vulnerability

Over the past several years, flooding has occurred in limited areas of the State from intense, scattered storm events and ground saturation from persistent and excessive rainfall. Since Irene, Vermont has experienced nine FEMA declared disasters from severe storms and flooding, three of which have impacted Windsor County. In recent years, flood intensity and severity appear to be increasing. According to prior *State of Vermont Hazard Mitigation Plans*, studies show that areas of the State can expect a greater frequency of flooding with an increase in extreme rainfall amounts.<sup>15</sup> Extreme changes in temperature during winter months with late winter rain storms is also a factor causing more frequent ice jams and can be expected to increase in frequency with climate change.

This trend is supported by local streamgage data. The United States Geological Survey (USGS) maintains a streamgage on the Williams River in Rockingham, east of Chester, which regularly monitors the river height and streamflow. The USGS streamgage data in **Figure 3** displays recorded historic peak data on gage height. During Tropical Storm Irene, gage height exceeded major flood level at almost 18ft. Other highest recorded peak stages from current datum show gage height exceeded the 8ft. flood stage five times over the past 35 years, three of which occurred over the past 10 years.

**FIGURE 3: Historical Gage Heights for Williams River in Rockingham, VT<sup>16</sup>**



*\*Note the gage height exceeded 'Major Flood Stage' of 15 feet during Tropical Storm Irene at 17.94 feet. Gage height exceeded flood stage 5 times over the past 34 years, since 1987, 3 of which occurred over the past 10 years.*

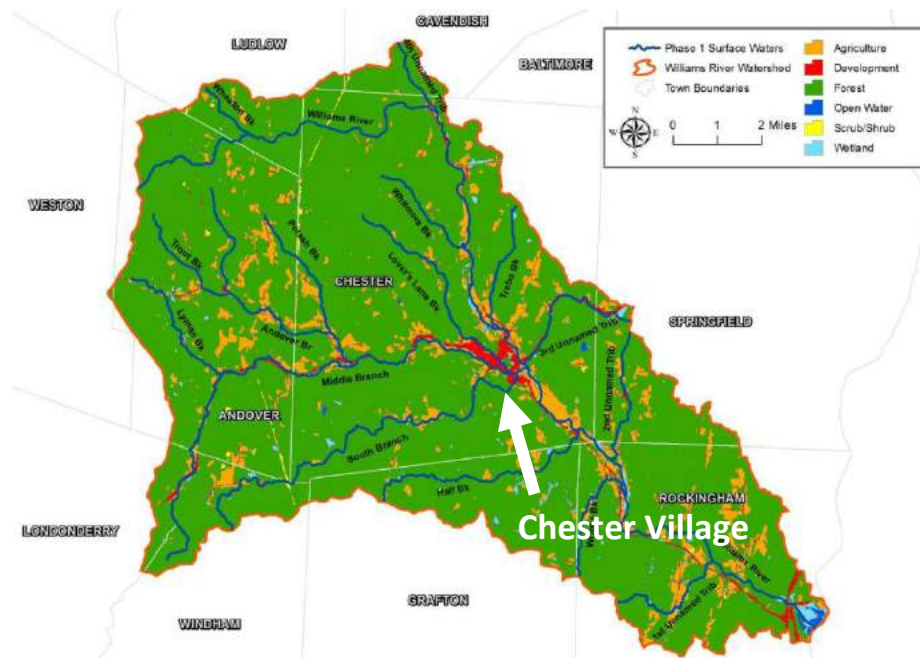
<sup>15</sup> 2018 State of Vermont Hazard Mitigation Plan

<sup>16</sup> <http://waterwatch.usgs.gov> accessed in May 2020, Toolkit, Flood-Tracking Chart



A region's **vulnerability** to flooding and erosion depends on topography, as well as meteorological events. The Town is particularly susceptible to inundation flooding in lower lying areas of the Village and also to flash flooding in higher elevation areas. Chester's vulnerability to flooding and erosion are augmented by the characteristics of the Williams River watershed, one of five large basins draining to the Connecticut River in southeastern Vermont. Approximately 75% of the town lies within the Williams River watershed with the remaining 25% within the Black River watershed.

**FIGURE 4: Williams River Watershed**



As shown in the **Figure 4** and in **Appendix A: Map 4(a&b)-Water Resources**, Chester Village is precariously located where three major tributaries and other minor streams converge with the Williams River mainstem. The Village is nestled between Lovers Lane Brook and the West Branch just above the confluence of the Williams River at the intersection of the two major state access roads of Rt. 103 and Rt. 11. (**Figure 5**)

**FIGURE 5: Flood Ready Map of Chester Village**



Although relatively few structures are located within the floodway, several that lie within the river corridor are at higher flood risk. Except for the Chester Wastewater Facility which lies on the fringe of the floodway and in the river corridor on Sewer Plant Road, the town's most critical structures are not at risk for flood and erosion.

**TABLE 8: Summary of Structures within Flood Hazard Zones and River Corridor <sup>17</sup>**

Flood Zone	Building Type	# Units	%
River Corridor	Single-Family	165	69%
	Multi-Family	11	5%
	Mobile Homes	19	8%
	Commercial	14	6%
	Other	30	13%
<b>Total RC</b>		<b>239</b>	<b>100%</b>
Floodway	Single-Family	12	67%
	Multi-Family	0	0%
	Mobile Homes	4	22%
	Commercial	0	0%
	Other	2	11%
<b>Total Floodway</b>		<b>18</b>	<b>100%</b>
Floodway Fringe	Single-Family	39	70%
	Multi-Family	2	4%
	Mobile Homes	2	4%
	Commercial	5	9%
	Other	8	14%
<b>Total Floodway Fringe</b>		<b>56</b>	<b>100%</b>

**Table 8** lists the number and types of vulnerable structures in Chester that lie within the Special Flood Hazard Zones (Floodway and Floodway Fringe) and the River Corridor.

Of the 313 structures, 254 or 81% are residential structures.

#### National Flood Insurance Program (NFIP)

Chester has been a participatory, non-sanctioned member of the National Flood Insurance Program since June 28, 1974 and regulates development in the floodplain through the enforcement of by-laws in the Flood Damage Prevention Regulations which are now included in the Unified

Development Bylaws, Article 6 - Flood Damage Prevention Standards. NFIP policies and claims are summarized in **Table 9**<sup>18</sup>. The Town of Chester has the highest number of claims and repetitive losses in Windsor County. Over the past few years, the Town has completed four FEMA buyouts of the most at-risk parcels with repetitive losses.

**TABLE 9: Chester National Flood Insurance Program Statistics (Report Date 6/26/2018)**

# of Policies	Total Premium	Total Coverage	# LOMCS	# of Policies in A Zone	# of Claims Since 1978	Claims Paid Since 1978	# of Repetitive Losses
37	\$44,918	\$6,977,700	9	21	43	\$920,676	11

<sup>17</sup>GIS analysis using E911 building points (2021), FEMA-mapped floodplains (2015), and ANR-mapped River Corridors (2015). Some structures may have been removed from SFHA or RC since this data was compiled.

<sup>18</sup> Vermont Flood Ready FEMA Policy & Claim Statistics for Flood Insurance -Claim Information by Town, [https://floodready.vermont.gov/assessment/community\\_reports#Flood](https://floodready.vermont.gov/assessment/community_reports#Flood)

Given the historic social and economic function of river valleys, development within these Vermont villages is often well established. Extreme channelization, berming and armoring of the Williams River to accommodate past development, has reduced the rivers access to its natural floodplain. As much as 70% of Vermont's rivers have lost access to their floodplains due to these common practices.

Flood risk for Chester is best managed by improving floodplain access along the Williams and its tributaries upstream in the watershed and minimizing further development within the river corridor. MARC continues to work with local communities within the region providing information on fluvial erosion hazard and river corridor bylaws, to further limit development and minimize risks.

**The community assets areas most at risk of flooding and erosion** became apparent following Irene and more recent storm events. Many of the roads impacted by the Tropical Storm Irene remain vulnerable areas of town although repairs made at that time have reduced the Town's flooding and erosion risk with upgraded culverts and other best management practices to control stormwater runoff. The following areas continue to be problem areas vulnerable to reoccurring minor flooding during a hard rain.

**Chester Wastewater Facility** on Sewer Plant Rd. sits on the floodway fringe with a sewer line crossing under the Williams River. Relocation of the wastewater facility is not financially feasible at this time; however, it had withstood Tropical Storm Irene and has since been mitigated to improve its flood resiliency.

The **North Branch** and **Williams River mainstem** south of the Village are prone to ice jams and flooding in the late winter and early spring. Ice jams most frequently occur in the Williams River at bridges along VT Route 103 between Trebo Road and VT Route 10. The bridge at the intersection of Route 11 and Route 103 at the southern end of Village is prone to flooding from ice jams. Infrastructure damage is most likely to occur at these locations.

The following areas continue to be problem areas vulnerable to reoccurring minor flooding during a hard rain:

- **Smokeshire Road** at intersection of Williams River and Chase Brook
- Intersection of Potash Brook Road and Andover Road
- **Marshall/Mountain View** south of village and Rt. 103 & Rt. 11 intersection
- **Palmer/Jewett/Thompson Road bridges** over the Williams North Branch along Rt. 103 for residential property access.
- Sections of **Popple Dungeon Road** which runs along the South Branch of the Williams River.
- A three-mile stretch of **Rt. 35** which lies within the river corridor and floodway of the South Branch of the Williams River.





Mass failure on Middle Branch along Rt. 11 showing little revegetation over the past 10 years.

The **massive failure of steep sloped riverbanks** of the Williams along Route 11 from Irene have yet to revegetate and remain extremely vulnerable to further fluvial erosion and heavy rainfall even during minor flood events. The volume of sediment and stone, when dislodged will fill channel beds along with uprooted trees and shrubs raising floodwater levels and blocking bridge underpasses along major access roads. These slope failures are primarily along state roads and beyond the scope of this plan.

**Bridges and culverts** are also vulnerable to flood and fluvial erosion damage, as much of this infrastructure remains undersized constricting flow or is poorly aligned. Blocked culverts compromise the structural integrity and safety of the road crossing resulting in damage to adjacent properties. [Bridge and Culvert Inventory](#) assessments are conducted every three years and provide the Town with information used to plan for infrastructure replacements and upgrades. In addition, the Williams River Corridor Plan identifies culvert and bridge upgrades or removal projects for reducing flood and erosion hazard risk, as well as opportunities for increasing access to natural floodplains.

Vermont State has focused its efforts over the past four years on “hydrologically-connected” road segments as part of the ***Municipal Roads General Permit (MRGP) Standards***. These standards will help to increase flood resiliency and reduce the risk of road erosion. A new road inventory, completed in 2019 based on these new standards, provides the Town with information on roads most vulnerable to erosion and is consulted in prioritizing road work each year. Chester has made significant progress in bringing high priority segments into compliance.

These assessments help guide the Town’s annual work on infrastructure improvements and are critical to reducing the Town’s risk to flooding and erosion.

## 5.2d. Heavy Snow

Probability of Occurrence:	3.0
Average Hazard Impact:	2.00
Hazard Assessment Score:	6.0

## Ice

Probability of Occurrence:	4.0
Average Hazard Impact:	2.30
Hazard Assessment Score:	9.0

**Heavy Snow** and **Ice**, are significant natural hazard events for Vermont and Windsor County. Both have a high probability of occurrence and have the greatest impact on town infrastructure and can isolate some vulnerable residents.

**Winter storms** and **blizzards**, with **snow**, **ice**, **wind** and **extreme cold** in varying combinations, are fairly commonplace in Vermont, Windsor County and occur town wide in Chester. Heavy accumulation of snow can be accompanied by strong winds, cold and low wind chills. Drifting of snow from high winds cause low visibility and make it difficult to keep roads cleared. Heavy wet snows of early fall and late spring, as well as ice storms and **freezing rain**, often result in power outages and property damage, leaving people without adequate heating capability. Ice glazed roadways and sidewalks, difficult to detect, are extremely hazardous to pedestrians and motorists. Power and communication loss is often the result of downed trees from heavy wet snow or ice accumulation combined with strong wind gusts which pull down utility lines and can disrupt traffic and emergency response by making roads and driveways impassable.

Severe winter storms in the northeastern United States develop through the combination of weather and atmospheric conditions including the moisture content of the air, direction of airflow, collision of warm air masses coming up from the Gulf Coast, and cold air moving southward from the Arctic.<sup>19</sup> Winter weather related Warnings, Watches and Advisories are issued by the local National Weather Service office based on local criteria.

**A Nor'easter** is a large weather system traveling from South to North, passing along, or near the Atlantic seacoast. Cyclonic winds impact the coast and inland areas from a northeasterly direction. The sustained winds may meet or exceed hurricane force.

**Blizzards** are defined by the National Weather Service as "sustained winds or frequent gusts of 35 mph or greater (and) considerable falling and/or blowing snow reducing visibility frequently to 1/4 mile or less for a period of three hours or more<sup>20</sup>."

**Ice Storms** are defined by the National Weather Service as "occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice are considered to be of ¼" or greater."<sup>21</sup> Multiple sources state that a ¼ inch of ice accumulation from an ice storm can add 500 pounds of weight on the lines between two power lines.

**Flash Freeze** occurs when temperatures rapidly fall below freezing during precipitation with sudden severity in travel conditions. Extreme variations in topography and altitude on Vermont roadways make

<sup>19</sup> 2018 State of Vermont Hazard Mitigation Plan

<sup>20</sup> National Weather Service Glossary

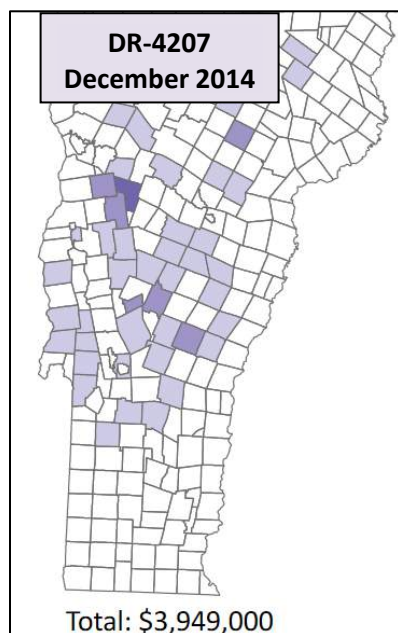
<sup>21</sup> National Weather Service Glossary

this a common hazard for motorists. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.

**Black ice** is a deadly driving hazard defined as patchy ice on roadways or other transportation surfaces that cannot easily be seen. It is often clear (not white) with the black road surface visible underneath. It is most prevalent during the early morning hours, especially after snow melt on the roadways has a chance to refreeze over night when the temperature drops below freezing. Black ice can also form when roadways are slick from rain and temperatures drop below freezing overnight.

**Extreme Cold** temperatures are part of Vermont's climate tendency to stray above or below expected temperature values. What constitutes 'extreme cold' can vary and is based on what a population is accustomed to in their respective climates. For Chester, a valley town, this hazard was assessed as having a relatively high probability of occurrence but a low potential impact.

### Heavy Snow and Ice: History and Extent of Impact



There are no standard models or methodologies for estimating loss from winter storm hazards, however, extreme winter weather is considered a way of life in Vermont and many rural Towns are accustomed and prepared for these events.

While the history of winter storm events in Vermont and the historical damaged caused is extensive, Windsor County has been a designated area in only one federally declared disaster event over the past 20 years. DR-4207 occurred over a four-day period in mid-December 2014 when heavy, wet snow and ice resulted in more than 175,000 power outages in the region, the 2nd most power outages due to weather in Vermont.<sup>22</sup> The damage assessment for Windsor County was estimated to be over \$200,000 and impacted the northwest corner of the county.

A brief review of [NOAA's database](#) for Winter Storm events for Windsor County suggests that a snowfall of over 10 inches is likely to occur two to three times in a winter/early spring season. Snowfalls of over 24 inches have occurred at least once most winters but typically just in higher terrains and less often in Chester. Reports of ice accumulation of 1/10<sup>th</sup> inch or more are common over the course of a winter season.

Over the past five years the NOAA has recorded 23 Winter Storm events for Windsor County, an average of four per year with most impactful events occurring in the month of March. **Table 10** below is a sampling of historical winter storm events and the extent of their impact.

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<sup>22</sup> 2018 Vermont State Hazard Mitigation Plan

**TABLE 10: Notable Winter Storm Events in Windsor County, Jan/2016 – Jan/2021<sup>23</sup>**

Occurrence Date	Estimated Property Damage	Event Description
11/29/2016	\$25,000	Ice accumulation less than one tenth of an inch. Numerous vehicle accidents from icy roads. Accident between a vehicle and a tractor-trailer resulted in a fatality.
3/14/2017	\$20,000	Snowfall totals across Windsor County generally ranged from 12 to 24 inches.
3/31/2017	\$25,000	Widespread 8 to 16 inches of a heavy, wet snow across the region. Scattered power outages from the snow loading on trees and power lines.
4/1/2017	\$25,000	Widespread 8 to 16 inches of a heavy, wet snow fell across the region with scattered power outages from snow loading on trees and power lines.
12/12/2017	\$20,000	A widespread 8 to 16 inches of snow fell across the region.
3/7/2018	\$40,000	A long duration snow event dropped 12 to 26 inches across the region, with highest totals along the southern Green mountains. Scattered to numerous power outages occurred in areas of the heaviest snow fall.
3/13/2018	\$20,000	Long duration snowfall event eventually delivered 10 to 20 inches across the region. Some isolated to scattered power outages were reported.
11/26/2018	\$250,000	Light rain changed to a pasty, heavy wet snow that resulted in downed tree limbs and power outages. across VT. Snow accumulated 3 to 6 inches in the valleys but quickly rose to 12 to 20 inches above 1000 feet.
1/19/2019	\$20,000	A widespread snowfall of 10 to 18 inches occurred across the region.
3/22/2019	\$15,000	A heavy wet snow fell across the region with snowfall totals of 8 to 12 inches and higher totals in the higher elevations.
3/23/2020	\$5,000	A period of heavy snow with 2-3 inches per hour rates moved through during the evening hours with storm total snowfall of 7-10 inches. Minor, isolated power outages.
12/16/2020	\$ 20,000	Record snowfall described below
1/16/2021	\$50,000	A heavy, wet snow fell across the region with totals ranging from 3 to 5 inches in the valleys to 18 inches in the higher terrain. Numerous power outages reported.



**Valley News, December 17, 2020**

totals of 41 inches. The National Weather Service is investigating a snowfall report for this event of 44.8

Local snow totals can vary tremendously. A recent snowfall event in December 2020 recorded snow rates of 4+ inches per hour for 6 to 8 hours across much of Windsor County. Storm total snowfall ranged from 8-12 inches in the north to 30-40 inches in the southeast upslope hilly terrain. Local reports for the December snowfall event had neighboring towns of Springfield and Ludlow the hardest hit with recorded

<sup>23</sup> [NOAA, National Centers for Environmental Information](#)

inches in Peru, VT, which, if verified, will become Vermont's highest 24-hour snowfall on record. The current state record stands at 42 inches from 1995 in Jay Peak.<sup>24</sup>

Below are historical data for snow and temperatures for the neighboring Town of Springfield obtained from U.S. Climate Data from 2008 to current.<sup>25</sup> Selected temperature data for the month of January, which is typically the coldest winter month in Vermont, is shown along with seasonal snowfalls. It can be seen that temperature trends reflect a general winter warming with the average low temperature during the month of January above the normal average low of 7°F for eight of the last eleven years. It is also worth noting that the area is seeing a greater range in temperature extremes which make for more hazardous conditions for flooding and icing. In the current year, 75-degree swings in winter temperatures ranged from -20.9 to 53.1°F in January and -2.9 to 72.1°F in February.

**TABLE 11: Winter Temperatures & Snowfall for Neighboring Springfield**

	January Low Temperature °F		Snow Fall (inches)				
	<u>Lowest</u>	<u>Avg Low</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Total</u>
<b>2008</b>	-11	10.8	0	17	32	9	58
<b>2009</b>	-18	-0.8	28	30	12	5	75
<b>2010</b>	-4	11	19	9	23	0	51
<b>2011</b>	-20.9	7.4	14	35	30	5	84
<b>2012</b>	-11.9	14.1	0	9	2	13	25
<b>2013</b>	0	8.6	18	11	19	12	59
<b>2014</b>	-18	5.4	20	11	27	10	68
<b>2015</b>	-13	1.2	7	15	31	2	55
<b>2016</b>	0	15	5	4	6	10	25
<b>2017</b>	-5	19.2	23	7	26	13	69
<b>2018</b>	-20.9	8.6	0	13	23	25	61
<b>2019</b>	-20.0	10.0	0	24	12	7	43

<sup>24</sup> <https://snowbrains.com/peru-vermont-record-snowfall/> (December 21, 2020)

<sup>25</sup> [US Climate Data](#), accessed May 2021



There is no specific region in Vermont that is more vulnerable to ice storms, according to the 2018 Vermont State Hazard Mitigation Plan. The state plan identifies accumulations for ice storms in December 2008 and January 1998 of 1/2-3/4" of ice plus 1-2" of sleet and 3" of ice, respectively. Local data for ice storms is not available. "There are no standard loss estimation models or methodologies for the winter storm hazards. Potential losses from winter storms are, in most cases, indirect and therefore difficult to quantify. " <sup>26</sup>

### **Heavy Snow and Ice: Trends and Vulnerability**

"According to the 2014 National Climate Assessment, there is an observable increase in severity of winter storm frequency and intensity since 1950. While the frequency of heavy snowstorms has increased over the past century, there has been an observed decline since 2000 and an overall decline in total seasonal snowfall. " <sup>27</sup>

Statewide, damage from winter storms can vary depending upon wind speeds, snow or ice accumulation, storm duration, tree cover and structural conditions such as heavy snow and ice accumulation on roof tops, barns or aged structures in deteriorating condition. A roof may collapse with little or no warning, and one common misconception is that only flat roofs are susceptible to collapse. Residents can expect at least 60 pounds of weight per square foot on their infrastructure during winter months. Older residents need to be vigilant when clearing snow from walkways and driveways.



Vermont communities are well prepared to handle heavy snowfall. However, it is typically the secondary hazards that are most concerning to the town. Depending on the event, particularly with heavy, wet snow or ice, electricity may be down for a few hours or days due to downed powerlines from falling trees. This is a time when residents are most vulnerable to structure fire hazard or carbon monoxide poisoning. Many residents heat their homes with open flame heating sources including fireplace, wood or pellet stoves, and will supplement with electric or kerosene space heaters. Extended periods of extreme cold or loss of power during the winter months require continued vigilance on the safety of heating to reduce the risk of a structure fire as a secondary hazard.

Green Mountain Power, the utility company that currently serves Chester, follows a regular tree-trimming schedule in coordination with the Tree Warden. Town officials believe this to be satisfactory to mitigate damages and power outages caused by downed trees and tree limbs during events. However, with major state thoroughfares, Rt. 11 and Rt. 103, also serving as local emergency access roads in Chester, keeping surfaces clear of snow and ice is critical to the safety of residents.

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<sup>26</sup> 2018 Vermont State Hazard Mitigation Plan

<sup>27</sup> 2018 Vermont State Hazard Mitigation Plan

Extreme weather conditions, such as moisture, snow, and rain can also lower the distribution of cellular signals from a cell tower to the receiving device such as a smartphone whether you are outdoors or indoors. Reliability of these communications for reporting an emergency can be compromised during extreme winter weather events. This can become a greater concern as there is a trend to eliminate home landlines to save utility costs is growing.

## 5.2e. High Wind

Probability of Occurrence:	4.0
Average Hazard Impact:	1.50
Hazard Assessment Score:	6.0

**High Winds** can be generated from a thunderstorm, hurricane or tropical depression, a localized microburst, Nor'easter, or simply just a wind storm. Any of these events can produce wind gusts up to 50 mph or greater causing property damage and disruption in electric and telecommunication utilities, transportation, and commercial businesses. Although difficult to predict, these events also pose a high risk of injuries and loss of life but tend to be localized.

**Severe thunderstorms** are a relatively common hazard in Vermont, particularly in the spring and summer months. Although typically short in duration, they are capable of producing damaging winds, heavy rain and flooding, dangerous lightning and large hail. Multicell cluster thunderstorms are likely to cause local flash flooding. It is the winds from these storms have most impacted the town.

The downward draft from these storms can produce **microbursts** which are not uncommon in Vermont. These events can come with wind speeds in excess of 80 mph, and pose an additional threat to low flying aircraft, making it difficult for them to maintain altitude. Although less common in Vermont, **super cell thunderstorms** are the largest, longest lasting, and most devastating thunderstorms, which can produce **tornadoes** and widespread destruction of crops and property. **Tropical storms, hurricanes, nor'easters, and winter storms** can also cause high wind damage throughout the state.

The **Beaufort Wind Scale** shown below can be used to predict damage based upon wind speeds. The National Weather Service will issue Wind Advisories when sustained winds of 31-39 mph are reached for at least one hour or gust between 46-57 mph and High Wind Warnings for winds of 58 mph or higher. Thunderstorm winds tend to affect areas of Vermont with significant tree stands as well as areas with exposed property and infrastructure and aboveground utilities.<sup>28</sup>

**Power Failure** is a common secondary hazard caused by high winds and occurs frequently within Windsor County. Power outages are most often isolated but can occur on a town-wide scale and are typically the result of power lines damaged by high winds, heavy snow or ice storms, but may also result from disruptions in the New England or national power grid as occurred in the Northeast Blackout of 2003. Dead or dying trees in proximity to power lines pose a particular threat for power failure, as these

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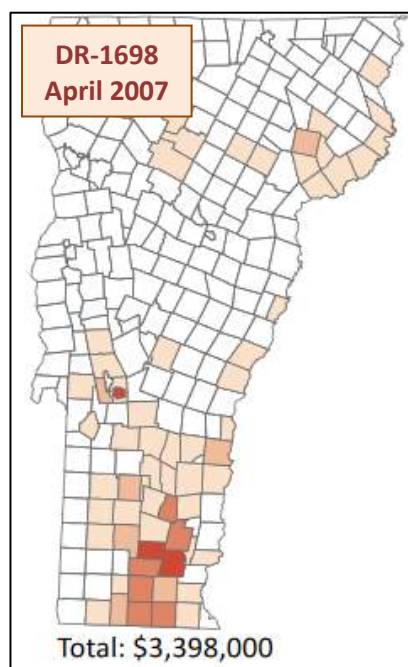
<sup>28</sup> 2018 State of Vermont Hazard Mitigation Plan

trees are often brought down by triggering events such as high winds during a thunderstorm or a Nor'easter.

Beaufort Wind Scale		
Classification #	Wind Speed	Land Conditions
6	25 to 31 mph	Large branches in motion; whistling in telephone wires
7	32 to 38 mph	Whole trees in motion; inconvenience felt walking against wind
8 to 9	39 to 54 mph	Branches can break off trees; wind generally impedes progress; slate blows off roof; slight structural damage
10 to 11	55 to 72 mph	Damage to chimneys and TV antennas; trees broken or uprooted; considerable widespread structural damage
12 to 13	73 to 112 mph Hurricane	Peels surfaces off roofs; windows broken; mobile homes overturned; moving cars pushed off road; devastation
		Roofs torn off homes; cars lifted off ground; widespread

\*For the purposes of the Hazard Mitigation Plan, the scale is only shown above wind force 5; Data from NOAA

### High Wind: History and Extent of Impact



Since 2000, there have been six (6) Federal Disaster Declarations for high wind events in Vermont, excluding those related to Tropical Storm Irene and Hurricane Sandy. One example of the extent of a **high wind** event in Vermont was the Nor'easter of April 2007 that resulted in a Federal Disaster Declaration, DR-1698. "High winds during this April storm resulted in many trees down and damage to some private homes and public infrastructure, primarily in Southern Vermont."<sup>29</sup> Total Public Assistance for this event was \$3,398,000 with the costliest damages in neighboring Windham County.

Since 2000, [NOAA National Centers for Environmental Information's Storm Events Database](#) recorded 30 High/Strong Wind events and 103 Thunderstorm Wind events that impacted Windsor County causing tree damage and power outages. Three of the strong wind events were the result of Tropical Storm Irene in August 2011, Hurricane Sandy in October 2012 and remnants of Tropical Storm Isaias in August 2020. Most of the thunderstorm wind events recorded sustained winds of 40-

45 mph with damaging wind gusts of 50-65 mph and isolated damage. Other High Wind events are more wide spread causing power outages up to 25,000 countywide. The majority of wind reported damage is due to **thunderstorm** activity from June through September and winter storms with **heavy snow** and **ice**.

<sup>29</sup> 2018 State of Vermont Hazard Mitigation Plan



Reports of damage due to downed trees in Windsor County are common when wind gusts begin to exceed 40 mph. Damage is typically localized in the form of downed trees and powerlines and isolated structural damage to buildings and vehicles. The most damaging local incident in recent history occurred in July 2003. A strong storm with heavy rain, lightening and severe winds ravaged the Town of Cavendish and portions of Chester.

**July 21, 2003:** Classified as a tornado, the storm destroyed one mobile home (while occupied), blew apart several outbuildings, damaged several other homes in Cavendish, VT.

**Winds: > 100mph**

**Damage: \$100,000 (estimated)**

“A path of tree damage approximately 3 to 4 miles long was about 1/4 mile wide at the beginning impact point and about 3/4 mile wide at the end of the damage path. An estimated 500 to 700 trees were destroyed. Pine trees were snapped while hard wood trees were uprooted. Power lines were blown down with a number of residents without power. The actual thunderstorm winds were reported to have lasted 30 seconds or less. In the town of Chester, a number of trees were uprooted with some structural damage.”<sup>31</sup>

### High Wind: Trends and Vulnerability

Thunderstorms and associated hazards can occur anywhere in Vermont at any time of the year; however, spring and summer are the most common times for severe thunderstorms.<sup>30</sup>

The frequency of high wind events has increased. It is anticipated that extreme weather conditions, due to climate change, will continue to impact the community in the form of high winds in Windsor County during the Chester 2021-2026 Plan cycle. This is supported by the NOAA data which shows that of the 103 reported Thunderstorm Wind events since 2000, 66 have occurred over the past 10 years.

Power failures often have only minimal impact to people and property; however, longer duration events may result in major disruptions and business losses. Outages in Chester typically last only a few hours but can last for days if the outage is regional. Potential loss estimates are difficult to predict as they are typically isolated in geographic area and short in duration. Power outages in winter months may result in the loss of home heating, ruptured water pipes, and the resulting structural damage. The loss of home heating may be a contributing factor to the increase in structure fires during the winter months. Local data on historical occurrences, extent of outage and associated costs are not available.

Town assets are located in developed downtown areas with less trees and are not particularly vulnerable to this hazard. The expected magnitude for future high wind events will fall between around 40 and 50 mph, or Beaufort scale number 8-9, and will likely result in downed trees, power lines, and small damage. However, the possibility does remain for larger high wind events such as the 1998 F3

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<sup>30</sup> 2018 State of Vermont Hazard Mitigation Plan

tornado on the Enhanced Fujita Scale and localized microbursts. In 2018, a localized microburst occurred in the Town of Windham near Magic Mountain leaving a swath of damaged trees, either downed or with the crowns sheared off, and home damage.

Heavily tree-lined roads, such as Reservoir Road in Chester, can experience frequent outages. Clearing overhanging, leaning, and dying trees near power lines is part of annual town-wide maintenance to minimize impact from high winds. Green Mountain Power has worked well with Chester in managing and removing trees that threaten lines utility lines.

## 5.2F. Extreme Heat

Probability of Occurrence:	4.0
Average Hazard Impact:	1.50
Hazard Assessment Score:	6.0

## Drought

Probability of Occurrence:	3.0
Average Hazard Impact:	1.50
Hazard Assessment Score:	4.5

**Extreme Heat** and prolonged hot weather and resulting **Drought** have not been of concern to Vermonters, historically. Only recently have these potential hazards captured the concern of Windsor County communities. They are profiled here for the first time in Chester’s hazard mitigation planning. The probability of occurrence scored relatively high with a low hazard impact on life, infrastructure and the environment.

**Extremely high temperatures** can occur when a high-pressure system (under which air is descending toward the Earth’s surface) develops and intensifies. Under such conditions, the potential for a heat wave exists. A heat wave is a period of three or more consecutive days during which the maximum temperature meets or exceeds 90°F. Extreme hot temperatures can have significant effects on human health and commercial and agricultural businesses, as well as primary and secondary effects on infrastructure. Prolonged periods of above normal temperatures along with increases in average annual temperature, also have direct and indirect effects on other hazards such as drought, wildfire, invasive species, and infectious disease.<sup>31</sup>

What is considered “extreme heat” can vary around the world and across the country. Populations in warmer climates are more accustomed to higher temperatures and have acclimated to withstand higher temperature thresholds and developed ways to cope with heat and humidity as a way of life.

The Heat Index is a measure of how hot it actually feels when relative humidity is considered in with the actual air temperature. For example, if the air temperature is 88°F and the relative humidity is 70%, it will feel like 100°F. The National Weather Service heat related advisories are shown below.

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<sup>31</sup> 2018 State of Vermont Hazard Mitigation Plan

National Weather Service Heat Advisories		
Classification	Advisory	Expected Conditions
Excessive Heat Outlook	Warning	A period of excessive heat is possible within next 3 to 5 days.
Heat Advisory	Take Action	The combination of hot temperatures and high humidity will create a situation in which heat related illnesses are possible. Heat Advisories are issued when heat indices are expected to reach at least 95°F.
Excessive Heat Watch	Warning	A prolonged period of dangerous excessive heat is possible within about 48 hrs.
Excessive Heat Warning	Take Action	A prolonged period of dangerous excessive heat is expected within about 24 hours. The combination of hot temperatures and high humidity will create a situation in which heat related illnesses are possible. Excessive Heat Warnings are issued when heat indices are expected to reach at least 105°F.

**Drought** can be defined as a shortage of water relative to need. Is a complex hazard in that it develops slowly during extended periods of low or no precipitation combined with extreme heat and high winds. It is typically widespread and can linger after normal precipitation returns. Although the surface waters may appear to have recovered from a period of drought following a return to normal precipitation, replenishing groundwater levels is a longer process.

The severity of a drought depends on the duration and extent of the water shortage, as well as the demands on the area's water supply. Drought classification categories range from 'D0' for abnormally dry conditions to 'D4' for widespread crop devastation and water emergencies. Vermont has experienced D2 drought conditions characterized by likely crop and pasture losses, common water shortages and imposed water restrictions.

Extended periods of drought during a Vermont growing season can be devastating for state agriculture and can result in loss of potable water when wells run dry. Drought conditions are also favorable for wildfires while small town fire departments that rely on river water will have limited capacity for fighting fires.

### Extreme Heat and Drought: History and Extent of Impact

The following notable **historic heat events** were gleaned from the Vermont Hazard Mitigation Plan:

- Between 2000 and 2017, the number of recorded days per year with a daily temperature high greater than or equal to 85°F peaked during the 2016 summer at 45 days, closely followed by the summer of 2015 at 41 days in Burlington.
- August 2006, temperatures rose into the 90s but significantly more important were dewpoints that reached the middle to upper 70s to produce excessive heat index values of 100°F to 105°F, some of the highest values in nearly a decade.
- In July 2011, during a 4-day heat wave, temperatures across southern Vermont warmed into 90s. With dew points in the 70s combined with the hot temperatures, heat indices reached 104°F. Heat

index values reached 100°F to 108°F across the Champlain and Connecticut valleys as well as some interior valleys. One death is attributed to this event in Windsor County.

A review of summer temperature data over the past 10 years (2010 to 2019) for the Town of Springfield, which lies directly east of Chester, suggests no identifiable warming trend between 2010 and 2019. In July and August, average high temperatures varied from 79 to 86°F with highest maximum summer temperatures ranging from 90 to 98°F. Three to five consecutive days of >90°F occurred in 2011, 2013, 2015 and 2019. In 2018, there were six consecutive days of >90°F in July and three in August.

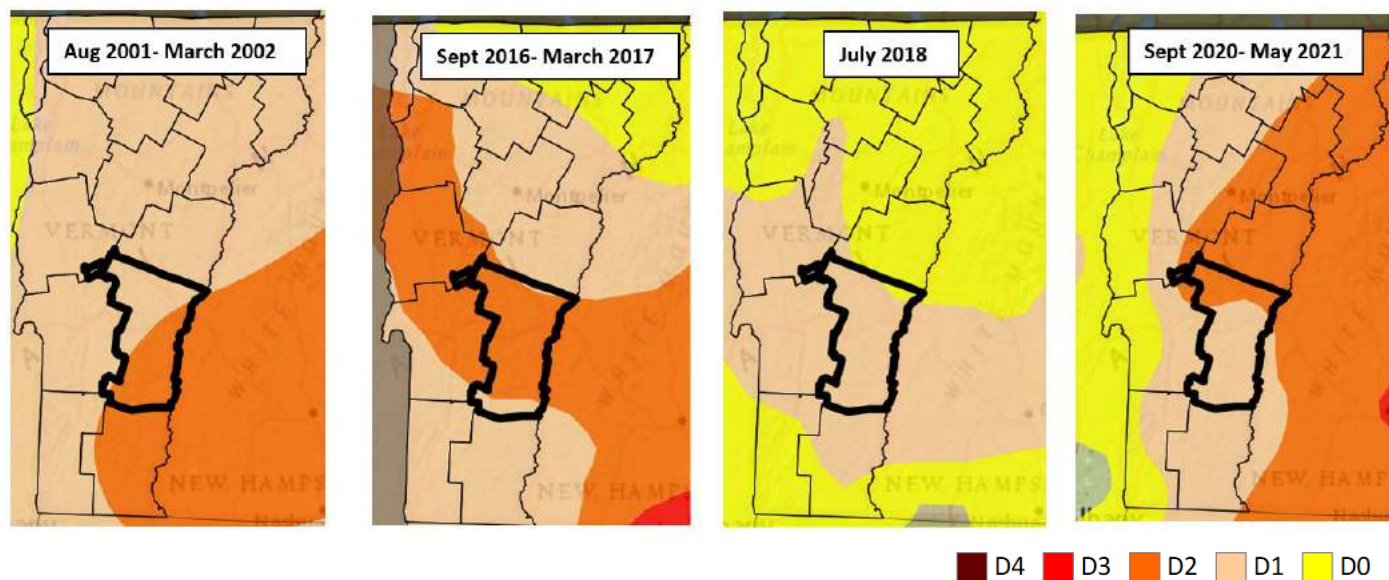
For Windsor County, in the summer of 2018, high temperatures in the upper 80s to upper 90s with dewpoints in the 60s and 70s created dangerous heat indices in the 95-to-110-degree range between June 30th and July 5th. A substantial increase in hospitalizations occurred due to the excessive heat and duration and at least 3 deaths were contributed to the heat. Burlington VT witnessed the warmest 5- and 6-day consecutive stretch since records have been kept in 1892. Also, the ALL-TIME warmest minimum daily temperature was recorded on July 2nd of 80°F, breaking the old record of 78°F.

The 2nd longest heatwave in modern history (1900-onward) occurred across portions of NY and VT in 2020 from June 18th through June 23rd. Temperatures exceeded 90°F for up to 6 consecutive days in portions of the Champlain and Connecticut River valleys. Daily High temperature records were set at Burlington on June 22nd and June 23rd with high temperatures of 96°F for both days.

Vermont droughts are infrequent as precipitation in the northeast is fairly reliable. According to the State plan, there were two declared statewide droughts in the summer of 1995 resulting in water usage restrictions and loss of crops in some areas. A third, more severe drought affected Southern Vermont late summer of that year.

**Figure 6** together with **Figure 7**, show regional and statewide historical occurrences since 2000 and level of drought as a percent of the State affected. Since 2000, there have been four distinct periods of Severe to Moderate Drought in Vermont. In 2001-2002, drought which began in early winter and continued through July impacting nearly 100% of the state in at least Moderate Drought (D1). In 2016-2017, a Severe Drought (D2) from October through April, affected 29% of the State with 80% in at least Moderate Drought (D1). As of the writing of this plan, Moderate Drought (D1) which began in September 2020 continues through May 2021 but has ended by July 2021. Windsor County was affected by all of these recent droughts as shown in **Figure 6** below.

**FIGURE 6: Extent of Historical Drought in Windsor County (2000 – 2020)**



### Extreme Heat and Drought: Trends and Vulnerability

Heat-related events are, historically, less likely to occur compared to other areas of the country. However, taking a more regional view, they are beginning to occur in much greater frequency. Both state annual minimum and maximum averages show a steady increase from 1960 (**Figure 8**<sup>32</sup>), with a greater rise in the minimum average rate, or winter temperatures. The **Northeast region warmed** more than any other **region** in the lower-48 over the last five decades, according to data from NOAA, and is projected to warm at a rate 50% greater than the global rate by some analysis.<sup>33</sup>

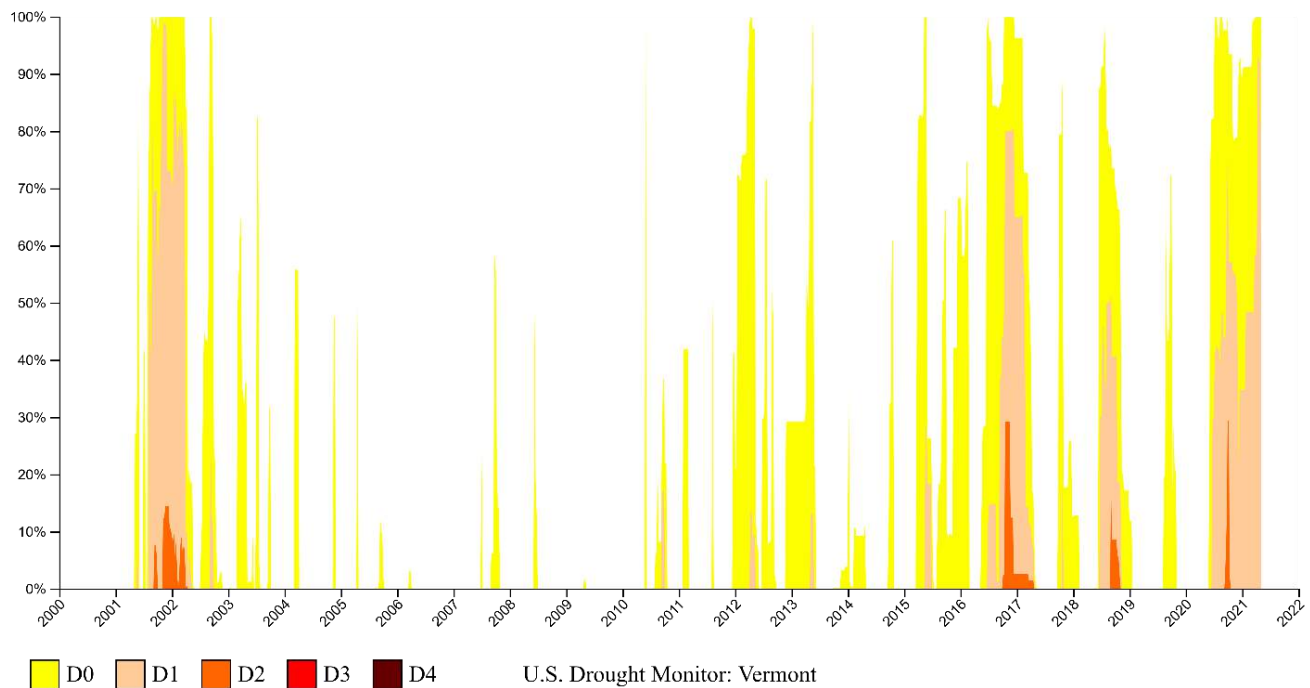
The primary impact of extreme heat or prolonged periods of hot weather is to human life, especially when combined with high humidity. Exposure to hot conditions can lead to heat exhaustion or heat stroke which require medical attention and can be fatal. Older adults, children and people with chronic medical conditions, such as asthma, are at greater risk for serious heat-related illnesses. Studies by the Vermont Department of Health suggest that the heat threshold in which hospitals in the State see a rise in heat-related emergency room visits is 87°F.<sup>34</sup>

<sup>32</sup> 2018 State of Vermont Hazard Mitigation Plan

<sup>33</sup> <https://www.usgs.gov/center-news/northeast-warming-faster-rest-us>

<sup>34</sup> 2018 State of Vermont Hazard Mitigation Plan

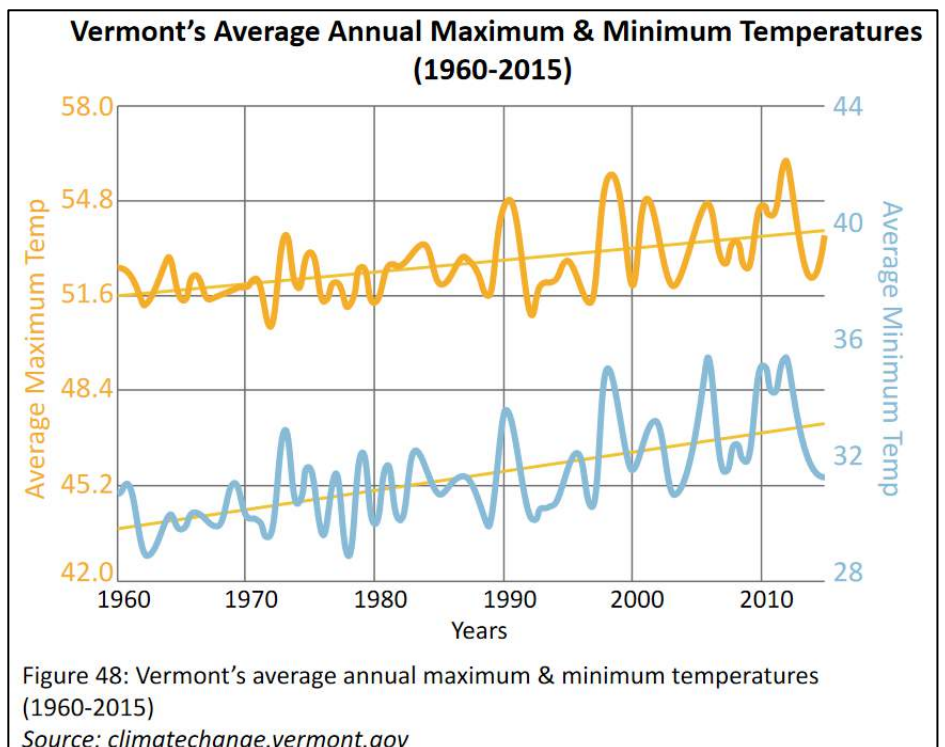
**FIGURE 7: Vermont Drought Monitor (accessed 6-9-2021)**



Warmer conditions also favor insect populations that cause Lyme, West Nile and Eastern equine encephalitis and other vector-borne diseases which have become more prevalent earlier in the spring and later in the fall. Much of Vermont recreational and agricultural economies rely on outdoor activities and are at greater risk of tick and mosquito borne illnesses.

Some types of cyanobacteria proliferate in warmer waters and can release natural toxins into the water. Swimming or wading in these waters can cause minor rashes and stomach problems or

**FIGURE 8: Vermont Average Annual Temperature Trends (1960-2015)**





more serious health problems. Children and pets are at higher risk of exposure because they are more likely to play and drink water while swimming.

Periods of drought for Vermont and Windsor County are also expected to occur with more frequency as can be surmised from the timeline above in **Figure 7** obtained from NOAA's National Integrated Drought Information Systems (NIDIS) at [drought.gov](https://drought.gov).

Critical Vermont economic sectors such as logging, farming, maple sugaring and dairy farming can be disrupted by impacts from a warming climate. Chester has experienced only isolated issues with extreme heat and drought but specific data is not available. The Town anticipates this trend continuing and has included these hazards for the first time in their local Hazard Mitigation Plan. Effort will be made to better monitor local incidents of extreme heat and drought.

## 6. MITIGATION PROGRAM

The following sections detail the mitigation goals and potential mitigation strategies identified by the Town and compiled and organized by the Hazard Mitigation Committee to reduce the impact of the hazards assessed in this plan. The implementation schedule that follows in **Table 12: 2021-2026 Mitigation/Preparedness Strategies and Actions** is a comprehensive list of actions that the town has targeted for implementation during the five-year cycle of this plan.

### 6.1. Mitigation Goals and Objectives

Following the Hazard Analysis and Hazard Profile and review process as described in **Section 4**, the Hazard Mitigation Committee then agreed upon the following overarching goals and associated objectives below. Note that the numbers do not indicate goal priority but are used to identify actions that support it.

#### Hazard Mitigation Goals and Objectives

1. Provide protection and Reduce Risk to the community from the Impact of Hazard Events.
  - a. Reduce the risk of potential loss of life, injuries, negative health impact, and property damage.
  - b. Maintain and enhance Emergencies Operation Plan.
  - c. Minimize financial losses due to hazard events incurred by the community including residents and business owners.
  - d. Improve resiliency of our built and natural environment including public infrastructure, and recreational, cultural and historic assets.
  - e. Protect, restore and enhance local natural resources to promote healthy, resilient ecosystems.
2. Raise community awareness of the Hazard Risks, Resiliency Resources and Mitigation Planning.
  - a. Encourage hazard mitigation planning to be incorporated into other municipal and community planning effortss.

- b. Review progress on implementation of the hazard mitigation plan during publicly noticed meetings (Selectboard, Planning Commission).
  - c. Improve and enhance efforts to increase public knowledge of hazards and resources.
- 3. Improve effectiveness of future Hazard Mitigation Planning efforts.
  - a. Develop a process for tracking plan implementation over the plan period and incorporate phased planning for large or complex projects.
  - b. Be proactive in seeking funding opportunities for hazard mitigation projects.
  - c. Improve local engagement in reporting vulnerabilities and hazard events.

## 6.2. Hazard Mitigation/Preparedness Strategies and Actions

Throughout the planning process, efforts were made to identify actions that would address the town's vulnerabilities and achieve the goals and objectives outlined above.

These mitigation actions have been chosen by the committee as the most effective and feasible actions to be taken during this plan period to lessen the impacts of the hazards identified in **Section 5**. Some of the actions from the previous plan have been carried-over or modified either because they have been expanded or because of their on-going cyclical nature. Compared to the previous Hazard Mitigation Plan, below are changes in the selection of hazards addressed and changes in the approach on formulating goals and actions:

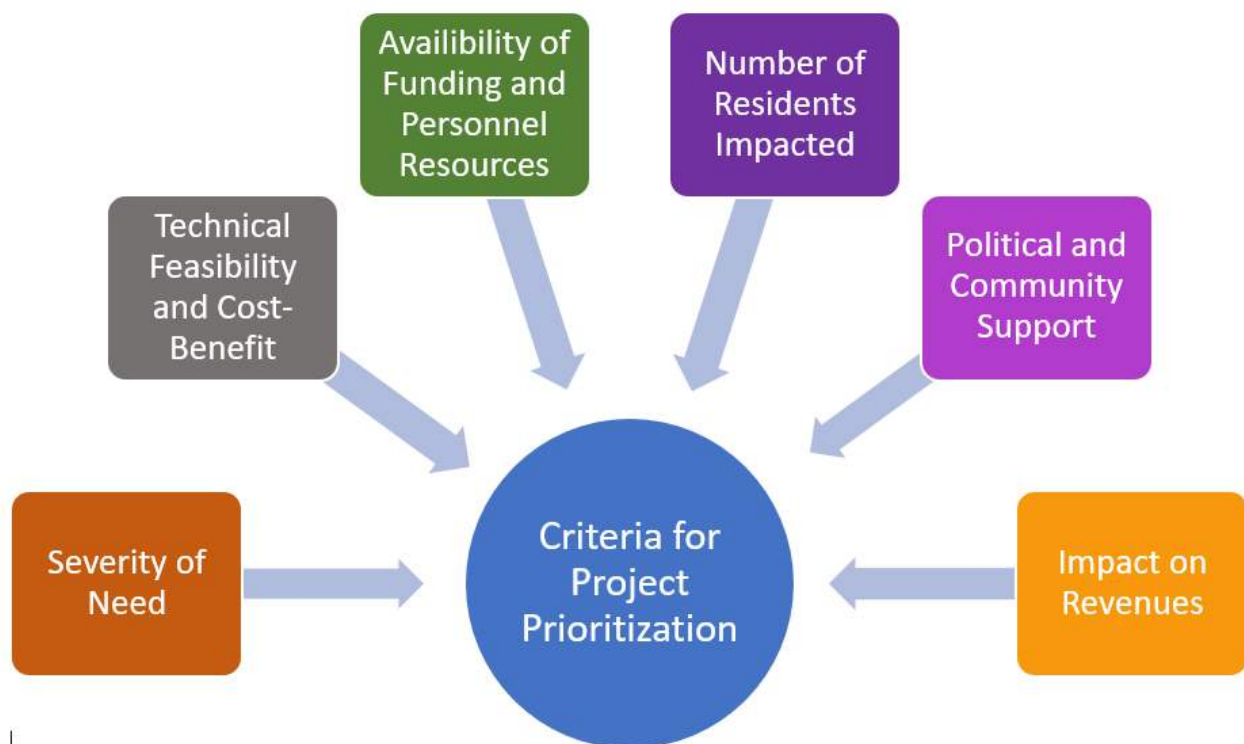
### 6.2a Changes from Prior Plan

- The Town's **method of hazard assessment** was modified to resemble that used by the State. The hazard impact assessment was expanded to differentiate between the probability of a weather hazard event and the probability of the hazard impact which can be common to other weather events. Community impact was broken-down into four categories (life, economy, infrastructure and environment) and assessed individually.
- **Flood, Erosion, Wildfire and Structure Fire** were again assessed as high priority hazards but with an expanded number of flood and erosion related strategies and actions than in previous years to incorporate recommendations from the Flood Resiliency section of the Town Plan, new stormwater, road erosion and river corridor reports and plans.
- **Heavy Snow and Ice** have risen in priority compared to the prior plan and **High Wind, Extreme Heat and Drought** are profiled for the first time as new hazards to be addressed. This is, in part, a result of the way these hazards are now scored, but there is also greater concern about the higher probability of occurrence of these hazards given recent and trending climate extremes in wind, temperature and precipitation events.
- Identifying **Extreme Heat** as a notable hazard is, in part, due to the growth in number of residents over 65 years of age who are most vulnerable.



- **Infectious Disease** and **Invasive Species** are new hazards to be recognized in the assessment exercises with recent experiences from the COVID Pandemic and tree infestations. Action items have been identified for these hazards.
- **More local hazard data** has been obtained and presented.
- Changes were made with the development of **specific mitigation goals and objectives** and in **methodology for prioritizing actions** to be sure they address these goals to improve plan effectiveness.
- A formalized process for **plan monitoring** was developed to improve plan effectiveness and effort was made to better **correlate mitigation actions** to the Town Plan goals and recommendations.
- Recognizing the **high percent of seasonal residents** and new influx of people that have settled either as second home owners or as permanent residents over the course of the pandemic, this plan will focus on enhancing efforts to reach this population through **targeted outreach** to raise awareness.

## 6.2b Prioritization of Strategies and Actions



For this update, the Committee selected a method for prioritization of strategies and actions based on three categories – High, Moderate, and Low compared to a more ad-hoc basis in the prior plan. It was decided that this methodology would improve overall progress on implementation with a focus on higher priority actions. Compared to a specific scoring process, this methodology for prioritization offers the following benefits:

- Provides needed flexibility as priorities can change over time.
- Allows the Town to take advantage of all funding opportunities as they arise.
- Implies that several actions can progress simultaneously.
- Works well for larger or complex phased projects.
- Encourages the Town to keep all proposed actions in mind.

To assign action priority, a number of criteria were taken together, in addition to the Hazard Analysis Score in Section 5.1, but weighted subjectively. These criteria are depicted above and listed below.

As an example, a “High” priority action would typically score higher in the Hazard Analysis and have greater weight for the first two criteria listed below than those with a “Moderate” priority.

- Severity or immediacy of need. This subjective assessment would consider the potential extent of risk in terms of structural damage repair costs, level of safety risk to residents, and probability of occurrence.
- Number of residents impacted that would benefit from mitigation.
- Availability of funding and personnel resources to implement the project. Availability of town, state or federal funds, and availability of town personnel and MARC staff.
- Strong community support and little or no political opposition or reduction in revenue.
- Project feasibility and cost-benefit. Note that Chester is a small town and does not currently have the capacity to determine the cost/benefit of each proposed action. However, prior to pursuing any mitigation project, the Town would consider the costs and benefits of the project using FEMA methodology.

**TABLE 12: 2021-2026 Mitigation/Preparedness Strategies and Actions**

High Priority
Moderate Priority
Low Priority

MITIGATION ACTION OR STRATEGY (**Indicates Action is from Prior Plan)	TYPE <sup>1</sup>	HAZARD ADDRESSED	RESPONSIBLE PARTY <sup>2</sup>	TIME FRAME	FUNDING SOURCE <sup>3</sup>
**Complete construction and opening of <b>New Emergency Services Facility</b> and use the opportunity for public outreach.	P, M	All	Selectboard, Emergency Management, <b>Town Administration</b> , Fire/Rescue	2021-2022	TCB ARPA
**Attend <b>training on floodplain management</b> and flood regulation administration.	P	Flood, Erosion	<b>Zoning Administrator</b> , Town Administration, Planning Commission	2022-2024	TOB
**Provide FEMA and other <b>flood mitigation guide materials</b> digitally on website and through link on Facebook.	P, M	All	<b>HMC</b> , MARC	2021-2022	TOB
Provide information on <b>Village Center designation benefits</b> ; ie: building owners eligible for tax credits for code improvements	P, M	Flood, Structure Fire	<b>Zoning Administrator</b> , Town Administration	Ongoing	TOB
<b>Address risk to infrastructure and public and private property from Emerald Ash Borer</b>  <b>Phase I:</b> Form a project committee and conduct inventory assessment of ash trees in the municipal ROW for emerald ash borer and provide public outreach to community on emerald ash borer information and mitigation.  <b>Phase II:</b> Determine risk to Town infrastructure and develop a plan to address these risks.	M	Invasive Species, High Wind	Highway Dept, <b>Tree Warden</b>	Phase I: 2021-2022  Phase II: 2022-2025	CP, Other

<p><b>**Complete erosion and flood mitigation efforts on vulnerable stretch of Rt. 35 along the South Branch</b> that is susceptible to further deteriorate due to streambank erosion and stormwater during heavy rain and high flows.</p> <p><b>Phase I:</b> Complete repairs of highly eroded section</p> <p><b>Phase II:</b> Complete engineering study/design for flood and erosion resiliency on remainder of road.</p> <p><b>Phase III:</b> Implement recommended upgrades to remainder of road.</p>	M	Flood, Erosion	Town Administration, Highway Department, Selectboard Advanced Ass FEMA Geotech for rest of rt 35.	<p>Phase I: 2021-2022</p> <p>Phase II: 2022-2023</p> <p>Phase III: 2023-2026</p>	TCB, VTrans, ANR, FEMA
<b>**Complete engineering study to assess vulnerability of Waste Water Treatment Facility and stabilization of the Williams River riverbank to reduce vulnerability of the facility to flooding.</b>	M.	Flood, Erosion	Town Administration Highway Department	2021	Funded
Continue work on <b>stabilizing stream banks along Smokeshire Rd.</b> to reduce vulnerability of infrastructure to flood and erosion.	M	Flood, Erosion	Town Administration, Highway Department, Selectboard	2022-2024	TCB, ANR, VTrans
Identify opportunities to <b>enhance public outreach</b> and awareness of hazards, in light of recent climate trends identified in this plan, including extreme heat and drought, particularly for vulnerable populations.	M	All	HMC, Emergency Management, Fire/Rescue, MARC	2022-2024	TOB, FEMA/VEM Other
<b>**Continue progress to upgrade all technical level emergency responders</b> to EMT or higher level to provide more capacity for emergency response.	P	All	FD/EMD	Ongoing, Annually, 2021-2026	TOB FEMA/VEM ARPA
Review/reevaluate/enhance <b>Pandemic Standard Operating Guidance</b> (PPE, establish supply/inventory, equipment maintenance, and response) from lessons learned to improve preparedness.	P, M	Infectious Disease Outbreak	Emergency Management, Fire/Recue, Town Administration	2022-2024	TCB, FEMA/VEM ARPA
Address flood risk to <b>Mountain/Flamstead and Marshall Rd. areas</b> as recommended in the Road Erosion Inventory Report:	M	Flood	Town Administration, Highway Department, Selectboard	Phase I: 2022-2024	TCB, FEMA/VEM, ANR,

<p><b>Phase 1:</b> Conduct an engineering study for a stormwater system for the to control stormwater runoff and help stabilize the river bank. This project is consistent with Town Plan policy to strengthen stormwater infiltration practices for new development to improve flood resiliency.</p> <p><b>Phase 2:</b> Implement engineering design</p>				Phase II: 2024-2026	VTrans
Assess drainage issues to reduce flooding on <b>Mineral Springs Rd.</b> which occurs after heavy rain.	M	Flood, Erosion	Town Administration, <b>Highway Department,</b> MARC	2022-2023	TCB, FEMA/VEM, ANR, VTrans
<p>Address flood risk associated with three <b>bridges over the Williams River</b> used for access to private properties along Rt. 103 (Thompson, Jewitt and Palmer). Failure of these bridges may isolate residents and cause debris jams and flooding downstream.</p> <p><b>Phase I:</b> conduct study to determine best options. <b>Phase II:</b> Conduct Engineering Design In progress) <b>Phase III:</b> Implement Project</p>	M	Flood, Erosion	<b>Town Administration,</b> Selectboard, Highway Department	<p>Phase 1: 2021</p> <p>Phase II: 2021-2022</p> <p>Phase III: 2022-2024</p>	TCB, FEMA/VEM, ANR, VTrans
Work with GMP on enhancing <b>tree maintenance</b> to better assess and mitigate the potential impact of heavy snow, ice and wind to protect vulnerable utility infrastructure. Assess and determine need for funding upgrades.	M	High Wind, Ice, Heavy Snow	Town Administration, <b>Highway Dept.</b>	Annually 2021-2026	TCB, FEMA/VEM, ARPA
Allocate enough funding each budget cycle to acquire and maintain an <b>adequate salt/sand inventory</b> beginning early in the fall season in anticipation ice events over the season.	M	Ice	Town Administration, <b>Highway Dept.</b>	Annually (each fall for next year's inventory) 2021-2026	TCB
Develop a list of potential projects for <b>increasing floodplain access</b> as recommended in stream geomorphic and river corridor studies should opportunities arise for conservation easements, berm removal and buffer planting. Increased floodplain access	M	Flood, Erosion	Town Administration, <b>MARC/Environmental</b> Consultant	2024-2026	TOB, CP, Other

upstream will reduce Village flooding and the risk of mass slope failure along the Williams.					
Continue efforts to address overbank flooding on <b>Popple Dungeon Rd.</b> Complete a culvert upgrade near Zezza Rd. as recommended in River Corridor Plan which will reduce overbank flooding and less prone to debris jams.	M	Flood, Erosion	Town Administration, <b>Highway Department</b> , Selectboard	2022-2025	TCB, FEMA/VEM, ANR, VTrans
Make continued progress on <b>Municipal Roads General Permit (MRGP)</b> standards for implementing best management practices on hydrologically-connected road segments.	M	Flood, Erosion	Town Administration, <b>Highway Department</b> , Selectboard, MARC	Annually 2021-2026	TCB, ANR, VTrans
Develop and maintain, a <b>3-year plan</b> to address high priority town roadways that are susceptible to erosion that can be addressed with GIA, BR and other Vermont state funding programs.	M	Erosion	Town Administration, <b>Highway Department</b> , MARC	Establish 2022, Update Annually 2023-2026	TOB
Consider <b>tracking data on requests for filling wells</b> to better anticipate and prepare for water shortage during periods of drought. Consider local warnings and water conservation recommendations based on this data.	M	Drought	Fire/Rescue, <b>Emergency Management</b>	2022-2026	TOB, FEMA/VEM
Continue to <b>promote Chester Emergency Response program</b> resources and link to chesterambulance.org on a periodic basis for public awareness, particularly for new residents and businesses.	P, M	All	<b>Emergency Management</b> , Fire/Rescue	Ongoing 2021-2026	TOB
Explore and consider participation in FEMA's <b>Community Rating System (CRS)</b> - a voluntary incentive program that recognizes and encourages community floodplain management practices and reduces NFIP premiums.  <b>Phase I:</b> Evaluate the benefits (financial and other) of the FEMA CRS program to the community.  <b>Phase II:</b> Determine the feasibility and personnel resources for participation.	M	Flood, Erosion	Town Administration, Selectboard, <b>Zoning Administrator</b> MARC	Phase I: 2021-2022  Phase II: 2022-2023	TOB, FEMA/VEM, ARPA

Update <b>bridge and culvert inventories</b> and maintain a priority list for upgrades and repairs to reduce risk of damage and infrastructure failure from flooding and erosion.	M	Flood, Erosion	Town Administration, <b>Highway Department</b> , MARC	Every 3 yrs. priority list annually, 2021-2026	TOB, TCB, VTrans,
Maintain and enhance <b>seasonal fire safety awareness program</b> for residents, landowners, and rental properties. Explore <b>Firewise</b> and other State fire safety outreach ideas for applicable programs, such as <b>campfire and brush burn safety</b> .	M, P	Wildfire & Structure Fire	<b>Fire/Rescue</b> , Recreation Dept, Chester Schools, Conservation Commission	Annually, 2021-2026	TOB, FEMA/VEM, VDFS
Conduct <b>annual review of Hazard Mitigation Plan</b> progress as noted in Section 6.3 prior to capital budgeting process and recommend incorporating projects selected from this plan, if feasible and funding is available.	M	All	Town Administration, <b>HMC</b> , Selectboard, MARC	Annually, 2021-2026	TOB
Work with MARC to provide a concise and comprehensive list of <b>available funding sources</b> to include a description/examples of eligible project types and application schedules to better coordinate efforts in implementing mitigation projects.	M, P	All	Town Administration <b>MARC</b>	2021-2022	TOB
Work with MARC to encourage hazard mitigation awareness and <b>incorporate mitigation/preparedness actions into other town planning efforts</b> providing specific examples and language to be discussed and considered.	M	All	Selectboard, Planning Commission, Town Administration <b>MARC</b>	During various plan cycles, ongoing	TOB

<sup>1</sup> M – Mitigation, P – Preparedness

<sup>2</sup> Responsible Party: Responsible Party is shown in **Bold** and others listed are support entities

HMC – Hazard Mitigation Committee

MARC- Mount Ascutney Regional Commission

<sup>3</sup> Funding Sources:

**Town Funding**

TOB - Town Operating Budget

TCB – Town Capital Budget

**FEMA and Vermont State Department of Emergency Management (VEM)**

HMA - Hazard Mitigation Assistance Grant Program (VT State Department of Emergency Management)  
HMGP – Hazard Mitigation Grant Program (acquisition, infrastructure, planning, outreach)  
BRIC – Building Resilient Infrastructure and Communities Grant Program  
FMA - FEMA Flood Mitigation Assistance Program  
EMPG – Emergency Management Performance Grant (VT State Department of Emergency Management)  
FPSG – FEMA Fire Prevention & Safety Grant

**Vermont Agency of Natural Resources (ANR)**

ERGP - Ecosystem Restoration Grant Program  
DIBG – Design/Implementation (Clean Water) Block Grant Program  
RCCEG – River Corridor Conservation Easement Grant (ERPG)

**Vermont Agency of Commerce and Community Development (ACCD)**

CDBG – VT ACCD Community Development Block Program  
HPG – Historic Preservation Grant Programs

**Vermont Department of Fire Safety Programs (VDFS)**

**Vermont Transportation Agency (VTrans)**

MRGIA – Municipal Roads Grants-In-Aid Program  
BRGP – Better Roads Grant Program  
THSGP – Town Highway Structures Grant Program  
THC2RP – Town Highway Class 2 Road Program  
MHSMP – Municipal Highway Stormwater Mitigation Program  
TAP – Transportation Alternatives Program

**Conservation Programs (CP)**

VMG – Vermont Watershed Grant  
VLT – Vermont Land Trust  
CRC – Connecticut River Conservancy  
VRC – Vermont River Conservancy



**American Rescue Plan Act (ARPA)** - Coronavirus State and Local Fiscal Recovery Funds & related future funding opportunities

**MARC Brownfields Reuse Program Grants (MBRP)** – EPA Brownfields Grants through MARC

**Vermont Urban & Community Forestry (UCF)**

EABG - Emerald Ash Borer Grant Program

CCFC-Community Caring for Canopy Grants

**Other**

VCF-Vermont Community Foundation

VCC-Vermont Conservation Commission

SGSG- Vermont Natural Resources Council Small Grants for Smart Growth

New England Grass Roots Environmental Fund

## 6.3. Plan Monitoring and Maintenance Process

### Plan Monitoring Process

With the Town Manager as lead responsible party, the Hazard Mitigation Committee will be monitoring this plan as outlined below, to ensure that progress is made and identified mitigation actions are implemented as resources or opportunities become available. The Town will work with its regional partners, including MARC, to identify funding opportunities and for assistance with funding applications.

New to this plan update is an effort to formalize a method for monitoring and evaluating the Town's progress on action items and to improve local hazard data collection and public awareness and participation. The monitoring process has been identified as an action item to be implemented annually (at a minimum) over the plan period and will include a noticed annual meeting of the Hazard Mitigation Committee, to review and track the following:

- progress on **Mitigation/Preparedness Strategies and Actions** listed in **Table 12**;
- changes or improvements in effectiveness of **Community Capabilities and Resources** in **Table 3**;
- updates to local, regional or State hazard data occurrences and extent;
- changes in prioritization of identified hazards;
- consistency with other Town Plan goals, policies, and recommendations, and
- whether stated goals and objectives are being met.

This new method for monitoring plan progress will be implemented gradually over the plan period. Once fully established, it will include an annual review to be conducted by the Hazard Mitigation Committee prior to the Town's annual budgeting process each fall with the completion of **Hazard Mitigation Plan Monitoring Form** in **Appendix E**. Monitoring forms will be completed identifying any progress made for each action and plans for the coming year. Completed forms will become part of this plan and distributed to the appropriate boards and commissions and made available for public viewing on the Town website. Following the review meeting by the Committee, an update on plan progress is to be reported once each year at a scheduled Selectboard meeting which is publicly noticed with an agenda.

For these scheduled public meetings, representatives of the Planning Commission, Emergency Management, Fire and Highway Departments, and interested members of the public will be encouraged to attend. Participants will be asked during these review periods to express their concerns and experiences with natural hazards, identify new vulnerabilities and suggest additional mitigating measures. All public input during the annual plan monitoring process will be noted.

During the monitoring process, the Town will consider and incorporate appropriate hazard mitigation actions from **Table 12** as part of the budgeting process each year and as part of the planning process for updates to the Town Plan, Planning and Zoning Regulations, and Flood Damage Prevention Regulations, as well as for future community development projects, as appropriate. The Hazard Mitigation Committee will also be responsible for ensuring proposed mitigation actions remain in line with current town goals, strategies, and policies.

### Plan Maintenance Process

The Town will reconvene the Hazard Mitigation Committee at the direction of the Town Manager in the latter half of 2024 to kick-off the update process with an initial meeting to discuss grant funding and contracting services for assistance in the planning process. The Town Manager will again reach out to the community for additional volunteers to participate as members of the Hazard Mitigation Committee for the new plan period.

The Town will review the prior plan progress and monitoring forms. The Committee will conduct the planning activities as outlined in the Process Flow Chart (**Appendix C**) and incorporate the plan monitoring information, updated hazard data, town and regional plans, and new relevant reports and studies. All public meetings will be warned following town protocols.

A preliminary draft plan which will be made available for public comment. The plan will be available on the town and regional websites, and hard copies will be available at the town office. A second publicly warned meeting will be held in the 3rd quarter 2025, during which any substantial revisions gathered during the public input period will be discussed. All final edits and revisions will be made and a final draft will be provided to the Hazard Mitigation Committee for final review by end of 2025.

Subsequently, the plan will be sent to Vermont Emergency Management for review, approval and referral to FEMA for Approval Pending Adoption (APA) to be completed in 1<sup>st</sup> quarter 2026. Following the receipt of APA, the Chester Town Selectboard may then adopt the updated Local Hazard Mitigation Plan and forward a copy of the adoption resolution to FEMA to complete the plan approval and adoption process before this plan expires in 2<sup>nd</sup> quarter 2026.

## Appendix A



Current Land Use, Facilities and Utilities Map - Town of Chester, VT  
Town Plan 2020 - Town of Chester, VT  
Adopted: May 6, 2020



See Village Map

- |  |   |  |
|--|---|--|
| <ul style="list-style-type: none"><li>Town Services</li><li>Post Office</li><li>Library</li><li>Train Station</li><li>School</li><li>Other Civic/ Public Site</li><li>Health Clinic</li><li>Large Solar Array</li><li>State Forest</li></ul> | <ul style="list-style-type: none"><li>Town Park/ Forest/ Recreation Area</li><li>Lake or River Access</li><li>Fishing Access</li><li>Other notable recreation site</li><li>Cemetery</li><li>Telecommunications Facility</li><li>State Highway</li><li>Town Highway (C1,2,3)</li></ul> | <ul style="list-style-type: none"><li>Railroad</li><li>Transmission Line</li><li>Rivers and Streams</li><li>Lakes and Ponds</li><li>Public Land</li><li>Privately conserved land</li><li>Town Boundary</li><li>Parcels</li></ul> |
|--|---|--|

Note: Use of public lands may be restricted.

Data Sources: Telecommunications Tower (Natural Resources Board 2007 and SWCRPC 2013), Electric Transmission Line Corridor (VCGI 2003 and SWCRPC 2015), Public Land and Privately Conserved Land (2010 Town Plan, VLT 2013, UVM 2013, ANR 2012, SWCRPC 2015), Site types (VT E911 July 2015, 2010 Town Plan, SWCRPC 2015), Cemeteries (VTrans 2001, 2010 Town Plan and SWCRPC 2015), Roads (VTrans 2014), Railroad (VTrans 2014), Rivers and waterbodies (VHD 2008), Parcels (CA 2014), Town Boundary (VCGI 2012 and RPC 2014 using Parcels 2014), Aerials (NAIP 2014)

VT State Plane Meters, NAD 83

Map for planning purposes only.  
Not for regulatory interpretation.

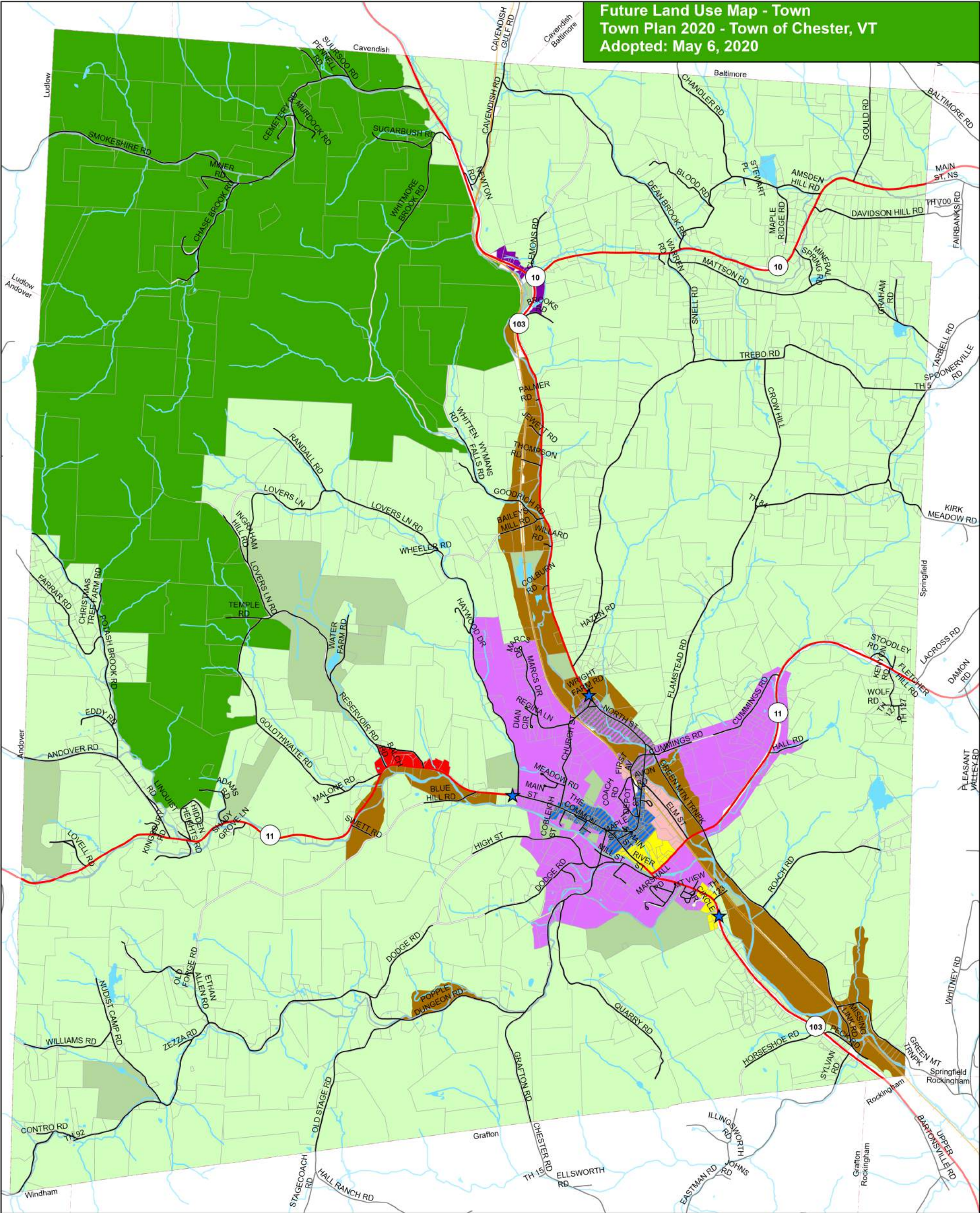
Map drawn March 1, 2016



SOUTHERN WINDSOR COUNTY  
REGIONAL PLANNING COMMISSION  
PO Box 320, Ascutney, VT 05030  
www.swcrpc.org



Future Land Use Map - Town  
Town Plan 2020 - Town of Chester, VT  
Adopted: May 6, 2020



- ★ Gateway/ Transition
- The Center of Chester (Village Center Subdistrict)
- The Center of Chester (Stone Village Subdistrict)
- Commercial
- Commercial Industrial
- Special Mixed Use Area
- Village Residential
- Gassetts/ Hamlet

- Farmlands
- Conservation
- Public Lands
- Forest/ Rural
- ROW
- Water
- State Highway
- Town Highway (C1,2,3)
- Railroad
- Rivers and Streams
- Lakes and Ponds
- Town Boundary
- Parcels

0 0.45 0.9 Miles

Data Sources: Future Land Use (RPC April 2016 Draft), Roads (VTrans 2014), Railroad (VTrans 2014), Rivers and waterbodies (VHD 2008), Parcels (CA 2014), Town Boundary (VCGI 2012 and RPC 2014 using Parcels 2014)

VT State Plane Meters, NAD 83

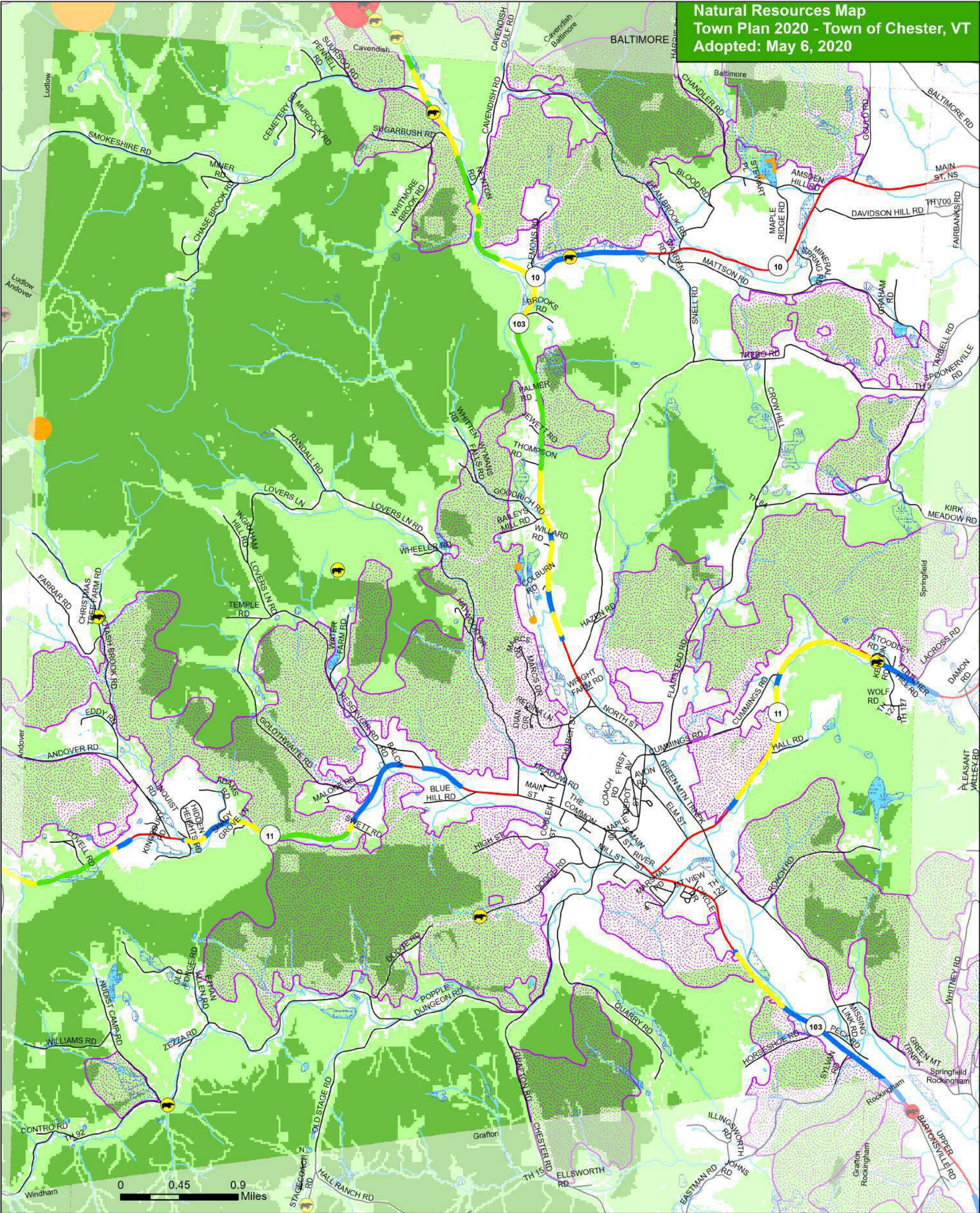
Map for planning purposes only.  
Not for regulatory interpretation.

Map drawn April 26, 2016





Natural Resources Map  
Town Plan 2020 - Town of Chester, VT  
Adopted: May 6, 2020



- Bear Collision
- Bear Travel
- Bear Mast

- State Threatened Species
- State Endangered Species
- Deer Wintering Area
- Wetland

- Wildlife Crossing Value  
(out of 10)
- 5 - 5.5
  - 6 - 6.5
  - 7 - 7.5
  - 8 - 8.5

- Wildlife Habitat Suitability  
(out of 10)
- 0 - 6
  - 6.01 - 8
  - 8.01 - 10

- State Highway
- Town Highway (C1,2,3)
- Rivers and Streams
- Lakes and Ponds
- Town Boundary

Note: Some data, eg wetlands and vernal pools, is incomplete. Further study may be needed prior to applying for permits to develop or make changes to the land. Currently no vernal pools have been identified in Chester.

Data Sources: Threatened and Endangered Species (ANR 2015), Bear Collision (ANR 2004), Bear Travel/ Crossing Area (ANR 2004), Bear Mast (ANR 2001), Biofinder (ANR 2013), Vernal Pools (SN6 component of Biofinder 2013), Wetlands (VSWI, ANR 2010), Deer Wintering Areas (ANR 2011), Wildlife Habitat Suitability (ANR 2006), Wildlife Crossing Value (ANR 2006), Waterbodies (50ft buffer on VHD 2008), Roads (VTrans 2014), Railroad (VTrans 2014), Rivers and waterbodies (VHD 2008), Parcels (CA 2014), Town Boundary (VCGI 2012 and RPC 2014 using Parcels 2014)

VT State Plane Meters, NAD 83

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Not for regulatory interpretation.

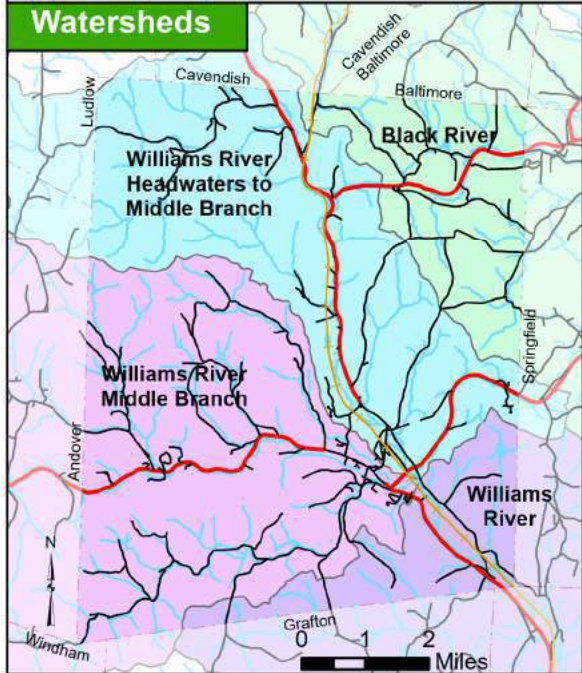
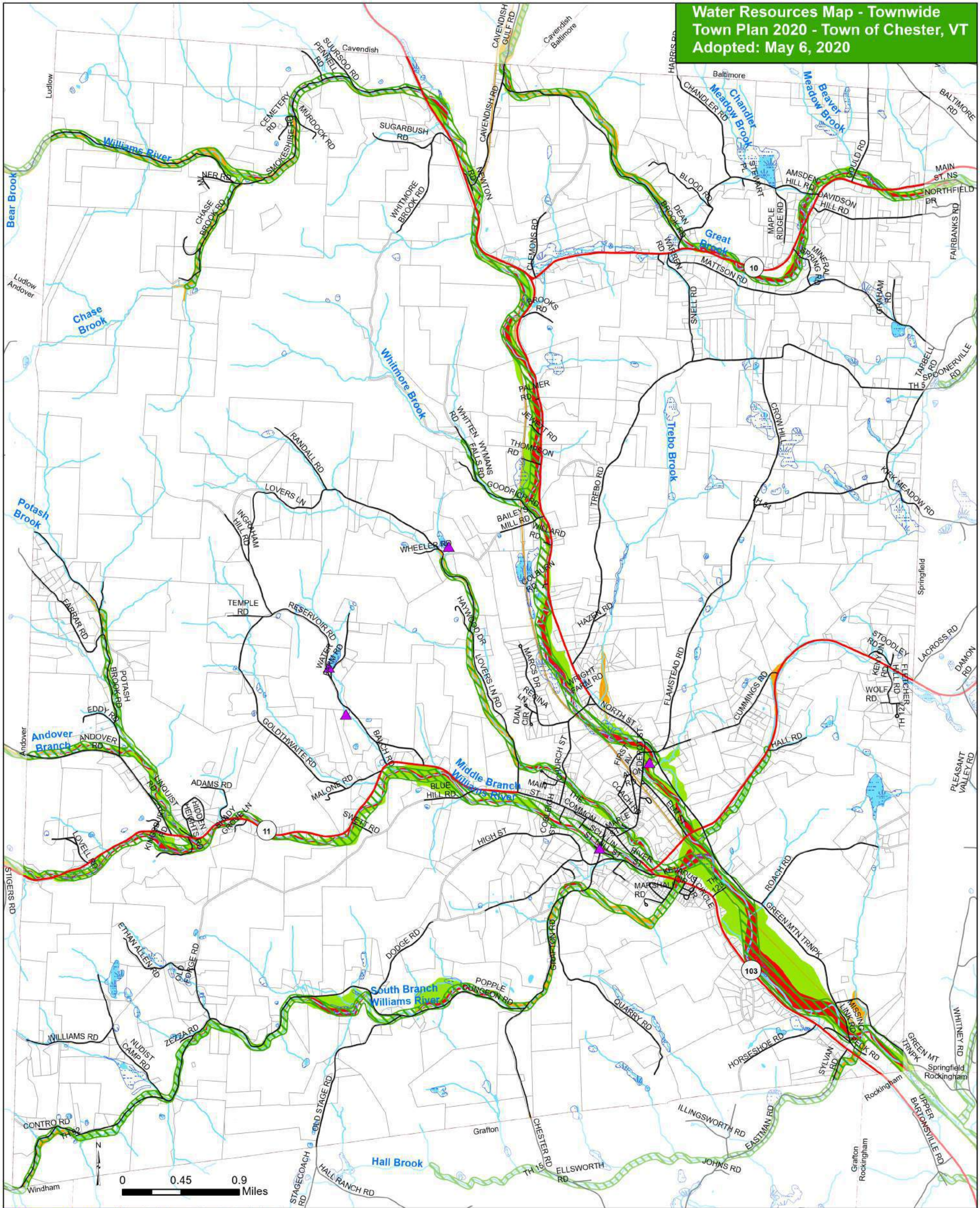
Map drawn Feb 11, 2016



SOUTHERN WINDSOR COUNTY  
REGIONAL PLANNING COMMISSION  
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**Water Resources Map - Townwide  
Town Plan 2020 - Town of Chester, VT  
Adopted: May 6, 2020**



- |   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li> Dam</li> <li> River Corridor</li> <li> Wetland</li> <li> Floodway (Zone AE)</li> <li> Floodplain (Zone A)</li> <li> Floodplain (Zone AE)</li> </ul> | <p><b>Watersheds (small map only)</b></p> <ul style="list-style-type: none"> <li> Black River</li> <li> Headwaters Williams River</li> <li> Middle Branch Williams River</li> <li> Williams River</li> <li> State Highway</li> <li> Town Highway (C1,2,3)</li> </ul> | <ul style="list-style-type: none"> <li> Railroad</li> <li> Rivers and Streams</li> <li> Lakes and Ponds</li> <li> Town Boundary</li> <li> Parcels</li> </ul> |
|---|--|--|

Special Flood Hazard Areas (SFHA), including the Floodway and Floodway Fringe (i.e. Floodplain), are shown on this map for planning purposes only. This is not the official map for regulatory flood hazards.

Data Sources: Dams (ANR 2008), Floodplain and Floodway (Special Flood Hazard Areas) (FEMA 2008), River Corridor (ANR January 2, 2015), Wetlands (VT Significant Wetlands Inventory) (ANR 2010), Railroad (VTrans 2014), Rivers and waterbodies (VHD 2008), Parcels (CA 2014), Town Boundary (VCGI 2012 and RPC 2014 using Parcels 2014)

VT State Plane Meters, NAD 83

Map for planning purposes only.  
Not for regulatory interpretation.

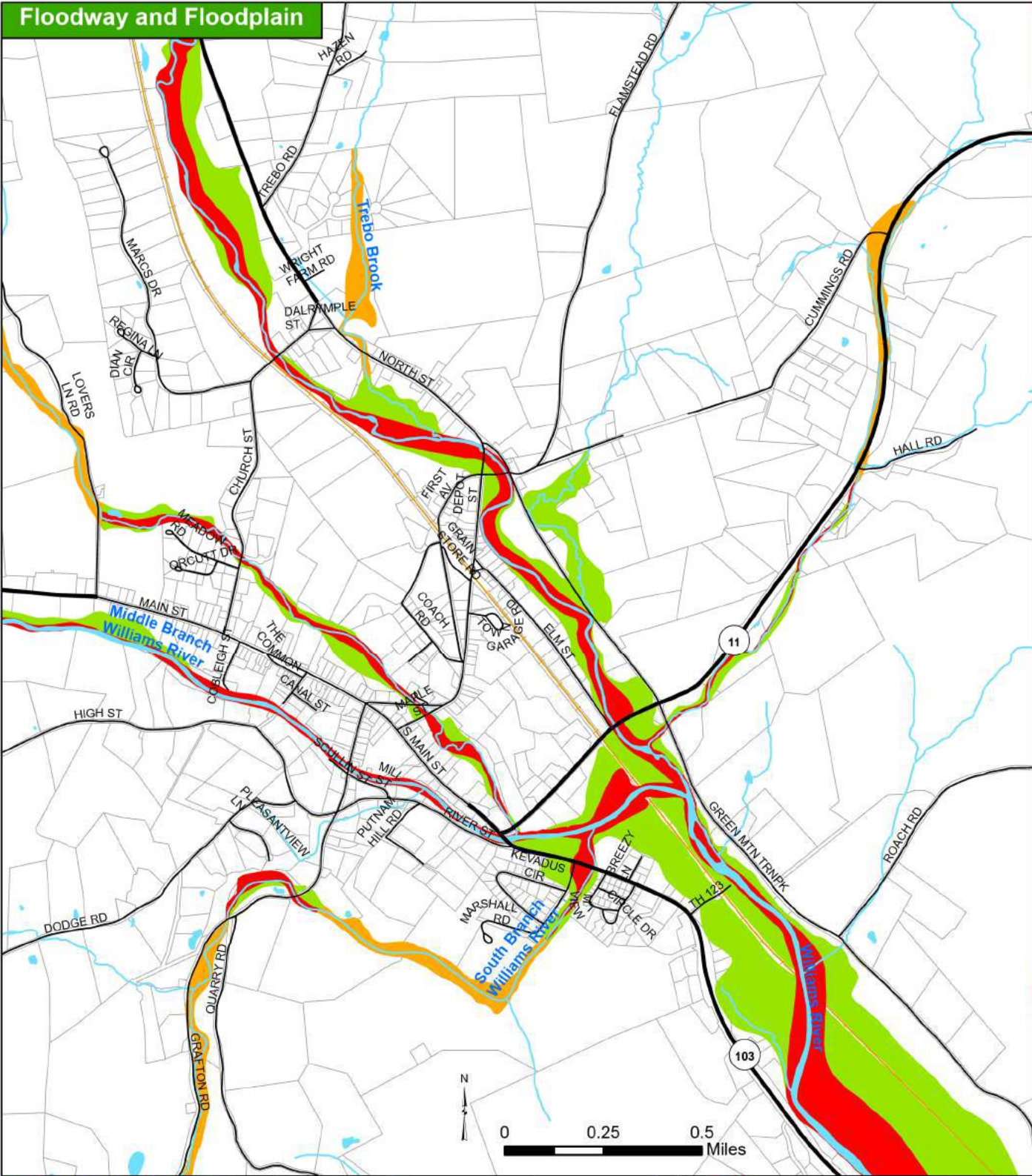
Map drawn Feb 11, 2016



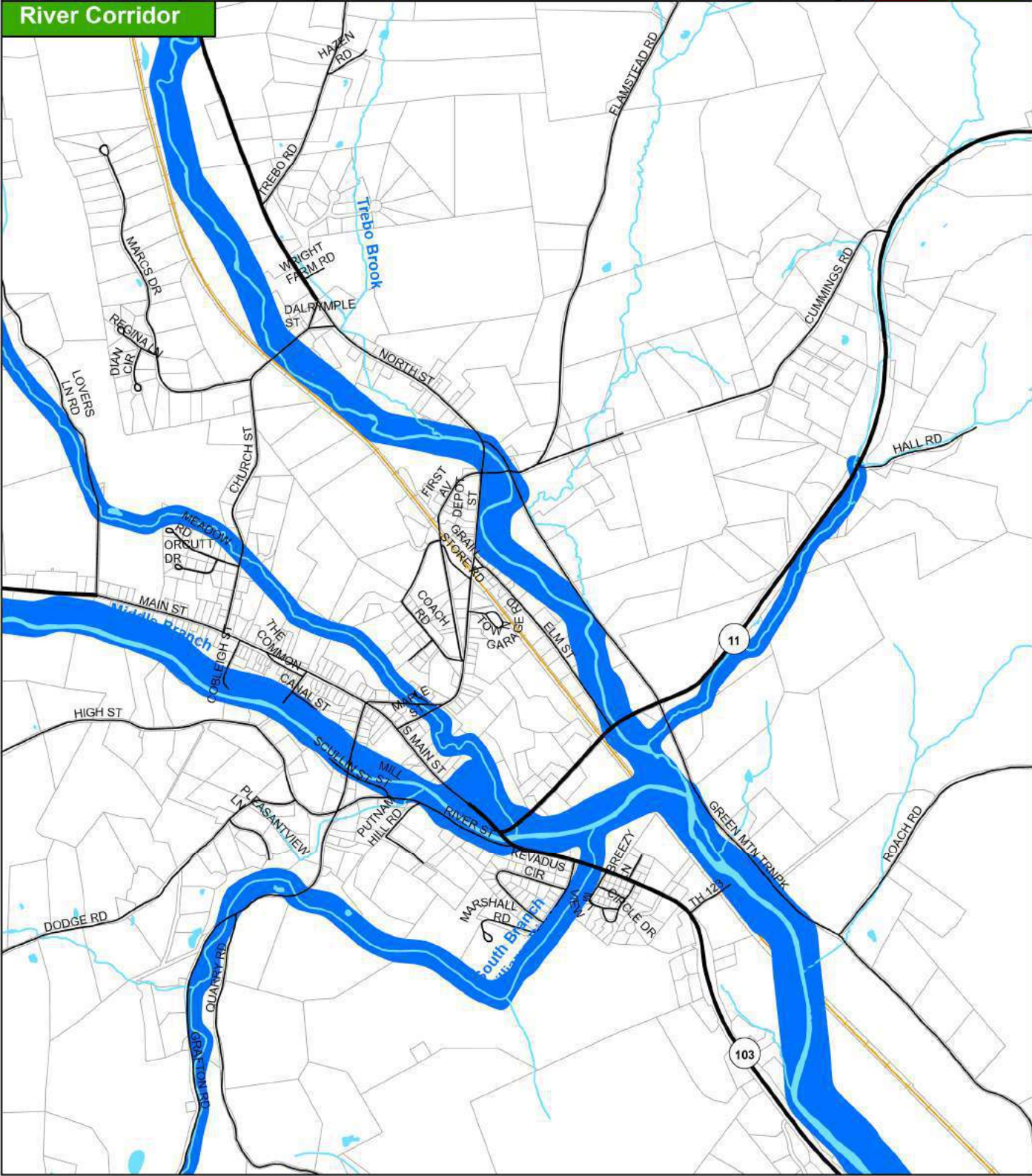
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Floodway and Floodplain



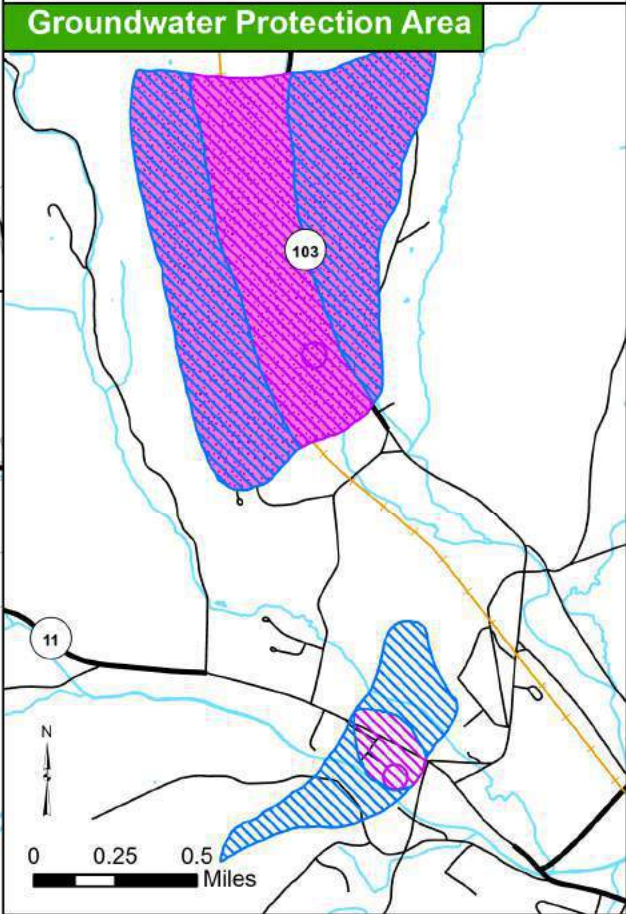
River Corridor



Water Resources Map - Village  
Town Plan 2020 - Town of Chester, VT  
Adopted: May 6, 2020

- Floodway (Zone AE) (Top Left Map)
  - Floodplain (Zone A) (Top Left Map)
  - Floodplain (Zone AE) (Top Left Map)
  - River Corridor (Bottom Left Map)
  - Primary Aquifer Protection Area (Below)
  - Secondary Aquifer Protection Area (Below)
  - Groundwater Protection Area (Below)
- State Highway  
Town Highway (C1,2,3)  
Railroad  
Rivers and Streams  
Lakes and Ponds  
Town Boundary  
Parcels

Groundwater Protection Area



Special Flood Hazard Areas (SFHA), including the Floodway and Floodway Fringe (i.e. Floodplain), are shown on this map for planning purposes only. This is not the official map for regulatory flood hazards.

There are no surface water protection areas within the Town of Chester.

Data Sources: Dams (ANR 2008), Floodplain and Floodway (Special Flood Hazard Areas) (FEMA 2008), River Corridor (ANR January 2, 2015), Groundwater Protection Area (also known as Wellhead Protection Areas) (ANR 2011), Surface Water Protection Area (ANR 2010), Roads (VTrans 2014), Aquifer Protection Zoning Overlay District (Adopted 2014) (SWCRPC 2014), Railroad (VTrans 2014), Rivers and waterbodies (VHD 2008), Parcels (CA 2014), Town Boundary (VCGI 2012 and RPC 2014 using Parcels 2014)

VT State Plane Meters, NAD 83

Map for planning purposes only.  
Not for regulatory interpretation.

Map drawn Feb 11, 2016



## Appendix B

TOWN OF CHESTER  
LOCAL HAZARD MITIGATION PLAN UPDATE  
Hazard Mitigation Committee  
Thursday, February 11, 2021  
9:00 AM – 11:00 AM  
Virtual Meeting

**AGENDA**

1. Virtual Meetings- sign-in, facilitation
2. Purpose and Benefits of Hazard Mitigation Planning
3. Planning Update Process
4. Changes since last plan update
5. Conduct Preliminary Hazard Assessment Exercise
6. Identifying Vulnerabilities and Risks (ongoing)
7. Public Outreach
8. Match - Recording your time as in-kind match
9. Next Meeting – date and topics

## VOLUNTEER/STAFF FORM TO DOCUMENT HMP MEETINGS - MATCH INFORMATION

**PROGRAM:** Chester Local Hazard Mitigation Plan Update  
**DATE OF MEETING:** February 11, 2021  
**MEETING LOCATION:** Virtual  
**TOPIC:** Hazard Mitigation Planning Update (see agenda)  
**MEETING TIME:** 9 AM - 11 AM

VOLUNTEER/STAFF* ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.565	\$24.14
1	Julie Hance	Town Manager		2	-	48.28
2	Kirby Putnam	Highway Foreman		2	-	48.28
3	Richard Cloud	Chief of Police		2	-	48.28
4	Matt Wilson	Fire Chief		2	-	48.28
5	Dan Cook	Ambulance / Emergency Management		2	-	48.28
6	Jeff Holden	Water/Sewer & Selectboard Member		2	-	48.28
7	Amanda Silva	Ambulance Chief / Emergency Coordinator		2	-	48.28
8					-	-
9					-	-
10					-	-
11					-	-
12					-	-
13					-	-
14					-	-
15					-	-
16					-	-
17					-	-
18					-	-
34					-	-
35					-	-
Sub Total			0.00	14.00	\$0.00	\$337.96

FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.565	\$24.14
1	Cindy Ingersoll	Mount Ascutney Regional Commission		2	-	48.28
2					-	-
3					-	-
4					-	-
5					-	-
6					-	-
7					-	-
8					-	-
9					-	-
10					-	-
Sub Total			0.00	16.00	\$0.00	\$48.28

TOTAL MATCH \$386.24

TOTAL Non-Volunteer Match 48.28

**TOTAL VOLUNTEER MATCH \$337.96**



TOWN OF CHESTER  
LOCAL HAZARD MITIGATION PLAN UPDATE  
Hazard Mitigation Committee  
Thursday, March 11, 2021  
9:00 AM to 11:00 AM  
Virtual Meeting

**AGENDA**

1. Introduction if Public is Present
2. Prior Meeting Output on Hazard Assessment and Hazards to be Profiled (attached)
3. Status of Current Policies, Programs, Resources since 2016 LHMP (attached)
4. Status of Hazard Mitigation/Preparedness Actions since 2016 LHMP (attached)
5. Review of 2019 Town Plan related goals, policies and recommendations (attached)
6. Relevant Changes in Other Town Planning Efforts and Documents
7. New Relevant Reports, Studies, Plans Resources
8. Reminders:
  - a. Identify Vulnerabilities and Risks (attached template)
  - b. Hazard Occurrences Over Past 5 Years (attached template)
  - c. Record match hours (attached excel template)
9. Next Meeting April 8<sup>th</sup> – topics for discussion

# VOLUNTEER/STAFF FORM TO DOCUMENT HMP MEETINGS - MATCH INFORMATION

**PROGRAM:** Chester Local Hazard Mitigation Plan Update  
**DATE OF MEETING:** March 11, 2021  
**MEETING LOCATION:** Virtual  
**TOPIC:** Hazard Mitigation Planning Update (see agenda)  
**MEETING TIME:** 9 AM - 11 AM

VOLUNTEER/STAFF* ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.565	\$24.14
1	Julie Hance	Town Manager		2	-	48.28
2	Kirby Putnam	Highway Foreman		2	-	48.28
3	Richard Cloud	Chief of Police		2	-	48.28
4	Matt Wilson	Fire Chief		2	-	48.28
5	Dan Cook	Ambulance / Emergency		2	-	48.28
6	Jeff Holden	Water/Sewer & Selectboard Member		2	-	48.28
7	Amanda Silva	Ambulance Chief/ Emergency Coordinator		2	-	48.28
8					-	-
9					-	-
10					-	-
11					-	-
12					-	-
13					-	-
14					-	-
15					-	-
16					-	-
17					-	-
18					-	-
34					-	-
35					-	-
Sub Total			0.00	14.00	\$0.00	\$337.96

FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.565	\$24.14
1	Cindy Ingersoll	Mount Ascutney Regional Commission		2	-	48.28
2					-	-
3					-	-
4					-	-
5					-	-
6					-	-
7					-	-
8					-	-
9					-	-
10					-	-
Sub Total			0.00	16.00	\$0.00	\$48.28

TOTAL MATCH \$386.24

TOTAL Non-Volunteer Match 48.28

**TOTAL VOLUNTEER MATCH \$337.96**

TOWN OF CHESTER  
LOCAL HAZARD MITIGATION PLAN UPDATE  
Hazard Mitigation Committee  
Thursday, April 8, 2021  
9:00 AM to 11:00 AM  
Virtual Meeting

**AGENDA**

1. Introduction if Public is present
2. Review of 2019 Town Plan related goals, policies and recommendations (attached)
3. Identify Hazard Mitigation Goals (example attached)
4. Identify Hazard Mitigation/Preparedness Actions (Recommendations from Other Plans- attached)
5. Prioritize Hazard Mitigation/Preparedness Actions
6. Plan Monitoring Process
7. Next Meeting - TBD



# VOLUNTEER/STAFF FORM TO DOCUMENT HMP MEETINGS - MATCH INFORMATION

**PROGRAM:** Chester Local Hazard Mitigation Plan Update  
**DATE OF MEETING:** April 8, 2021  
**MEETING LOCATION:** Virtual  
**TOPIC:** Hazard Mitigation Planning Update (see agenda)  
**MEETING TIME:** 9 AM - 11 AM

VOLUNTEER/STAFF* ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.565	\$24.14
1	Julie Hance	Town Manager		2	-	48.28
2					-	-
3	Richard Cloud	Chief of Police		2	-	48.28
4	Matt Wilson	Fire Chief		2	-	48.28
5	Dan Cook	Ambulance / Emergency		2	-	48.28
6	Jeff Holden	Water/Sewer & Selectboard Member		2	-	48.28
7	Amanda Silva	Ambulance Chief/ Emergency Coordinator		2	-	48.28
8					-	-
9					-	-
10					-	-
11					-	-
12					-	-
13					-	-
14					-	-
15					-	-
16					-	-
17					-	-
18					-	-
34					-	-
35					-	-
Sub Total			0.00	12.00	\$0.00	\$289.68

FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.565	\$24.14
1	Cindy Ingersoll	Mount Ascutney Regional Commission		2	-	48.28
2					-	-
3					-	-
4					-	-
5					-	-
6					-	-
7					-	-
8					-	-
9					-	-
10					-	-
Sub Total			0.00	14.00	\$0.00	\$48.28

**TOTAL MATCH** \$337.96  
**TOTAL Non-Volunteer Match** 48.28

**TOTAL VOLUNTEER MATCH** **\$289.68**

## VOLUNTEER/STAFF FORM TO DOCUMENT HMP MEETINGS - MATCH INFORMATION

**PROGRAM:** Chester Local Hazard Mitigation Plan Update  
**DATE OF MEETING:** August 3, 2021  
**MEETING LOCATION:** Virtual/In-Person  
**TOPIC:** Hazard Mitigation Draft Plan Review  
**MEETING TIME:** 9 AM - 11 AM

VOLUNTEER/STAFF* ATTENDEES - CLAIMED						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.565	\$24.14
1	Julie Hance	Town Manager		2	-	48.28
2	Kirby Putnam	Highway Foreman		2	-	48.28
3	Amanda Silva	Ambulance Chief/ Emergency Coordinator		2	-	48.28
4	Matt Wilson	Fire Chief		2	-	48.28
5					-	-
6					-	-
7					-	-
8					-	-
9					-	-
10					-	-
11					-	-
12					-	-
13					-	-
14					-	-
15					-	-
16					-	-
17					-	-
18					-	-
34					-	-
35					-	-
Sub Total			0.00	8.00	\$0.00	\$193.12

FEDERALLY SUPPORTED PERSONNEL - CAN NOT CLAIM						
No.	NAME	AFFILIATION	MILEAGE ROUND TRIP	MEETING HOURS	TOTAL MILEAGE	TOTAL TIME
					0.565	\$24.14
1	Cindy Ingersoll	Mount Ascutney Regional Commission		2	-	48.28
2					-	-
3					-	-
4					-	-
5					-	-
6					-	-
7					-	-
8					-	-
9					-	-
10					-	-
Sub Total			0.00	10.00	\$0.00	\$48.28

TOTAL MATCH \$241.40

TOTAL Non-Volunteer Match 48.28

**TOTAL VOLUNTEER MATCH \$193.12**

## Chester Local Hazard Mitigation Plan Update Public Notice

### **Reducing Risk to Natural Hazards and Disasters in Chester: Voice your concerns during the Local Hazard Mitigation Plan update.**

The Town of Chester is updating its Local Hazard Mitigation Plan. The purpose of this planning effort is to protect life, property, economy, quality of life, and environment of the Chester Community from hazards and disasters. We are requesting input from the local community regarding experiences and concerns about hazard events and the potential risks and vulnerabilities to hazards, such as flooding, erosion, extreme temperatures, winter storms and drought.

The Town's Hazard Mitigation Committee plans to virtually meet on a monthly basis on the second Thursday of the month, 9:00 AM to 11:00 AM. The next meeting is scheduled for March 11, 2021. Meetings will be via ZOOM and conducted by the Mount Ascutney Regional Commission (MARC). The public is encouraged to participate and share their thoughts.

If you are interested in participating, please email Cindy Ingersoll at [cingersoll@marcv.org](mailto:cingersoll@marcv.org) for ZOOM link. You can also provide your concerns, comments, and questions regarding this planning effort via email to Cindy Ingersoll.

Meeting agendas, planning materials, and templates which you can use to provide your input can be found on the MARC website under the Town of Chester page at <https://marcv.org/town-of-Chester/> under '**2021-2026 Chester Local Hazard Mitigation Planning Update Process**'. Contents will be updated biweekly. Feel free to review the Town Plan and the current 2016 Local Hazard Mitigation Plan which can also be found on the webpage.



## Town of Chester Selectboard Notice of Public Information Meeting

The Town of Chester is seeking comment on its 2021-2026 Local Hazard Mitigation Plan draft. The purpose of this planning effort is to improve Chester's resiliency to natural hazards through hazard assessment, recognition of vulnerable assets, and identification of mitigating actions and strategies to reduce the impact of these hazards on the community.

The Chester 2021-2026 Local Hazard Mitigation Plan draft can be found [here](#) or on the Town website.

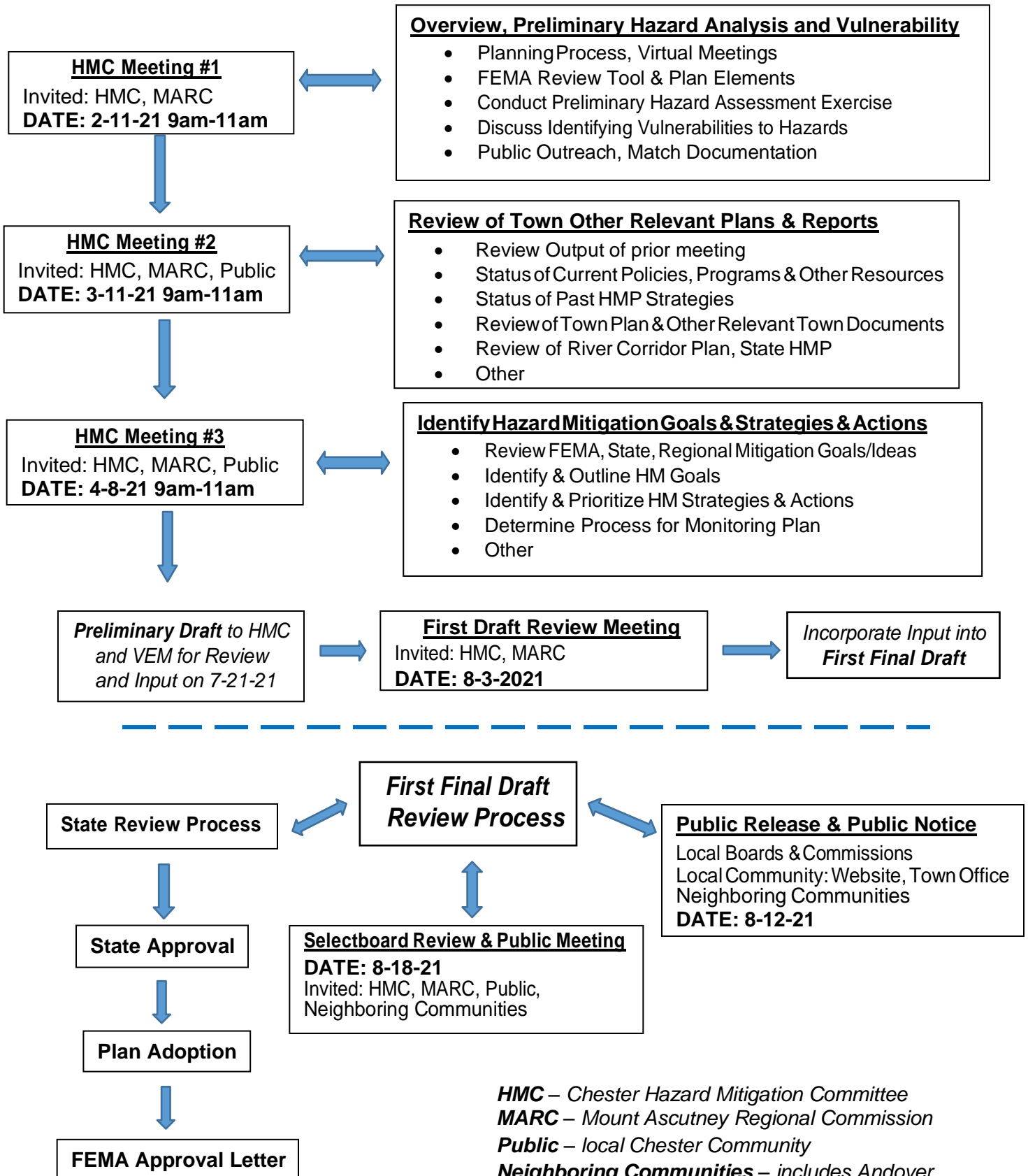
Please attend the Selectboard meeting of August 18<sup>th</sup> at 6 PM for a review of the draft plan. The meeting will be held both in-person at the Chester Town Hall and virtually. The ZOOM login for the meeting can be found at <https://www.chestervt.gov/>. Please feel free to forward any questions or comments on the draft plan to Julie Hance, Town Manager at [julie.hance@chestervt.org](mailto:julie.hance@chestervt.org) or to Cindy Ingersoll at [cingersoll@marcv.org](mailto:cingersoll@marcv.org) by August 27<sup>th</sup>. We welcome all input!

## Appendix C

# APPENDIX C

## Town of Chester

### 2021-2026 Hazard Mitigation Plan



**HMC** – Chester Hazard Mitigation Committee  
**MARC** – Mount Ascutney Regional Commission  
**Public** – local Chester Community  
**Neighboring Communities** – includes Andover, Baltimore, Cavendish, Grafton, Ludlow, Rockingham, Springfield, Weathersfield, Windham

## Appendix D

## **Chester Town Plan – Review of Relevant Plan Goals, Policies and Recommendations:**

The 2019 Chester Town Plan identifies the following recommendations which support hazard mitigation.

- Adopt *Chester's All Hazard Mitigation Plan (AHMP)*, as most recently approved under 44 C.F.R. §201.6, to serve as the flood resilience element for *Chester's Town Plan*, including the flood resilience-related strategies identified in the *AHMP*.
- Intensive residential development should be encouraged only in the areas of the Town serviced by sewer and water; strip development along the highways should be discouraged.
- Residential development that occurs in designated rural areas should be designed so as to prevent negative impacts to natural, cultural and aesthetic resources.
- Development should be discouraged on slopes greater than 15%.
- Development on ridge lines should be limited.
- Discourage development within flood plains to the extent that it will cause damage to natural or manmade resources.
- Encourage the renovation and preservation of historic buildings in village centers.
- Include important resource areas on Future Land Use Map and develop a conservation plan to protect and preserve those features.
- Discourage development in areas of natural, cultural and scenic significance.
- Support state and federal policies and standard to protect the water quality of the Town's rivers, streams and groundwater supplies.
- Use of public funding for the maintenance or improvement of infrastructure development of affordable housing, and conservation of natural resources is encouraged.
- Development adjacent to significant natural resources (waterways, large forested areas, wildlife habitat, etc) should be compatible with the value of those resources and negative impacts on the natural resource should be mitigated with buffer strips or visual screening, where this will be effective mitigation and where possible.
- The elimination or mitigation of the adverse effects of development on the natural resources that extend beyond Town borders or which are regionally significant should be considered and is encouraged.
- Any proposed development should not place an undue burden upon Town facilities or services.
- Evaluate proposed development projects for possible adverse effects to important natural resources, both within and beyond town borders.

- Culverts and drainage ditches should allow for an adequate flow of stormwater so as to protect infrastructure from damage during typical large snowmelt and rain events.
- A Road Surface Management Plan has been developed by the Town Manager and Selectboard. The highway department should continue to inspect and evaluate the condition of bridges and culverts, and replace deficient or undersized drainage structures annually as funding allows.
- Fire Department has enhanced equipment testing and servicing procedures and improved record keeping.
- Fire Department has developed a plan to schedule equipment replacement instead of risking equipment failures.
- Fire department recognizes the need for a simple, used ladder truck, as newer buildings have roof structures that make ground ladders ineffective and dangerous.
- The town is working on a properly designed storm drainage system which will appropriately direct the ground and surface water to a designated location and bypass the wastewater system.
- Due to the significance of these surface waters, it is important that they be protected. Protection of surface waters involves stream bank management, overseeing point source discharges of wastes, and controlling non-point sources of water pollution (for example, agricultural runoff, erosion from logging or construction, and stormwater runoff from roads and impervious surfaces).
- Maintain or enhance the integrity and functions of Chester's surface waters and wetlands.
- To encourage flood resilient communities.
- Continuous areas of undisturbed vegetation along rivers and streams should be encouraged, thereby protecting shorelines, wildlife habitat and scenic quality.
- New development adjacent to streams or rivers must be designed to cause minimal damage to the stream environment.
- Any alterations to ponds and wetlands must be in compliance with local zoning and all State and Federal laws.
- Review zoning regulations to protect rivers and streams, ponds and wetlands not already protected under state law.
- Include high elevation streams and buffer areas in a plan for open space conservation.
- Consider conducting an inventory of class 3 wetlands and/or vernal pools.
- Excessive commercial development along VT Route 10, 11, and 103 (i.e. strip development) is discouraged. Access management and innovative commercial development that maintains the characteristics of the existing village areas and greens, is encouraged.



## Appendix E

**Chester 2021-2026 Local Hazard Mitigation Plan**  
**Annual Monitoring Form**  
**Progress on Mitigation Strategies & Actions**  
*(WORD Doc Available)*

Period Covered: \_\_\_\_\_

Date: \_\_\_\_\_

High Priority
Moderate Priority
Low Priority

\*Edit Cell Color to Reflect changes in  
Priority of Mitigation Actions

MITIGATION ACTION OR STRATEGY (**Indicates Action is from Prior Plan)	PROGRESS MADE*	FUNDING SOUGHT	NEXT STEPS	RESPONSIBLE PARTY	TIME FRAME
**Complete construction and opening of <b>New Emergency Services Facility</b> and use the opportunity for public outreach.					
**Attend <b>training on floodplain management</b> and flood regulation administration.					
**Provide FEMA and other <b>flood mitigation guide materials</b> digitally on website and through link on Facebook.					
Provide information on <b>Village Center designation benefits</b> ; ie: building owners eligible for tax credits for code improvements					
<b>Address risk to infrastructure and public and private property from Emerald Ash Borer</b>  <b>Phase I:</b> Form a project committee and conduct inventory assessment of ash trees in the municipal ROW for emerald ash borer and provide public outreach to community on emerald ash borer information and mitigation.					

Phase II: Determine risk to Town infrastructure and develop a plan to address these risks.					
<p><b>**Complete erosion and flood mitigation efforts on vulnerable stretch of Rt. 35 along the South Branch</b> that is susceptible to further deteriorate due to streambank erosion and stormwater during heavy rain and high flows.</p> <p><b>Phase I:</b> Complete repairs of highly eroded section</p> <p><b>Phase II:</b> Complete engineering study/design for flood and erosion resiliency on remainder of road.</p> <p><b>Phase III:</b> Implement recommended upgrades to remainder of road.</p>					
<b>**Complete engineering study to assess vulnerability of Waste Water Treatment Facility and stabilization of the Williams River riverbank to reduce vulnerability of the facility to flooding.</b>					
Continue work on <b>stabilizing stream banks along Smokeshire Rd.</b> to reduce vulnerability of infrastructure to flood and erosion.					
Identify opportunities to <b>enhance public outreach</b> and awareness of hazards, in light of recent climate trends identified in this plan, including extreme heat and drought, particularly for vulnerable populations.					
<b>**Continue progress to upgrade all technical level emergency responders</b> to EMT or higher level to provide more capacity for emergency response.					
Review/reevaluate/enhance <b>Pandemic Standard Operating Guidance</b> (PPE, establish supply/inventory, equipment maintenance, and response) from lessons learned to improve preparedness.					
Address flood risk to <b>Mountain/Flamstead and Marshall Rd. areas</b> as recommended in the Road Erosion Inventory Report:					

<p><b>Phase 1:</b> Conduct an engineering study for a stormwater system for the to control stormwater runoff and help stabilize the river bank. This project is consistent with Town Plan policy to strengthen stormwater infiltration practices for new development to improve flood resiliency.</p> <p><b>Phase 2:</b> Implement engineering design</p>					
Assess drainage issues to reduce flooding on <b>Mineral Springs Rd.</b> which occurs after heavy rain.					
<p>Address flood risk associated with three <b>bridges over the Williams River</b> used for access to private properties along Rt. 103 (Thompson, Jewitt and Palmer). Failure of these bridges may isolate residents and cause debris jams and flooding downstream.</p> <p><b>Phase I:</b> conduct study to determine best options.</p> <p><b>Phase II:</b> Conduct Engineering Design In progress)</p> <p><b>Phase III:</b> Implement Project</p>					
Work with GMP on enhancing <b>tree maintenance</b> to better assess and mitigate the potential impact of heavy snow, ice and wind to protect vulnerable utility infrastructure. Assess and determine need for funding upgrades.					
Allocate enough funding each budget cycle to acquire and maintain an <b>adequate salt/sand inventory</b> beginning early in the fall season in anticipation ice events over the season.					
Develop a list of potential projects for <b>increasing floodplain access</b> as recommended in stream geomorphic and river corridor studies should opportunities arise for conservation easements, berm removal and buffer planting. Increased floodplain access upstream will reduce Village flooding and the risk of mass slope failure along the Williams.					

Continue efforts to address overbank flooding on <b>Popple Dungeon Rd.</b> Complete a culvert upgrade near Zezza Rd. as recommended in River Corridor Plan which will reduce overbank flooding and less prone to debris jams.					
Make continued progress on <b>Municipal Roads General Permit</b> (MRGP) standards for implementing best management practices on hydrologically-connected road segments.					
Develop and maintain, a <b>3-year plan</b> to address high priority town roadways that are susceptible to erosion that can be addressed with GIA, BR and other Vermont state funding programs.					
Consider <b>tracking data on requests for filling wells</b> to better anticipate and prepare for water shortage during periods of drought. Consider local warnings and water conservation recommendations based on this data.					
Continue to <b>promote Chester Emergency Response program</b> resources and link to <a href="http://chesterambulance.org">chesterambulance.org</a> on a periodic basis for public awareness, particularly for new residents and businesses.					
<p>Explore and consider participation in FEMA's <b>Community Rating System</b> (CRS)- a voluntary incentive program that recognizes and encourages community floodplain management practices and reduces NFIP premiums.</p> <p><b>Phase I:</b> Evaluate the benefits (financial and other) of the FEMA CRS program to the community.</p> <p><b>Phase II:</b> Determine the feasibility and personnel resources for participation.</p>					
<b>Update bridge and culvert inventories</b> and maintain a priority list for upgrades and repairs to reduce risk of damage and infrastructure failure from flooding and erosion.					

Maintain and enhance <b>seasonal fire safety awareness program</b> for residents, landowners, and rental properties. Explore <b>Firewise</b> and other State fire safety outreach ideas for applicable programs, such as <b>campfire and brush burn safety</b> .					
Conduct <b>annual review of Hazard Mitigation Plan</b> progress as noted in Section 6.3 prior to capital budgeting process and recommend incorporating projects selected from this plan, if feasible and funding is available.					
Work with MARC to provide a concise and comprehensive list of <b>available funding sources</b> to include a description/examples of eligible project types and application schedules to better coordinate efforts in implementing mitigation projects.					

**Note changes or improvements in effectiveness of Community Capabilities and Resources in Table 3:**

**Note changes in Goals or Objectives:**

**Chester 2021-2026 Local Hazard Mitigation Plan**  
**Local Hazard Occurrences**  
*(WORD doc available)*

<b>Hazard/Event</b>	<b>Date</b>	<b>Extent (inches snow/rain, MPH winds, degrees or descriptive</b>	<b>Impact (area Impacted, roadway, infrastructure, buildings, property, \$ in damage, can be descriptive)</b>
Flood/Flash Flood			
Fluvial Erosion			
Landslide/Slope Failure			
High Winds/Microbursts/Hurricane			
Extreme Cold/Heat			
Drought			
Structure Fire			
Wildland Fire			
Severe Winter Weather			
Ice Jams/flooding			
Drought			
Infectious Disease			
Invasive Species			
Dam Failure			