Town of Windham, Vermont
Local Hazard Mitigation Plan
DRAFT – June 15, 2023

Municipal Adoption Date:

FEMA Formal Approval Date:

Technical Assistance by the
Windham Regional Commission

WINDHAM REGIONAL COMMISSION

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INTRODUCTION AND PURPOSE

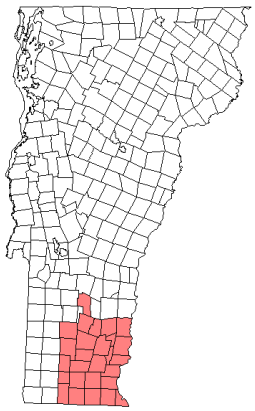
This Hazard Mitigation Plan is an update to a prior plan adopted by the Town of Windham on November 2, 2015 and approved by FEMA on November 19, 2015. This is a single jurisdiction plan covering the Town of Windham, Vermont. The purpose of this plan is to assist the Town of Windham in identifying all of the hazards facing the town and to identify new and continuing strategies to reduce risks from identified hazards.

Hazard mitigation is any sustained action that reduces or eliminates risk to people, property, and the natural environment from natural and human-caused hazards and their effects. Based on the results of previous Project Impact efforts, FEMA and state agencies have come to recognize that it is less expensive to prevent damage from disasters than to repeatedly repair damage after a disaster has occurred. This plan recognizes that communities also have an opportunity to identify mitigation strategies and measures during all of the other phases of Emergency Management: preparedness, response, and recovery. While hazards cannot be eliminated, a community can determine what the potential hazards are, where the hazards are most severe within the community, and identify what local actions can be taken to reduce the severity of hazard-related damage.

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

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

WINDHAM REGION OVERVIEW



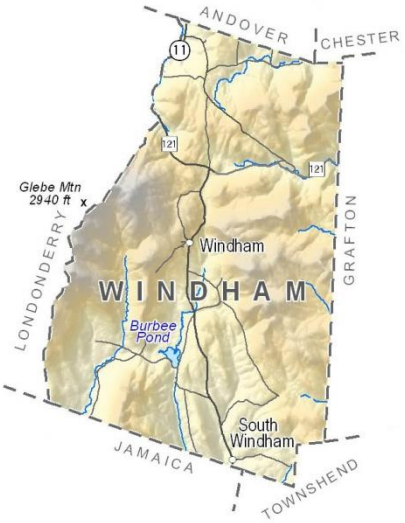
The Windham Region is located in southeastern Vermont and consists of 23 towns in Windham County, the neighboring towns of Readsboro, Searsburg, and Winhall in Bennington County, and Weston in Windsor County. The region is bordered by Massachusetts to the south and New Hampshire to the east. At over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

The Region's topography is relatively flat or gently rolling land in the Connecticut River valley in the east, while the western part of the region is characterized by the Green Mountain ridges and peaks with narrow stream valleys. Stratton Mountain is the highest point in the region at 3,936 feet. The

lowest point is along the Connecticut River in Vernon, at 200 feet. In addition to the Connecticut River, other major rivers of the region are the Deerfield, Green, North, Saxtons, West, and Williams, all tributaries of the Connecticut. There are two major flood control reservoirs on the West River, Ball Mountain and Townshend, and two major storage reservoirs for hydropower generation on the Deerfield River, Somerset and Harriman.

TOWN PROFILE

The Town of Windham is a rural community located in the upper portion of the Saxton's River watershed in Windham County in southeastern Vermont. The town is generally located in a north-south orientation, between Route 11 to the northwest and Route 30 to the south. Settlement is largely contained along Windham Hill Road, which runs north-south through the central part of town. Enclosing this area are dominant ridgelines to the west and east. To the west is Glebe Mountain, with an elevation of 2,940 feet, and to the east is the Stiles Brook Tract with an elevation of approximately 2,300 feet. Much of the land in town is unsuitable for development because of steep slopes and soils that are too wet, shallow, or unstable for development. The entirety of the town is located above 1,500 feet in elevation.



Windham can be reached from Windham Hill Road, which connects with Route 30 in the village of West Townshend; Route 121 which runs east-west through town and connects Windham with its neighbors Grafton and Londonderry; and from a small section of State Highway 11 which runs through the northwest corner of town. The major entry and exit routes to the town are steep inclines, rising to the hamlet of Windham in the center of town. As a result of its topography and location, the town does not see a large amount of through-traffic.

The residential settlement density is low and most residential development is located along Windham Hill Road or unpaved secondary roads. There are areas of more dense residential uses in the hamlets of Windham Center and South Windham, and near the former Timber Ridge Ski Area. Other development in Windham consists of public and semi-public land uses, including Windham Elementary School, churches, and town offices. There are relatively few commercial businesses in town and they are largely comprised of bed and breakfasts and home-based businesses.

There are lakes, ponds, rivers, streams, and wetlands in Windham. The most prominent water features include Saxtons River, Williams River, Cobb Brook and the 50-acre Burbee Pond. The floodplains in Windham are primarily related to seasonal high-water flow in the middle and south branches of the Williams River and the Saxtons River. There are also three abandoned talc mines in Windham that have filled in with water and pose potential health and safety hazards.

Forestland is the predominant land cover in Windham. Overall, forest land accounts for 15,610 acres of land, representing 93 percent of the town. Of the total forestland, nearly 10,000 acres are concentrated with two large landowners. Meadowsend Timberlands, LLC owns a large area of land on the eastern side of town bordering Grafton and The Nature Conservancy owns much of the land on Glebe Mountain. The Glebe Mountain tract of land is in the process of being transferred from the Nature Conservancy to the

U.S. Fish and Wildlife Service as part of the Silvio O. Conte National Fish and Wildlife Refuge. A remaining 6 percent of land is classified as open space, some of which is in agricultural use.

Existing Authorities

The Town of Windham is governed by a three-member Selectboard. Town office operations are run by the Town Clerk and two Assistant Town Clerks. The town has adopted various ordinances, bylaws, and policies, including Zoning Bylaws, a Traffic Ordinance, and a Winter Road Policy. The Zoning Bylaws were last amended in September 2019 and were updated to include new requirements for lands located with River Corridors as identified by the Vermont Agency of Natural Resources. The town has a Planning Commission and a Zoning Board of Adjustment that both consists of seven regular members. Windham also has a Conservation Commission and an Energy Committee.

Emergency Services

The town of Windham is served by a volunteer fire department located in North Windham. The facility consists of a two-bay garage that houses two fire trucks, a water tanker, and other equipment. The Windham Volunteer Fire Company is a member of the Keene Fire Mutual Aid. Windham is served by the State Police and the Windham County Sheriff's Department. The Sheriff's Department also provides road patrol for the town.

Windham is also supported by an Emergency Management team of volunteers that is responsible for maintaining the town's LEMP, completing training opportunities, communicating with Emergency Management Directors in adjacent towns and the region, and informing residents about emergency management resources. The town office is the designated Incident Command Center and includes a generator, office equipment, internet access, water, and cots. The town also directs residents to regional shelters at Flood Brook School in Londonderry and in Brattleboro in the event of an emergency.

Healthcare services are available in nearby towns, including Grace Cottage Hospital in Townshend and the Mountain Valley Medical Clinic in Londonderry. Nearby regional hospitals are located in Bennington, Springfield, Brattleboro, Keene, New Hampshire and Lebanon, New Hampshire. Ambulance service is provided by Londonderry Rescue Squad, Inc. and Rescue, Inc. in West Townshend.

Electric Utility Distribution System

Green Mountain Power provides electric service to approximately 509 meters in Windham. The Vermont Electric Power Company maintains a major transmission line that runs north to south through town near the boundary with Grafton. Outage statistics between 2018 and 2022 are shown in the table below. The results show that 2018 and 2022 were particularly impacted years for power outages, with these years having the highest number of outages and hours that the average customer was without power. Power outages are of particular concern for vulnerable populations during cold weather months in Vermont.

	Number of Incidents	Total Customers (Meters) Affected	Customer Hours Out	Avg # of outages per customer per year	Avg length of each outage	Total outage duration per customer (hours)
2018	35	2,690	40,106	5.28	14.91	78.79
2019	105	4,228	22,120	8.31	5.23	43.46
2020	74	1,647	7,337	3.24	4.45	14.41
2021	59	1,548	4,892	3.04	3.16	9.61
2022	55	4,087	28,053	8.03	6.86	55.1
5 Year Average	65.6	2,840	20,502	5.6	6.9	40.3

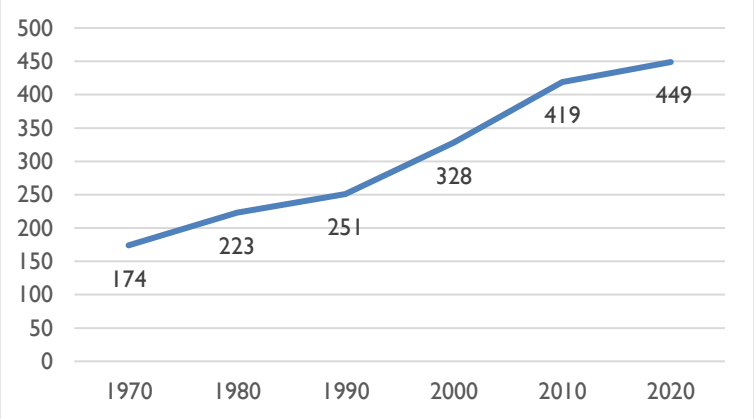
Source: Green Mountain Power; 5-year averages by WRC

During the planning process it was noted that many of the identified hazards are exacerbated and made more severe when there are corresponding power outages. This was a particular concern for heavy snow, ice storms, and severe cold events in the winter months.

Population Data

Windham ranks as the fourth smallest town in the Windham Region. The 2020 US Census reported Windham with a population of 449 residents. After experiencing a population decrease of over 50% during the first half of the 20th century to a low of 135 residents in the 1960 Census, Windham began to experience population growth. From 1970 to 2020, Windham's population has more than doubled. This population growth can largely be attributed to the trend of seasonal homeowners becoming full-time residents and new landowners building permanent homes.

Town of Windham Population: 1970-2020:

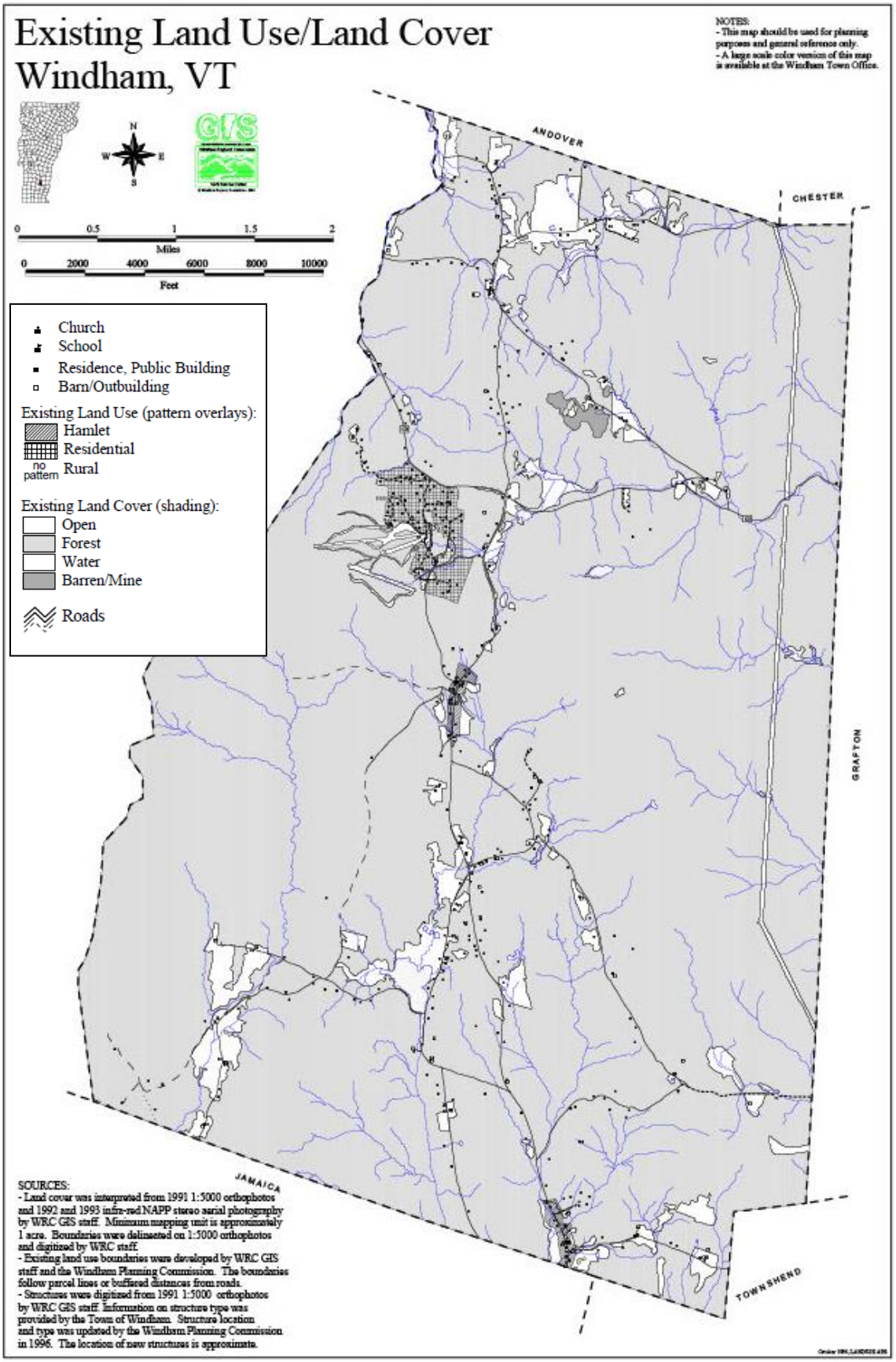


Population Trends in Windham and Surrounding Towns:

	2000	2010	2020	Change 2000-2010 (Pct)	Change 2010-2020 (Pct)
Windham	328	419	449	28%	7%
Londonderry	1,709	1,769	1,919	4%	8%
Jamaica	946	1,035	1,005	9%	-3%
Townshend	1,149	1,232	1,291	7%	5%
Grafton	649	679	645	5%	-5%
Andover	496	467	432	-6%	-7%

Land Use and Development Patterns

Recent development in Windham has consisted primarily of residential dwellings. Most of this development is located along Windham Hill Road or on unpaved secondary roads that branch off this main road. It is generally characterized as scattered, low density single-family homes. There are pockets of more concentrated residential uses in Windham Center, South Windham and near the former Timberside Ski Area. Because residential properties in Windham do not have access to a public sewer system, residences need to be located where soils are suitable for individual wastewater disposal systems. The existing land use map is shown on the following page.


Existing Land Use/Land Cover
Windham, VT
NOTES:
- This map should be used for planning purposes and general reference only.
- A large scale color version of this map is available at the Windham Town Office.
N
W
E
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GIS
0 0.5 1 1.5 2
Miles
0 2000 4000 6000 8000 10000
Feet
Church
School
Residence, Public Building
Barn/Outbuilding
Existing Land Use (pattern overlays):
Hamlet
Residential
no pattern Rural
Existing Land Cover (shading):
Open
Forest
Water
Barren/Mine
Roads
ANDOVER
CHESTER
GRAFTON
JAMAICA
TOWNSHEND
SOURCES:
- Land cover was interpreted from 1991 1:5000 orthophotos and 1992 and 1993 infra-red NAPP stereo aerial photography by WRC GIS staff. Minimum mapping unit is approximately 1 acre. Boundaries were delineated on 1:5000 orthophotos and digitized by WRC staff.
- Existing land use boundaries were developed by WRC GIS staff and the Windham Planning Commission. The boundaries follow parcel lines or buffered distances from roads.
- Structures were digitized from 1991 1:5000 orthophotos by WRC GIS staff. Information on structure type was provided by the Town of Windham. Structure location and type was updated by the Windham Planning Commission in 1996. The location of new structures is approximate.

PLANNING PROCESS

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

Documentation of the Plan Update Process

Matt Bachler, Senior Planner for the Windham Regional Commission (WRC), assisted the town with the update. Building Resilient Infrastructure and Communities (BRIC) Grant funds from FEMA supported this update process.

The following is a list of the Hazard Mitigation Planning Team members that assisted with the update. This includes representatives from organizations that sustain community lifelines and community-based organizations that work with socially vulnerable populations. For example, the Planning Team included the Principal of the Windham Elementary School and the President of the Windham Community Organization, which works to assist Windham area residents in times of need by providing financial and other assistance, in addition to other community services:

- Kord Scott, Selectboard Chair and Windham Road Commissioner
- Michael Pelton, Selectboard Member and local business owner
- Imme Maurath, Co-Emergency Management Director, Meeting House Committee Member, and Windham Grant Administrator
- Kathy Jungermann, Co-Emergency Management Director, Windham Town Auditor, and Windham News and Notes staff
- Bill Dunkel, Planning Commission Chair, Energy Committee Member, Windham representative to the WRC
- Richard Pare, Town Road Foreman
- Ellen McDuffie, Town Clerk and President of Windham Community Organization
- Joyce Cummings, Assistant Town Clerk
- Carrie Tintle, Assistant Town Clerk
- Jon Gordon, Chief of Windham Volunteer Fire Department
- Tan Bronson, Member of Windham Volunteer Fire Department and Radio Amateur Civil Emergency Service Operator
- Marcia Clinton, Town Health Officer and Justice of the Peace
- Mickey Parker Jennings, Windham Elementary School Principal
- Jim McCandless, Town Resident
- Ron Tintle, Town Resident
- Frank Seawright, Town Resident

Members of the Hazard Mitigation Planning Team met remotely via Zoom on December 7, 2022 with Matt Bachler from the WRC. Planning Team members were invited by Kord Scott, Selectboard Chair, and the meeting was also advertised and open to the public. The meeting covered the following topics:

- Review the purpose of the Local Hazard Mitigation Plan and the process for developing the Plan.

- Review of existing Local Hazard Mitigation Plan.
- Completion of hazard analysis and discussion of what hazards the town wants to focus on.
- Review of town map to note where hazard events are causing repeated or large-scale damage.

Following the first meeting, WRC created and distributed an online community survey on December 9, 2022. The survey was available through January 23, 2023. The purpose of the survey was for the Hazard Mitigation Planning Team to find out about what residents thought the most significant natural hazards are to Windham and their recommendations on how the town should respond. The survey provided an opportunity for community members not able to attend one of the public meetings with a chance to provide feedback for the plan update. Hard copies of the survey were also made available at the Windham town office for residents without access to the internet. A total of 23 community members completed the survey and the results are included in the Appendix. While this number may seem small, the total population of Windham is only 449 and this represents roughly 5 percent of residents.

The Hazard Mitigation Planning Team held an additional public meeting on January 25, 2023 remotely via Zoom. The meeting was advertised and open to the public. This meeting covered the following topics:

- Review of Community Survey Results
- Review of Mitigation Actions Table from expiring Plan.
- Development of an updated Mitigation Actions Table for the updated Plan.
- Identify gaps and capabilities with implementation.

WRC updated the plan to meet the current standards and guidelines of FEMA for hazard mitigation plans. WRC took the information from the public meetings, along with follow-up information gathered in conversations and emails with the town. WRC also reviewed and utilized the data sources noted and cited throughout this plan to gather further information.

The draft was presented for internal town review by the Hazard Mitigation Planning Team, town personnel, Planning Commission, and the Selectboard on May 16, 2023. The internal town review period was from May 16 to June 2, 2023. During the review period, two members of the Planning Team provided comments and edits. WRC then updated the draft for public comment.

The revised draft plan was sent out for public comment on June 16, 2023. The public comment period was from June 16 to July 7, 2023. An electronic copy of the plan was posted on the town's website and a hard copy of the plan was made available at the town office for those who could not access the website. Flyers were posted in town advertising that the draft plan was available for review and comment. To satisfy FEMA outreach requirements, the draft plan was also sent to Grace Cottage Hospital, Mountain Valley Medical Clinic, Green Mountain Power, Southern Vermont Home Health Agency, Visiting Nurse Alliance of Vermont, and Southeastern Vermont Community Action.

The draft plan was also distributed to adjacent towns and regional commissions via email for comments on June 16, 2023. The following towns and regional commissions were contacted: Londonderry, Jamaica, Townshend, Grafton, Andover, and Chester, and Mount Ascutney Regional Commission.

The plan was finalized by WRC for submittal to Vermont Emergency Management (VEM). This submittal allows VEM to make suggested revisions on the draft and allows for any revisions to be made

before the final draft is adopted by the town and submitted to the Federal Emergency Management Agency Region 1 (FEMA) for final approval.

In addition to the local knowledge of Planning Team members and other relevant parties, and information in the 2015 Windham Local Hazard Mitigation Plan, several existing plans, studies, reports, and technical information were utilized in the preparation of this Plan. A summary of these data sources is provided below and specific references are listed in footnotes throughout this Plan:

- Local Emergency Management Plan (updated 4/7/2022)
  - Referenced for Existing Authorities section of the plan
- Floodready VT Community reports and NFIP information
  - Referenced for Assessing Vulnerability section of the plan
- 2020 Windham Town Plan
  - Referenced for the Town Profile and Mitigation Strategies sections of the plan
- 2018-2022 Green Mountain Power Outage Data
  - Referenced for the Town Profile section of the plan
- 2018 State of Vermont Hazard Mitigation Plan
  - Referenced for the Risk Assessment section of the plan
- Vermont Agency of Natural Resources Online Natural Resources Atlas
  - Referenced for the Risk Assessment section of the plan
- 2020 United State Census
  - Referenced for the Town Profile and Assessing Vulnerability sections of the plan
- National Oceanic and Atmospheric (NOAA) National Climatic Data Center's Storm Events Database
  - Referenced for the Risk Assessment section of the plan
- FEMA Disaster Declarations for Vermont
  - Referenced for the Risk Assessment section of the plan
- U.S. Geological Survey National Water Information System- Stream Gage Data
  - Referenced for the Risk Assessment section of the plan
- FEMA Flood Insurance Rate Maps
  - Referenced for the Risk Assessment and Assessing Vulnerability sections of the plan
- 2013 FEMA Mitigation Ideas Report
  - Referenced for Mitigation Strategy section of the plan

RISK ASSESSMENT

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

Methodology and Results

A **vulnerability analysis** for each community begins with an inventory of possible hazards and an assessment of the risk that they pose. These are the questions to be answered: What hazards can affect your community? How bad can it get? What is the likelihood of future events occurring? What areas of your town are most vulnerable to these hazards? How does climate change impact your town currently and what are you worried about for future impacts? Information collected from the planning team went into this vulnerability assessment to identify the hazards the town feels most vulnerable to.

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

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

The following table shows the Planning Team's ranking of the probability of hazard occurrence in the town of Windham. The hazards are listed from most to least probable of occurring:

Probability of Hazard Occurrence	**Score**
Fluvial Erosion	3.7
Significant Snow Event	3.6
Significant Wind Event	3.5
Significant Ice Storm	3.4
Below Normal Cold	3.2
Inundation Flooding	3.1
Invasive Species	3
Significant Hail Event	2.8
Infectious Disease Outbreak	2.7
Wildfire	2.6
Severe Drought	2.6
Above Normal Heat	2.5
Landslide	1.5
Earthquake	1.3

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

time, considered with existing warning systems). Finally, the effects of climate change are also taken into account. Vermont is experiencing warming temperatures, shorter winter seasons, and increased intensity of storm events, which needs to be considered as part of the LHMP and addressed in the hazard profiles and mitigation actions when relevant. The Planning Team noted that since the 2015 LHMP was completed, the town has had more extreme heat events, seen an increase in invasive species, and experienced significant heavy rain events in July and August 2021, all of which were attributed to changing climate conditions. The following table was used to rank the potential impact of each hazard:

Score	Hazard Potential Impact
1	**Negligible**: Isolated occurrences of minor property damage and environmental damage, potential for minor injuries, no to minimal economic impact
2	**Minor**: Isolated occurrences of moderate to severe property and environmental damage, potential for injuries, minor economic disruption
3	**Moderate**: Severe property damage on a community scale, injuries or fatalities, short-term economic impact
4	**Major**: Severe property damage on a community or regional scale, multiple injuries or fatalities, significant economic impact

The following table shows the Planning Team's ranking of the potential impact of each hazard in the town of Windham. The hazards are listed based on most to least probable of occurring:

Possible Hazard	Potential Impact				
	Infrastructure	Life	Economy	Environment	Average
Fluvial Erosion	3.2	2.7	2.5	3.4	3.0
Significant Snow Event	2.8	2.8	2.3	2.3	2.6
Significant Wind Event	3	3.1	2.4	2.7	2.8
Significant Ice Storm	2.7	2.7	2.3	2.5	2.6
Below Normal Cold	2.5	2.8	2.5	2.5	2.6
Inundation Flooding	2.9	2.8	2.5	3.5	2.9
Invasive Species	2.7	2.3	2	3.2	2.6
Significant Hail Event	2.1	2.1	2	2.1	2.1
Infectious Disease Outbreak	2.5	3.3	3.2	2.6	2.9
Wildfire	2.6	2.8	2.5	3.2	2.8
Severe Drought	2.4	2.2	2.4	3.1	2.5
Above Normal Heat	2.1	2.5	2.1	2.7	2.4
Landslide	1.6	1.8	1.7	2.3	1.9
Earthquake	1.5	1.5	1.7	1.8	1.6

The frequency scores for each hazard and the impact ranking for each hazard related to infrastructure, life, economy and the environment, were then combined to determine the total hazard ranking score for each hazard as shown in the table below. The total score was determined by multiplying the probability and the average potential impact score.

Hazard Impacts	Probability	Potential Impact					Total Score
		Infrastructure	Life	Economy	Environment	Average	
Fluvial Erosion	3.7	3.2	2.7	2.5	3.4	3.0	10.9
Wind	3.5	3	3.1	2.4	2.7	2.8	9.8
Snow	3.6	2.8	2.8	2.3	2.3	2.6	9.2
Inundation Flooding	3.1	2.9	2.8	2.5	3.5	2.9	9.1
Ice	3.4	2.7	2.7	2.3	2.5	2.6	8.7
Cold	3.2	2.5	2.8	2.5	2.5	2.6	8.2
Infections Disease	2.7	2.5	3.3	3.2	2.6	2.9	7.8
Invasive Species	3	2.7	2.3	2	3.2	2.6	7.7
Wildfire	2.6	2.6	2.8	2.5	3.2	2.8	7.2
Drought	2.6	2.4	2.2	2.4	3.1	2.5	6.6
Heat	2.5	2.1	2.5	2.1	2.7	2.4	5.9
Hail	2.8	2.1	2.1	2	2.1	2.1	5.8
Landslides	1.5	1.6	1.8	1.7	2.3	1.9	2.8
Earthquake	1.3	1.5	1.5	1.7	1.8	1.6	2.1

These results were analyzed with the planning participants at the public meeting on December 7, 2022. While all the hazards were considered by the Planning Team for inclusion in this plan, it is not feasible to study each in depth. The results, local knowledge, and input from the community survey were used to determine which hazards the plan would address. The Planning Team decided to focus on the following hazards, as highlighted in blue in the above table, based on them having the highest risk to the community: Fluvial Erosion, Inundation Flooding, Significant Snow, Wind, and Ice Events, Below Normal Cold Invasive Species, and Wildfires.

For hazards that are not profiled in this plan, the reader is directed to the Vermont State Hazard Mitigation Plan, which is available on the Vermont Emergency Management website. The rationale for not addressing all of the hazards is that Windham has a lower level of risk associated with them. This plan will only focus on the hazards that Windham has decided are pertinent to their community.

Infectious disease scored similarly to invasive species and wildfires, both of which the Planning Team chose to address in this plan. At the first public meeting, the Planning Team discussed the impact of the COVID-19 pandemic on the community and the potential for future infectious disease outbreaks. The group ultimately decided not to mitigate for this hazard because they believed most of the mitigation and preparedness work is accomplished at the state and federal government level and not by the municipality.

Extreme heat, hail and drought all scored somewhat high on the frequency ranking, indicating that these hazards may be rising in frequency and may become more pressing in terms of the need to mitigate over time. This is particularly the case for high heat and drought, which are expected to increase in frequency as a result of climate change. However, at this point these hazards are seen as being more infrequent and as having less potential impact on the community so mitigation is not justified on a wide scale.

The final two hazards the town has decided not to mitigate for are landslides and earthquakes. Both of these hazards ranked significantly lower than other hazards in terms of probability of occurrence and potential impact. Due to this, the Planning Team determined it was not justified at this time to mitigate for landslides and earthquakes.

Identifying and Profiling Hazards

The following sections include a narrative with a Description, Geographic Area of the Hazard, Impact, Extent, Probability, and discussion of Past Occurrences of the highest-ranking natural hazards affecting Windham. The Planning Team noted that there was overlap between some of the hazards and for the purposes of this section of the plan the hazards will be grouped as follows: flooding and fluvial erosion; significant snow, ice, and extreme cold; high wind event; invasive species; and wildfires.

Flooding and Fluvial Erosion

Description

Flooding is the most widespread and destructive hazard in Vermont. Flood damages are associated with inundation flooding and fluvial erosion. Inundation flooding refers to the rise in water levels that result in flood events. Fluvial erosion occurs when streambanks are eroded by the movement of rivers and streams. Flooding can occur anytime of the year as a result of heavy rains, thunderstorms, tropical storms, hurricanes, Nor'easters, snowmelt, or ice jams. These hazards can also be exacerbated as result of human alterations to the environment or waterways, such as inadequate local drainage infrastructure or development within flood-prone areas.

Residents and businesses in Windham located in the floodplain are at greater risk from flooding than those properties located outside of the floodplain. The floodplain refers to the area around a river, lake, or stream where inundation occurs during high water events. There areas are subject to inundation by the 1 percent annual chance of flood (100-year flood). Windham has National Flood Insurance Program compliant Flood Hazard Regulations within their zoning bylaws, which gives residents access to discount flood insurance and enables the Town to regulate development within the Special Flood Hazard Area. Maps of these areas can be found at the Town Office or online at the FEMA Map Service Center.[1]

River Corridors are subject to fluvial erosion and are defined and mapped by the Vermont Agency of Natural Resources (ANR). River Corridor mapping delineates fluvial erosion hazard areas and includes a 50-foot buffer beyond those designated areas. For small streams, a 50-foot buffer from top-of-bank on either side of the waterway constitutes the River Corridor. Maps of River Corridor areas can be viewed on the Vermont ANR Natural Resources Online Atlas.[2] In 2019, Windham amended its zoning bylaws to include fluvial erosion hazard area regulations.

Much of the destruction from flooding in Windham is due to fluvial erosion rather than inundation flooding, which is the type of flooding targeted in FEMA mapping. Statewide data shows that more than 75% of flood damage costs in Vermont are a result of fluvial erosion versus inundation flooding.[3] Property owners outside of the FEMA floodplain can purchase flood insurance at a lesser expense, and it still covers damages resulting from fluvial erosion in events that damage multiple properties.

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

[1] https://msc.fema.gov/portal
[2] https://anr.vermont.gov/maps/nr-atlas
[3] https://floodready.vermont.gov/RCFAQ#4

Gravity and water power are the forces driving fluvial erosion. Factors that allow the force of gravity to overcome the resistance of earth material to erosion include: saturation by water, steepening of slopes by erosion or construction, alternate freezing or thawing, and removal of trees and other vegetation. Major erosion events are typically associated with periods of heavy rainfall or rapid snow melt, and tend to worsen the effects of flooding that often accompany these events. Associated issues in Windham are related to road cutting and bank erosion for the most part, areas where roads have been built between steep slopes on one side of the road, and slopes to a river or brook on the opposite side.

Bends in a river or stream are prone to movement as part of natural river processes, and their movements can be even more dramatic when manmade impacts and development upstream impinges on these natural stabilizing forces. The interaction of the dramatic forces of river movement, combined with the stationary location of the closely located roads is what leads to road damages during heavy weather events.

Impact

Windham has relatively few areas prone to inundation flooding. This is a result of the community being located at a higher elevation with steep topography. According to FEMA maps, areas along the Middle and South Branches of the Williams River, Saxtons River, Cobb Brook, Turkey Mountain Brook, and Burbee Pond are located in the 100-year floodplain. Burbee Pond is dammed at its southern end, which was left from a mill previously located here. If the dam were to fail, it would flood Turkey Mountain Brook which would potentially impact two private property owners downstream that access their properties by crossing over Turkey Mountain Brook.

Example of Fluvial Erosion – private driveway off Wheeler Road

Fluvial erosion has a higher likelihood of impacting Windham and having a greater impact than inundation flooding. Flash floods typically occur in high elevation drainage areas as a result of summer thunderstorm activity. These events occur when a large amount of precipitation falls during a short period of time and the soil is not able to absorb the water, resulting in runoff into streams. Compared to inundation flooding, there is often little notice of flash flood events. Infrastructure and structures along higher elevation streams and drainage areas are most susceptible to damage from flash flooding. Drainage ditches and culverts are the biggest concern for local flash flooding events.

There are several areas in Windham with fluvial erosion risks. The primary concern is the potential impact of fluvial erosion to roadways that could result in residences being cut off. The deeper layer of the soil is clay-based composition that stays in place, but the soil with vegetation on top of it will slide off when inundate with water and erode into the stream eating away at the land holding the road. The Planning Team noted that Popple Dungeon Road, Wheeler Road, Chase Road, West Windham Road, and Route 121 are all prone to erosion during heavy rain events. It was noted that the area around the intersection of Windham Hill Road, Abbott Road, and Burbee Pond Road experienced flooding and erosion during a July 2021 heavy rain event that overwhelmed Turkey Mountain Brook, which passes under this intersection through two culverts. The River Corridor mapping (included in this plan) shows the ANR defined River Corridors, which are more likely to have fluvial erosion. The map points out some of these particular problem spots.

Repeatedly having to repair roadways, shore up areas prone to erosion with short-term stabilization methods, and cleaning out culverts are threats to the town budget. Windham has taken steps to implement stabilization and mitigation projects that have helped, but there are areas in town where issues remain.

The town has also put in place a program to check and clean out culverts and to prioritize culvert replacement projects.

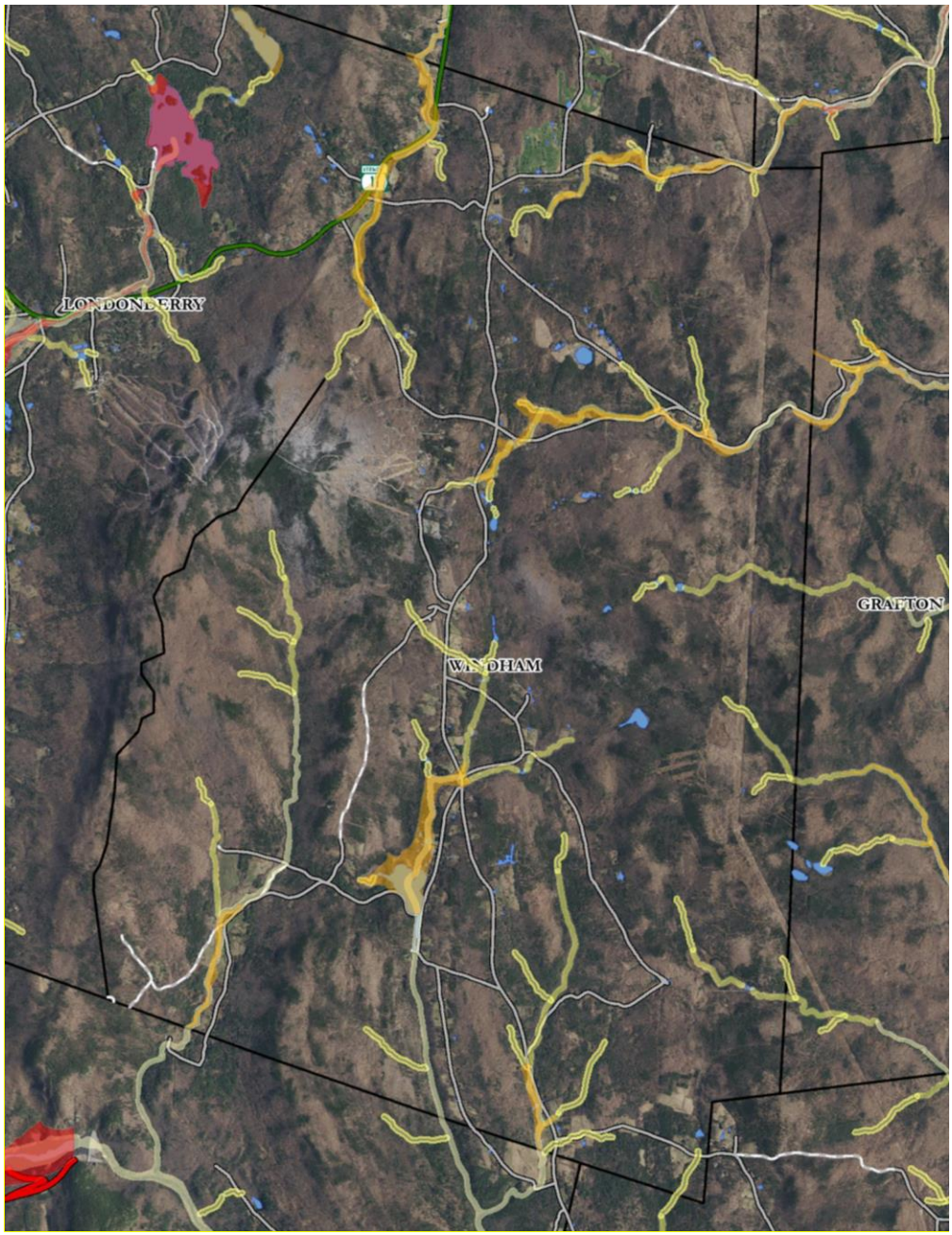
In addition to the Burbee Pond dam, there are open mine pits at the U.S. Talc/North Windham Talc Mine that have been subject to flooding of a residence off of White Road. A system for flood control and fluvial diversion was installed in 2012 to mitigate the risk, and is monitored and maintained both physically and electronically to standards set by the State of Vermont Dam Safety Department.[4]

Flooding and Fluvial Erosion Mapping

FEMA has mapped "A" zones, "AE" zones without floodway, and "AE" with Floodway zones in Windham. "A" zones are the lowest level of risk and "AE" with Floodway is the highest level of risk that FEMA maps. These zones are all part of the Special Flood Hazard Area (SFHA). Properties within the SFHA that have a mortgage are required to purchase flood insurance. Windham's participation in the NFIP gives residents access to discount flood insurance through the NFIP. The Flood Hazard Summary Sheets on FloodReady Vermont's website says there are 12 structures in the Special Flood Hazard Area.[5]

The below maps were created using the Vermont Agency of Natural Resources 'Natural Resources Atlas' which is an online mapping tool. These maps show all of the special flood hazard areas (SFHAs) that FEMA has designated in Windham. They are shown in orange, red and red hatching. The floodplains shown in these maps are based on the FEMA Flood Insurance Rate Maps (FIRMs) available through the FEMA Map Service Center.[6] The map effective date for the latest FIRMs for Windham County is 9/28/2007. The map also shows the River Corridors that Vermont Agency of Natural Resources (ANR) has mapped. River Corridors encompass an area around the present channel where fluvial erosion, channel evolution and down-valley meander migration are most likely to occur. The mapped river corridor includes this area and a 50-foot buffer on either side to allow for the recommended setback and zone of avoidance to protect the riparian/fluvial erosion hazard corridor. The ANR defined River Corridor also includes a 50-foot buffer on all streams shown on the Vermont Hydrologic dataset. The mapped River Corridors are for streams with a watershed of 0.25 square miles or greater.

[4] Windham 2019 Town Plan, Chapter 3, Section C.3
[5] Flood Hazard Summary Report for Windham, accessed 2/17/23
[6] FEMA Map Service Center: https://msc.fema.gov/portal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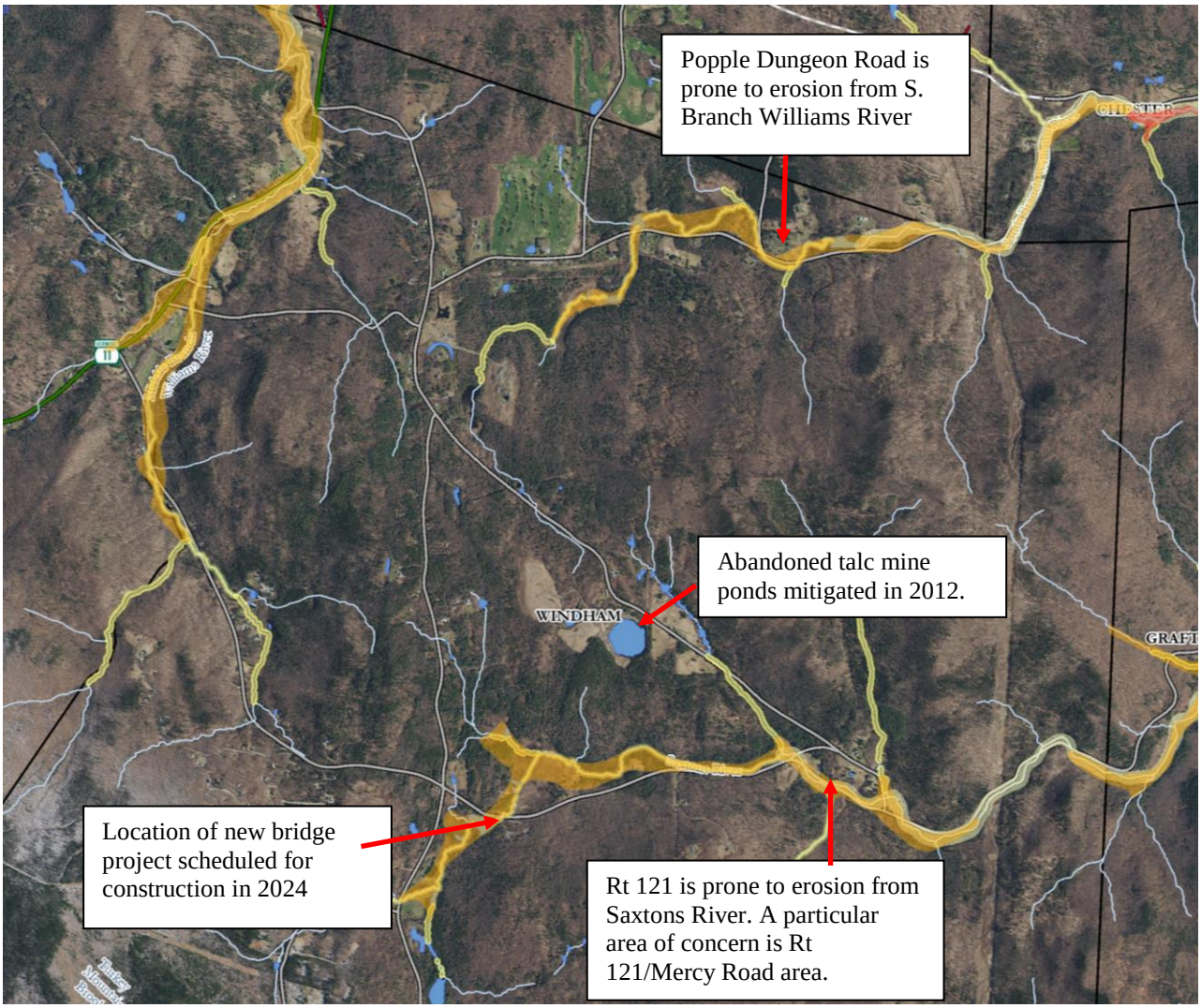
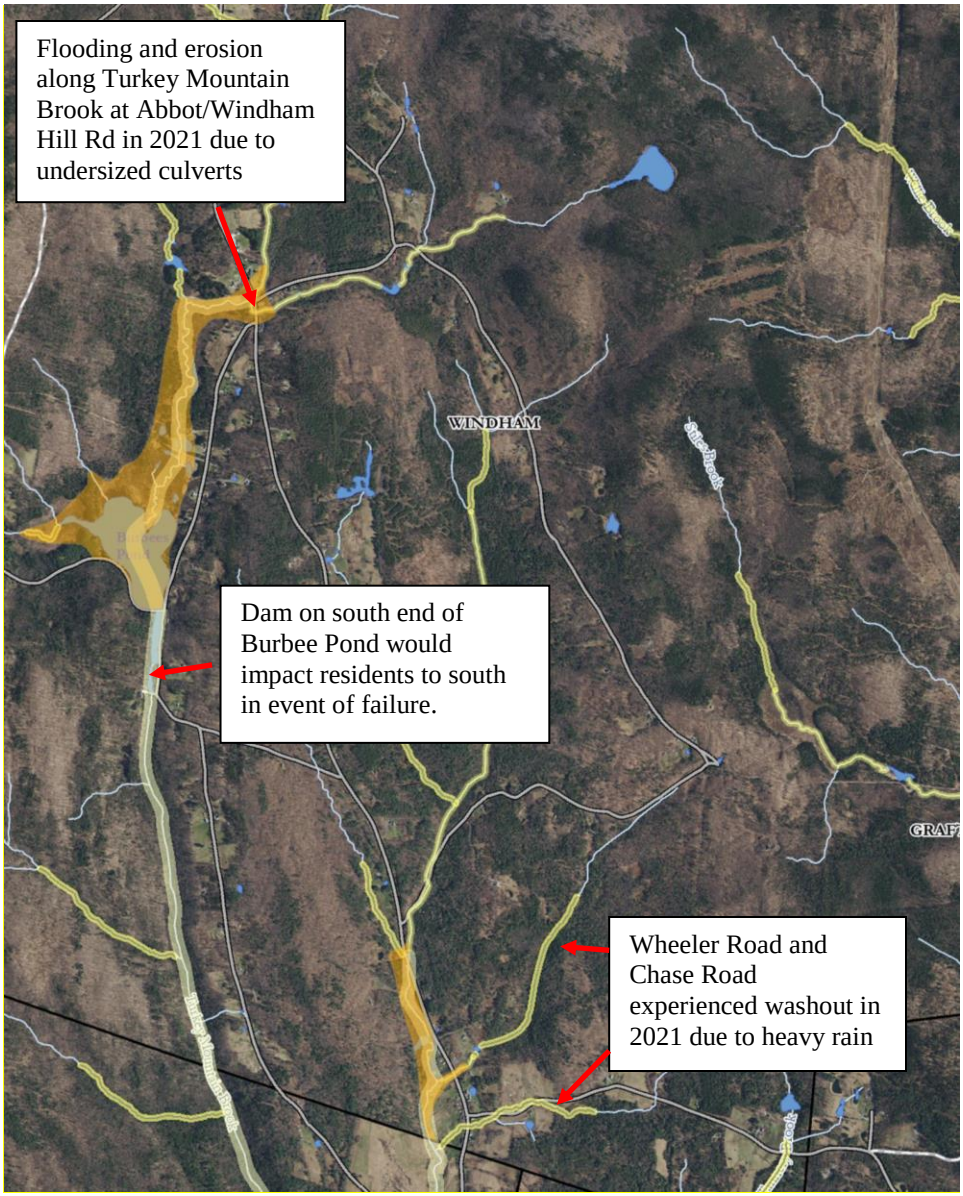


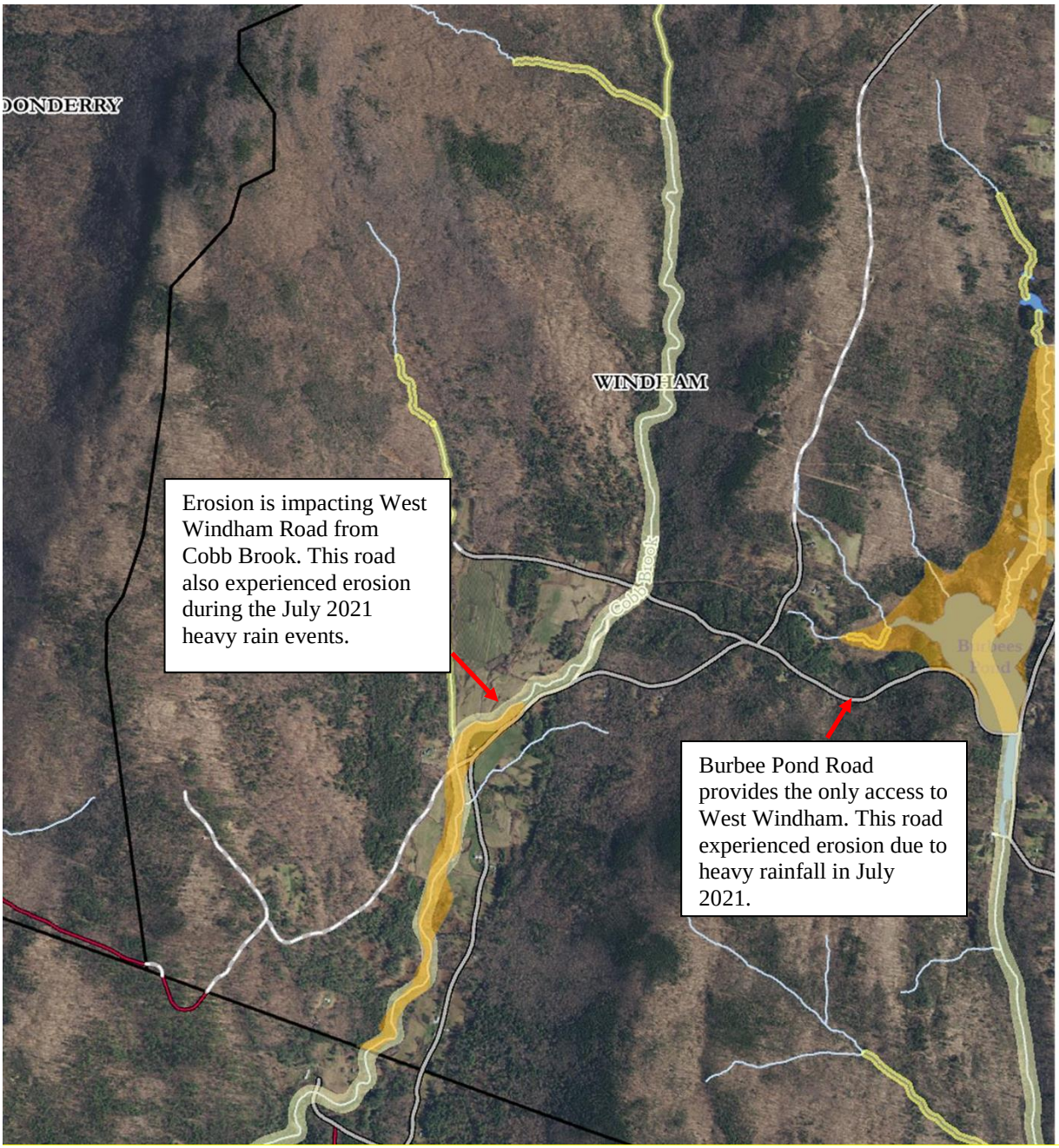
The northern half of Windham is shown in the above map. The orange shaded areas are the FEMA "A level" Special Flood Hazard Areas. The ANR mapped River Corridors are shown in white and the 50-foot buffers for streams in yellow. The SFHA areas are located along the Middle Branch of the Williams River on the western border of town adjacent to Route 11, the South Branch of the Williams River along Popple Dungeon Road, and the Saxtons River along Route 121.

Popple Dungeon and Route 121 are both at risk of fluvial erosion due their proximity to the South Branch of the Williams River and the Saxtons River. The town has noted that Popple Dungeon Road experiences flooding during heavy rain events. The town has been working on improvements along Route 121 to mitigate the risk of fluvial erosion. This has included completing stone lined ditching along the dirt portion of the roadway and working on a bridge replacement project for an undersized culvert that has experienced multiple washouts.



The above map shows the center and southeastern parts of Windham. Burbee Pond, Turkey Mountain Brook, and a portion of an unnamed stream adjacent to Windham Hill Road are in the SFHA, as shown in orange. Burbee Pond and Turkey Mountain Brook are prone to flooding, but the town did not note any flood events on the unnamed stream in the SFHA.

Windham experienced heavy rain events in the summer of 2021 that impacted several roads. High water in Turkey Mountain Brook led to flooding and erosion in the area around the intersection of Windham Hill, Abbott, and Burbee Pond Roads. These storms also led to road washouts on Wheeler Road and Chase Road in the southern part of town.



The above map shows the southwest part of Windham. Poritions of Cobb Brook are located in the SFHA, as shown in orange. The town is currently dealing with a fluvial erosion issue on West Windham Road from Cobb Brook. Erosion has encroached on the base of the road and the course of the stream has been re-establisehd. The town is working on a plan to stablize the bank for the long term. Burbee Pond Road and West Windham Road were also damaged by the heavy rain events in the summer of 2021 that impacted much of the southern part of the town. It should be noted the only access to West Windham is on Burbee Pond Road that crosses along the southern end of Burbee Pond in the SFHA. If this road were to be damaged, West Windham would be inaccesible.

VTrans Highway Flood Vulnerability and Risk Mapping

As part of the scope of work for the Transportation Resilience Planning Tool, the Vermont Department of Transportation has developed metrics to quantify the flood vulnerability and risk of bridges, culverts, and road embankments throughout the state.[7] Vulnerability assessments were completed for the following infrastructure:

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

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

The vulnerability map below provides an analysis of the probability of inundation, erosion, or deposition and the potential severity of the damage to infrastructure or structure. The map identifies sections of Route 11, Route 121, Wheeler Road, and Popple Dungeon Road as being highly vulnerable road segments. The following structure is identified as highly vulnerable: bridge on Route 121 just south of intersection with Route 11.

Flood Vulnerability - Structures

- High
- Moderate
- Low
- Not Vulnerable

Flood Vulnerability - Road Segments

- High
- Moderate
- Low
- Not Vulnerable

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

The transportation criticality map below provides an analysis of the relative importance of each segment in the roadway network. Only segments of Route 11 and Windham Hill Road are identified as moderately critical road segments. All structures are identified as low or not vulnerable.

The map below provides an analysis of overall flood risk based on the average of generalized vulnerability and criticality. Segments of Route 11 are identified as high or moderate flood risk. Portions of Route 121 are identified as moderate flood risk. There are several structures on Route 121 identified as moderate flood risk, in particular on Saxtons River in the vicinity of White Road and Mercy Road.

Extent
The extent of a flood event can vary from minor to major. A minor flood event may occur due to a typical rain event, where a major flooding event may result from a heavy summer thunderstorm, rapid spring snow melt, a tropical depression or storm, or rain falling on frozen ground. It is important to note that this plan is looking at flooding data primarily as it relates to resulting fluvial erosion.

Extent for inundation flood events:
Inundation flooding occurred in Windham during the summer of 2003 and during Tropical Storm Irene in 2011 along Popple Dungeon Road. There are three stream gauges that measure watersheds in Windham.[8] Data from these gauges are shown below. All three gauges are located downstream from the town of Windham so are not necessarily reflective of inundation flood events that have impacted Windham.

- USGS 01154000 SAXTONS RIVER AT SAXTONS RIVER, VT – The Saxtons River drains a northeastern section of Windham. The highest recorded measurement on the Saxtons River was 19.58 feet, which was measured during TS Irene on August 28, 2011. Before this the highest was 17.9 feet measured in September of 1938. Average height for this reach is about 5.62 feet.
- USGS 01155910 WEST RIVER BELOW TOWNSHEND DAM NEAR TOWNSHEND, VT – This is the gauge closest to Windham to the south. The highest recorded measurement on the West River at Townshend was 8.89 feet, which was measured on April 24, 1996. The Townshend dam is a flood control dam and this measurement was below flood stage (11 feet).
- USGS 01153550 WILLIAMS RIVER NEAR ROCKINGHAM VT – The northern portion of Windham drains to the Williams River. The highest recorded measurement on the Williams River near Rockingham was 17.94 feet, which was measured during TS Irene on August 2/8, 2011. Before this the highest was 10.69 feet measured on March 31, 1987. Average height for this reach is between 5 and 6 feet.

Extent for fluvial erosion events: Data on the extent for fluvial erosion is unavailable as fluvial erosion loss has not historically been collected after flooding events. There are several known locations in Windham that regularly experience fluvial erosion. These include Popple Dungeon Road, Route 121, West Windham Road, Wheeler Road, and Chase Road. The town experienced especially significant erosion events during Tropical Storm Irene in 2011 and during heavy rainstorms in July 2021.

Probability
Inundation flooding and fluvial erosion is highly likely, as determined by the Planning Committee. There are events every year, especially during spring snow melt and heavy rain events in the summer season. Fluvial erosion is highly likely and exists in Windham. Similar to other communities in the area, the damage caused by Tropical Storm Irene in 2011 de-stabilized many steep-sloped out areas and washed out riparian areas adjacent to roads and streams leaving Windham more susceptible to future flood events.

Past Occurrences
Since 1996, when National Climatic Data Center detailed records start, there have been 50 flood events in Windham County, Vermont.[9] There have been 16 Federal Declared Disasters since 1953 in Windham County as a result of flood events.

[8] Stream gauge data courtesy of http://waterwatch.usgs.gov
[9] National Climatic Data Center http://www.ncdc.noaa.gov/. Data generated February 2023 via database download.

Disaster Declarations for Windham County, VT					
Disaster Number	**Declaration Date**	**Incident Type**	**Title**	**Incident Begin Date**	**Incident End Date**
4621	9/29/21	Severe Storms	SEVERE STORMS AND FLOODING	7/29/2021	7/30/2021
3567	8/22/21	Hurricane	TROPICAL STORM HENRI	8/22/2021	8/22/2021
4356	1/2/18	Severe Storms	SEVERE STORMS AND FLOODING	10/29/2017	10/30/2017
4043	11/8/11	Severe Storms	SEVERE STORMS AND FLOODING	5/20/2011	5/20/2011
4022	9/1/2011	Hurricane	TROPICAL STORM IRENE	8/27/2011	9/2/2011
3338	8/29/2011	Hurricane	HURRICANE IRENE	8/26/2011	9/2/2011
1698	5/4/2007	Severe Storms	SEVERE STORMS AND FLOODING	4/15/2007	4/1/2007
1559	9/23/2004	Severe Storms	SEVERE STORMS AND FLOODING	8/12/2004	9/12/2004
1488	9/12/2003	Severe Storms	SEVERE STORMS AND FLOODING	7/21/2003	8/18/2003
1336	7/27/2000	Severe Storms	SEVERE STORMS AND FLOODING	7/14/2000	7/18/2000
1307	11/10/1999	Severe Storms	TROPICAL STORM FLOYD	9/16/1999	9/21/1999
1124	6/27/1999	Flood	FLOODING	6/12/1996	6/14/1996
1101	2/13/1996	Flood	ICE JAMS AND FLOODING	1/19/1996	2/2/1996
518	8/5/1976	Flood	SEVERE STORMS, HIGH WINDS & FLOODING	8/5/1976	8/5/1976
397	7/6/1973	Flood	SEVERE STORMS, FLOODING, & LANDSLIDES	7/6/1973	7/6/1973
277	8/30/1969	Flood	SEVERE STORMS & FLOODING	8/30/1969	8/30/1969

Since 2000, the town has experienced several heavy rain and flooding events as described in the table below. The information provided here is based on local knowledge about the impacts of these events on the community. Photographs from some of the events are provided in the appendix.

Date	**Event**	**Location**	**Extent**
July 2021	Flooding and fluvial erosion	Wheeler, Chase, West Windham, and Burbee Pond Roads	Heavy rains caused significant erosion on all roads in southern part of town. Total damages estimated at $600,000
October 2014	Flooding and fluvial erosion	Wheeler Road	$64,000 of damage on Wheeler and Horesnail Road due to washout and culvert damage
July 2014	Flooding and fluvial erosion	Town wide	Major road damage on Horsenail Road. Total damages estimated at $211,000
August 2011	Tropical Storm Irene; flooding, fluvial erosion, damaging winds	Region wide	Extreme rainfall averaging 4-8 inches within 12 hours resulted in catastrophic flooding Countywide. Tropical Storm Irene caused $872,359 worth of damages to the Town of Windham.
August 2003	Flooding and fluvial erosion	Region wide	A slow moving storm produced 3 to 4 inches of rainfall in about four hours time. County Highway 121 was washed out in the Town of Windham. Total damages in Windham cost $942,621.

Heavy Snow/Ice Storm/Extreme Cold

Description

For the purposes of the hazard mitigation plan, the Planning Committee elected to address the hazards of heavy snow, ice storms, and extreme cold together because the three hazards often impact the community at the same time and require similar mitigation actions. These hazards are common occurrences in Windham during the winter months and the town is well prepared to respond to them. The town's road crew is experienced and has the proper equipment to maintain town roads during snow and ice storms. The town uses the town office as emergency shelters that can be used by residents who have lost power as a result of winter storms. These facilities do not currently allow for overnight accommodations.

In Vermont, snow and ice storms occur as a result of the combination of moisture content in the air, direction of airflow, and interaction between warm air masses from the south and cold air from the Arctic. Generally, the most significant snowstorms are a result of weather systems moving up along the Atlantic coast bringing in moisture that interacts with colder air inland. These storms are referred to as Nor'easters. Extreme cold events most often occur as a result of cold air masses located in the Arctic sinking south allowing for colder air to infiltrate into Vermont.

Heavy snow storms and ice storms can contribute to hazardous travel conditions that can result in vehicle accidents and injuries, and limit residents' ability to access goods and services. Ice storms can weigh down tree and power lines resulting in power outages. The region has also been experiencing heavier wet snowstorms in recent years, which have a similar impact to ice events on utility lines and infrastructure.

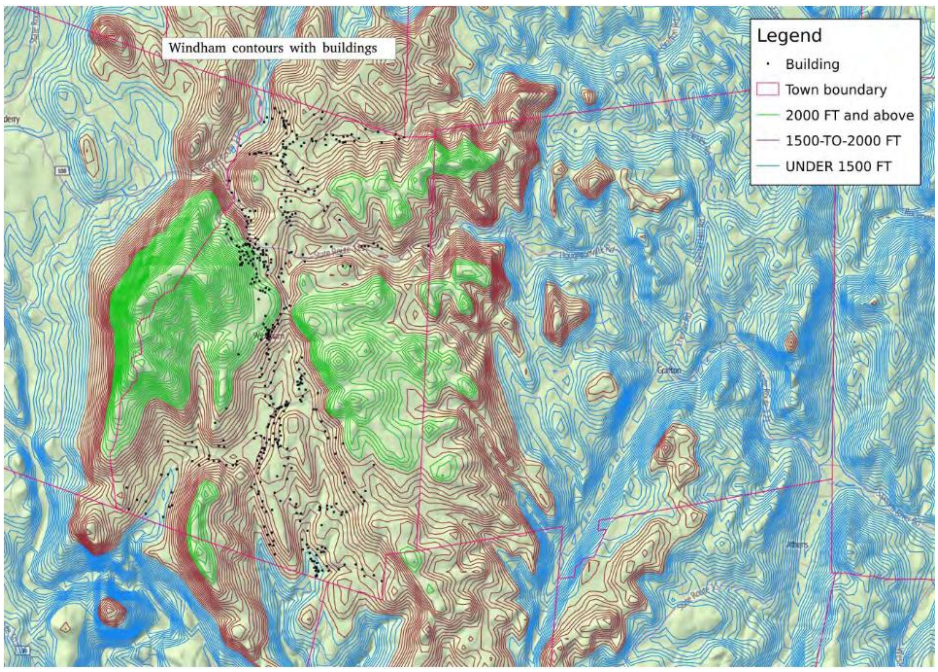
Extreme cold can impact public health because there is an increased risk of frostbite and hypothermia as a result of exposure. When extreme cold events are accompanied by winter storms and power outages residents need access to warming shelters for protection from harsh conditions.

The most significant warming trends in New England as a result of climate change are occurring in the winter months. Since 2000, the state has seen an overall decline in total seasonal snowfall. There has also been a significant decrease in the number of days with more than 1-inch of snow cover since 1963, with a steeper decline beginning in the 2000s. At the same time, Vermont has seen an increase in the severity of winter storms in terms of precipitation amounts. The region has experienced more ice storm events in recent years as a result of these warming trends as well.

Geographic Area of the Hazard

Heavy snow, ice storms, and extreme cold events impact the entire community of Windham and are not isolated to specific geographic areas of the town. Windham's varied topography, with elevations of 1,500 to 2,400 feet, can result in unpredictable patterns of snow accumulation. Generally, areas in higher elevations see higher snowfall totals than those areas in lower elevations in town. Due to Windham's location in a higher elevation area, it tends to see more significant snowfall than other parts of the region.

The map on the following page shows the location of structures in Windham and the topography of the community. The brown contour lines represent elevations between 1,500 – 2,000 feet and the green contour lines show areas above 2,000 feet in elevation. As can be seen on the map, nearly all buildings in the town are at elevations above 1,500 and a large number are located at elevations over 2,000 feet, in particular around the former Timberside Ski Area.



Impact

The biggest potential impact of heavy snow, ice storms, and extreme cold is on public health. Snow and ice storms can result in hazardous driving conditions which can lead to accidents that cause serious injury or death. Two main roads into Windham (Route 121 and Windham Hill Road from Route 30) are both very steep, so they pose a particular safety risk due to icing and heavy snow and could cut off the town if the roads are impassable. Many private residences have long and sometimes steep driveways given the topography of the town. This can result in vulnerable populations being isolated or having difficulty returning to residences due to heavy snow or icy conditions. Snow and ice can also lead to fallen power lines and trees resulting in power failures and road closures. Because of Windham's remote location, it can take longer to restore power in the community than other locations in the region.

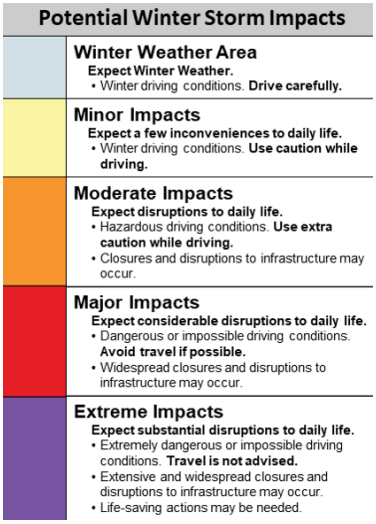
Storms with heavier wet snow can lead to increased risk of heart attacks resulting from shoveling. Extreme cold can result in hypothermia and frostbite as a result of exposure if residents are not properly prepared for severe conditions. For residents that do not have a source of backup heat or generator, there is an increased risk of structure fires if unsafe heating sources are used. Elderly residents are particularly vulnerable to these risks.

Damage to property and infrastructure from heavy snow and ice storms can vary depending upon wind speeds, snow or ice accumulation, storm duration, and structural conditions (such as heavy snow and ice accumulation on large, flat roofed structures). The assessed value of all properties in Windham is $107,709,800 as of 2021. Assuming a range of town-wide damage of just 1%, a heavy snow or ice storm could result in approximately $1 million of total damage. The town garage has a flat roof and parts of the school building are also flat roofed, so they are of particular concern. Problems sometimes arise with finding locations to deposit large quantities of snow during the season because there is not always a mid-season melt off. Snow amounts are not necessarily a problem for residents, but heavy, wet snow, or the event of rain on snow or frozen ground, are usually more problematic.

Extreme cold can also result in burst water pipes fore residences and businesses, resulting in property damage and lost business. As the region is seeing less snowfall and more days with exposed ground in the winter, extreme cold can cause deeper soil frosts that impact road infrastructure.

Extent

The National Oceanic and Atmospheric Administration's Winter Storm Severity Index helps communities prepare for forecasted storms based on the anticipated impacts. The index ranks storms based on minor, moderate, major, or extreme impacts:



The National Weather Service also issues watches, warnings, and advisories for extreme cold temperatures. These are aimed at informing the public so they are able to prepare in advance of extreme cold events.

Probability

Winter storms and extreme cold events are highly likely to occur in Windham on an annual basis. Every winter there is a weather-related incident where people in town will lose power for a few days.

Past Occurrences

Heavy Snow and Ice Storm

There have been three winter storms in recent history in Windham County that were Disaster Declarations:

- Ice Storm (1201): January 6 – 16, 1998
- Snowstorm (3167): March 5 – 7, 2001
- Severe Ice Storm (1816): December 11 – 18, 2008

A Windham resident provided data on seasonal snowfall amounts for this plan through the winter of 2015. The highest snowfall season for Windham on record is the season of 2002-2003. It is notable there is a clear trend of less annual snowfall.

Season	Amount of snow (in inches)
2002-2003	177
2003-2004	153
2004-2005	118
2005-2006	84
2006-2007	105
2007-2008	119
2008-2009	138
2009-2010	100
2010-2011	81
2011-2012	70
2012-2013	115
2013-2014	no record
2014-2015	100

Below is a summary of major snow and ice events that have occurred since 1996 based on local knowledge and the 2018 Vermont State Hazard Mitigation Plan[10]:

- March 13 – 15, 2023: Prolonged major snow event. Snowfall totals varied greatly based on location and elevation. Towns in the southern Green Mountains received up to 40 inches of snow. Storm produced heavy, wet snow that led to numerous downed tress and power lines resulting in widespread power outages. Some locations were without power for 4-5 days.
- November 25 and 26, 2014: Major snow event followed by a major rain event resulting in a thick layer of ice that covered everything, weighing down power lines, resulting in widespread power outages. The longest power outage was seven days for some residents in Windham.
- February 25, 2011: A storm system produced a widespread swath of heavy wet snow across southern Vermont. Snowfall rates of 1 to 2 inches per hour occurred with total amounts of 12 to 17 inches.
- January 19, 2011: Snow and sleet accumulations across southern Vermont varied from 3 to 9 inches, with ice accumulations of up to a half of an inch.
- January 12, 2011: Heavy snow fell across southern Vermont with snowfall accumulations ranging from 14 inches up to 3 feet. A mesoscale snowband set up across the western New England, including southern Vermont, resulting in snowfall rates of 3 to 6 inches an hour.
- December 11, 2008: Snow and ice combined with high winds resulted in extensive power outages. Southern Vermont was especially hard hit by the storm. Up to 40,000 homes statewide were without power, many for several days.
- March 20, 2002: Air was just cold enough for the precipitation to fall mostly as snow across southern Vermont. This snowstorm was elevation dependent, as a swath of 6 to 12 inches accumulated across the higher terrain of Bennington and Windham Counties, especially in the area of Windham. Snowfall amounts included 9 inches at Peru, 9 inches at Townsend Lake and 12 inches at West Wardsboro.
- March 2001: A series of snowstorms impacted Vermont in March 2001 ranging from 10 – 30 inches of snow with each storm.

[10] 2018 Vermont State Hazard Mitigation Plan

- November 22, 1997: A low pressure system south of Long Island produced heavy wet snow across southern Vermont. Snowfall averaged 4 to 8 inches in Bennington and Windham Counties. The heavy wet snow downed trees and power lines, which produced scattered power outages. The power outages were most widespread in Windham County.
- November 26, 1996: Low pressure system brought a combination of snow and freezing rain to southern Vermont. Over Bennington and Windham Counties, snow and heavy freezing rain downed trees and power lines and caused numerous accidents. Across southern Vermont approximately 10,000 customers lost power.

Extreme Cold

According to local knowledge and NOAA's storm event history, Windham has been impacted by the following extreme cold events since 2000:

- December 27, 2017 – January 1, 2018: Low temperatures were as low as -5˚F to -14˚F with wind chills as low as -37˚F in Windham County.
- February 13, 2016: Low temperatures ranged from -12˚F to -28˚F with winds gusting 20 to 40 mph. Wind chill values reached -25˚F to -45˚F in Windham County.
- February 15, 2015: Low temperatures reached -20˚F in Windham County with wind chill values as low as -25˚F to -45˚F. Reports of burst water mains and pipes.
- January 8, 2016: Coldest temperatures were experienced in the southern Green Mountains with morning lows between -15˚F to -35˚F. Wind chills in the mountains reached from -40˚F to -70˚F. The cold weather results in delayed school openings and closures.
- January 23, 2011: Low temperatures ranged from -10˚F to -25˚F in Windham County with wind chill values readings of -25˚F to -35˚F.
- January 14, 2009: Arctic cold front resulted in temperatures falling over 20˚F within several hours. Nighttime lows were -10˚F to -30˚F across Vermont with isolated readings of -40˚F.
- March 6-9, 2007: This multi-day cold event resulted in several nights of temperatures below zero and as low as -34˚F. Wind chill readings were -20˚F to -40˚F. Daytime temperatures remained around 0˚F on March 7th.
- January 17, 2000: Cold temperatures between 0˚F to -10˚F along with winds between 15-30 mph across southern Vermont result in wind chill values of -50˚F to -60˚F.

Strong Wind Event

Description
Strong wind events in Windham can result from thunderstorms, hurricanes or tropical storms, tornadoes, or wind storms. Each of these hazards are distinct and can occur in the community at different times of the year with different types of potential impact. Thunderstorms and tornadoes are most common in the spring and summer. Hurricanes and tropical storms generally occur in the late summer and fall. Wind storms can occur at any time of the year, including in the winter months. It is important to note that while all of these events could occur in Windham, thunderstorms and wind storms are the most likely, followed by tropical storms, and last hurricanes and tornadoes. In addition, thunderstorms, hurricanes, and tropical storms can also be accompanied by heavy rain that results in the additional hazards of flooding and fluvial erosion. Similarly, wind storms can be accompanied by heavy snow and ice storms.

The primary concern with wind events is their potential impact on infrastructure and property. Strong winds can result in downed trees and tree limbs, which can cause power outages, blocked roads, and property damage. There is also a risk to human life as downed trees and limbs can cause injury or death. A secondary issue is fallen trees and limbs can dam waterways and drainage ditches, which can result in flooding.

Geographic Area of the Hazard
The entire community of Windham is susceptible to high wind events. Winds associated with thunderstorms and wind storms generally blow from west to east. Higher elevations and exposed areas are particularly susceptible to strong winds, which includes the town of Windham. Glebe Mountain on the western side of town and the higher elevation areas on the eastern side of town are especially vulnerable to high winds. The wind impact from tornadoes tends to be very localized depending on where a tornado touches down and is much less predictable.

Impact
The main potential impacts from strong wind events are on infrastructure and property. Strong winds can result in downs trees and tree limbs, which can significantly impact the electrical grid and result in long-term outages. Falling trees and limbs can also damage homes and businesses and result in road closures.

Extent
Hurricane/Tropical Storm: A tropical cyclone with speeds of 74 mph or higher is classified as a hurricane and a storm with wind speeds between 39 to 73 mph is classified as a tropical storm. These storms lose wind speed as they move inland from the coast. Most of the storms that may impact Windham have lost wind speed and tend to be tropical storms by the time they impact the community. In addition to high winds, tropical storms bring heavy rains that can result in inundation flooding and fluvial erosion. This is the primary hazard associated with tropical storms for Windham, as was seen during Tropical Storm Irene in 2011.

Thunderstorm: summertime thunderstorms are often accompanied by high winds. Storms can include what are known as straight-line winds that can exceed 50 mph.

Wind Storms: wind storms can occur at any time of year. The National Weather Service issues a wind advisory for winds sustained at 31 to 39 mph for at least one hour or any gusts between 46 to 57 mph. A High Wind Warning is issued for sustained winds of 40 to 73 mph or gusts of 58 mph or higher.
Tornadoes: tornadoes are rare in Vermont and since 1950 the state has only experienced 49 tornadoes. The Fujita Scale is used to measure the intensity of a tornado. The only types of tornadoes that have

impacted the state are EF0 (minor or no damage), EF1 (moderate damage), and EF2 (considerable damage). The scale goes up to EF5, which are extreme damage storms.

Probability

The Planning Committee ranked high wind events as the third most likely hazard to impact the community after fluvial erosion and heavy snow. Windham is more likely to experience high winds as a result of thunderstorms, wind storms, and tropical storms. The community is less likely to be impacted by a hurricane or tornado, although the town did have a confirmed tornado touchdown in 2019.

Past Occurrences

The following is a list of strong wind events that have impacted Windham or nearby areas in recent years. Some of these, such as the high winds associated with Tropical Storm Irene, also include flooding and fluvial erosion that impacted Windham more than the high winds:

- August 21, 2019: An EF1 tornado touched down in the Timberside section of Windham with a path length of 0.75 miles and width of 350 yards. The tornado resulted in shingle and siding damage to several homes. Dozens of trees were uprooted. NWS estimated maximum wind speeds of 105-110 mph, which is a high end EF1 tornado.
- October 29, 2012: Hurricane Sandy resulted in high winds, especially in the southern part of the state. Estimated damages from the storm were under $1 million. A total of approximately 64,600 customers lost power statewide.
- August 28, 2011: Winds associated with Tropical Storm Irene were between 35 to 45 mph with gusts up to 60 mph.
- April 15, 2007: High winds resulted in many downed trees and damages to homes. This event primarily impacted southern Vermont. There was an estimated $4.8 million in damages total.
- June 5, 2002: Thunderstorms resulted in two tornadoes in the nearby towns of Wilmington (EF2) and Woodford (EF1).
- September 16, 1999: Strong winds associated with Tropical Storm Floyd caused downed trees and power line. There was an estimated $675,000 in property damages from the event statewide.
- May 31, 1998: Strong straight-line winds resulted in damages in Windham and Benning Counties. Funnel clouds were reported in Brattleboro, but there was not a confirmed tornado. There was an estimated $630,000 in property damages from the event.

Wildfire

Description

Wildfires pose a unique danger to communities and individuals. Wildfire conditions are typically most dangerous in spring when dead grass and fallen leaves from the previous year are dry and in the late summer and early fall. Drought conditions and high winds also increase the risk of wildfire. The most common cause of wildfires in Vermont is humans through burning refuse, or untended or improperly extinguished campfires. Lightning strikes are also a less common cause of fires. The Windham Volunteer Fire Company handles wildfire control and call on assistance through the mutual aid system if needed.

FEMA has the following four categories for wildfires:

1. Wildfire: fueled by natural vegetation. These most often occur in national forestlands. Federal agencies are responsible for fire management.
2. Interface or Intermix Fires: vegetation and built environment (buildings) provide fuel for fire.
3. Firestorms: occur during extreme weather events.
4. Prescribed Fires and Prescribed Natural Fires: intentionally set for a beneficial purpose.

Most of Windham is heavily forested and there is potential, given the right conditions, for wildfires. As residential areas expand into forested areas, fires increasingly threaten people and residences. Protecting structures in these areas from fire poses special problems and can stretch firefighting resources. If heavy rains follow a major forest fire, other natural disasters can occur, including landslides, mudflows, and floods. Once ground cover has been burned away, little is left to hold soil in place on steep slopes and hillsides. A major wildfire can leave a large amount of scorched and barren land, and affected areas might not to return to pre-fire conditions for decades.

Climate change is anticipated to impact the likelihood of wildfire occurrence in Windham in the future. As the community experiences warmer summer days and increasing chances of drought, the risk of wildfire will likely increase.

Geographic Area of the Hazard

Because most of Windham is forested, the geographic area of the hazard covers the majority of the community. Areas prone to wildfires are described as “interface” or “intermix.” The interface areas can be found along the divide between urban scale development and natural areas. Windham is characterized by “intermix” areas where residential dwellings are interspersed within heavily forested areas.

According to the Wildland Urban Interface map created for Vermont by the University of Wisconsin in 2010, specific areas in town that may be more susceptible to wildfires are the lands along Windham Hill Road, Wheeler Road, Chase Road, Abbot Road, Route 121, and Hitchcock Hill Road. The map to the right shows identified “intermix” areas in orange. This makes sense as these are the areas of town with the greatest concentration of residential dwellings, but are still primarily forest covered.

Impact

The potential impact of damage from wildfires is difficult to project because it depends on the location of the fire, when they are discovered, and the size of the burn. Wildfires can impact public infrastructure, utilities, private residences, and businesses. There is also the potential of loss of life if a wildfire results in

structure fires. Windham has large areas of forested land used for timbering operations and fires can have a significant impact on forestry industries if they burn productive tree stands.

Wildfire can pose a threat to critical structures. The most critical community facilities in Windham are the town office, Windham Elementary School, Town Meeting House, Town Highway Garage, and Windham Volunteer Company. All are generally located in areas identified as "intermix" with some risk of wildfire. There are open spaces around these structures so they are not particularly vulnerable to wildfire.

Extent

The extent of wildfire risk can be hard to predict because it is so dependent on soil moisture, drought, and current weather conditions. The U.S. Forest Service maintains the Wildland Fire Assessment System, which provides national fire danger ratings and is updated daily. Danger level is ranked as low, moderate, high, very high, or severe. Wildfire conditions are typically most dangerous in spring when dead grass and fallen leaves from the previous year are dry and in the late summer and early fall.

Probability

The probability of a large-scale wildfire occurring in Windham is relatively low. Small wildfires may occur, but if the Windham Fire Company is able to quickly respond they may have little or no impact. Conditions can vary significantly year-to-year in terms of precipitation and drought conditions, which have significant impact on the likelihood of a fire occurring.

Past Occurrences

According to the town, the largest wildfire in Windham was approximately 5-10 acres off of Scott Pet Road in 2009 in a heavily forested cliffside area. On average the Windham Volunteer Fire Company responds to roughly 2 – 3 wildfires every year. The town does not have data on the number of acres burned per event. The Fire Company is part of a mutual aid system, so some of these wildfires may occur outside of Windham as well.

Invasive Species

Description

An invasive species is considered to be as an exotic species that is introduced into an ecosystem in which the species is not native and causes or is likely to cause environmental or economic harm, or harm to human health.[11] Invasive plants and insects are a region-wide hazard in Windham County. However, each town will be confronted with a distinct mix of invasive species that thrive under the particular ecological conditions of that place. Each invasive species has a different potential to spread to other areas based on the rate at which it spreads and the ecological suitability of the ecosystem that it is expanding into.

Impacts

Invasive Plants

In the absence or near absence of natural predators or controls, invasive non-native plants are able to spread quickly and out-compete native plants. Invasive plant species can create monocultures, which often provide poor habitat for native animals that have not evolved with the non-native species, resulting in degraded habitat value and increased vulnerability. Invasive species tend to come up early in the growing season and flower early, allowing them to get established before native plants.

Japanese knotweed, vtinvasives.org

The invasive plant issue in the Windham Region escalated in the early 1990s. Invasive plants tend to thrive in disturbed areas. Within the Windham Region, invasive species are more prolific in the towns along the Connecticut River than in communities to the west because these towns are more populated, contain major transportation routes, such as Interstate 91 and the rail corridor, that serve as vectors for their expansion, and tend to have significant land disturbance resulting from development. Some of these invasive plant species were originally planted because of their perceived positive aspects, such as their ability to grow in difficult growing conditions, growing season length, large seed production, and ornamental value. These features are also a reason that these plant species have become invasive in our region.

Invasive plants impact the natural environment by crowding out of native plants and resulting in diminished habitat quality. Many of these species also have the potential of impacting local infrastructure including roads and utility line areas. Certain types of invasive plants can damage roads through their root structure growth and can also lead to overgrown vegetation along roads reducing visibility. The following invasive plants are thought to likely pose a threat to native plants and infrastructure in Windham. This list was created based on local knowledge of invasive plants already present in the community and the Vermont Mapping for Healthy Forests project, which is a volunteer effort to identify and map the presence of invasive plant species statewide. Information was also taken from the Vermont Invasives website to develop this table.

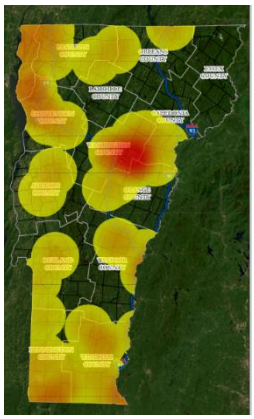
[11] (USDA) https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ct/technical/ecoscience/invasive/?cid=nrcs142p2_011124

Species	Habitats	Impacts
Japanese Knotweed	Banks of rivers and streams, disturbed areas, forest edges, floodplains, fields	Quickly form dense stands and crowd out native vegetation. Stands can block small waterways leading to bank erosion and reduced riparian habitat quality. Also common along roadsides and can result in maintenance concerns for right-of-way areas. Extensive plant roots can damage roads and overgrown stands can result in diminished visibility for drivers.
Wild Parsnip	Disturbed areas, such as roadsides and utility ROWs	Displaces native plants in fields, meadows, and open disturbed areas. Causes intense, burning rash on contact with human skin.
Buckthorn, Common and Glossy	Disturbed areas, forests, forest edges, meadows, fields	Invades forests and can form dense thickets that crowd out native species. Buckthorn can increase amount of nitrogen in soils impacting native plant community. Common along roadsides resulting in right-of-way maintenance issues.
Garlic Mustard	Disturbed areas, roadsides, utility ROW, abandoned fields	Crowds out native plant species. Plant has a high shade tolerance that allows it to form dense stands in high quality mature woodland areas
Multifora Rosa	Disturbed areas, meadows and fields, shores of rivers and lakes	Plant has high tolerance for variety of soil, moisture, and light conditions and can thrive is multiple habitats. Forms dense thickets that crowd out native species.
Common Reed	Disturbed areas, shores of rivers and lakes, wetland edges	Replaces native grasses, sedges and herbaceous plants. Provide poor habitat for insects, birds, and amphibians compared to native species. Concentration of reeds can result in higher mortality rates for fish populations.
Wild Chervil	Abandoned fields, disturbed area, yard or gardens	Plant grows aggressively and is tall and so outcompetes native vegetation by forming extensive stands that shade other plants.

Preventing the spread of invasive plants is something that everyone in a community can assist with. The first step is to only plant native species on your property and to remove invasives that exist. Additionally, it is important that when soil is disturbed, to plant native cover before invasives have a chance to establish themselves. Proper disposal of non-native vegetation is critical to avoid its spread, safely burning the material when possible. Avoid transporting non-native plants, including firewood and garden debris, as this is critical to prevent the spread of non-native seeds and insects. The website VTinvasives.org is a great resource for towns interested in engaging in activities around invasives, including using their template to develop a custom invasive species plan for your town.

Invasive Insects

Non-native invasive insect species cause irreversible impacts to tree health, forest composition, and biodiversity. This plan highlights three non-native insects that currently threaten Vermont: Emerald Ash Borer (EAB), Asian longhorned beetle (ALB), and hemlock wooly adelgid (HWA). Hemlock wooly adelgid is currently present throughout the state. Initially discovered in Orange County in February 2018, Emerald Ash Borer (EAB) has spread quickly and has been determined to be present in the orange areas on the map to the left. Asian longhorned beetles have been identified within fifty miles of Vermont's border, but has not been confirmed in the state yet. Over half of the trees in Vermont are host species of one of these three invasive insects, representing a significant risk.[12]



Emerald Ash Borer Map

Emerald Ash Borer

The Emerald Ash Borer (EAB), *Agrilus planipennis*, is an exotic beetle that was first discovered in Michigan in 2002. EAB has not been confirmed in Windham, but it has been confirmed in the adjacent communities of Londonderry in 2019 and in Townshend in 2022. The map to the right shows EAB infestation areas in Vermont as of January 2023. Darker oranges indicate a higher severity of infestation. Windham is currently shown being in a moderate severity area.

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

The EAB larvae feed in the tree cambium between the bark and wood of Ash trees, producing S-shaped galleries that girdle and kill branches and trees. Symptoms and signs include D-shaped adult exit holes, bark splitting, serpentine frass-filled (sawdust-like waste) feeding galleries, wood pecker feeding, crown dieback, and epicormic shoots (whips growing off the trunk and branches). Many of these symptoms and signs are similar to other insects and diseases of Ash trees.

Woodpeckers feed on EAB, but their population is not large enough to significantly impact the EAB population. Also, woodpeckers do not generally detect the insects in the trees until they have been present for about two years. One of the best diagnostic methods for detecting EAB is called "blonding". It occurs when woodpeckers, while foraging for EAB larvae, flake off outer layers of bark, revealing the lighter or blond-colored inner layers of bark.[13]

The main concern in Windham is the impacts of hazardous Ash trees to roads and power lines. Cutting dead trees is a very hazardous activity and the potential for numerous dead trees along roadways is a concern for protecting public safety and infrastructure. Green Mountain Power expects EAB to severely impact their grid over time and they are proactively removing vulnerable Ash trees near power lines in confirmed affected areas. In addition, towns will need to budget for removing dead or dying ash trees, and plan for the aesthetic and visual impacts caused by their loss. Windham has not yet done a comprehensive ash tree survey to know where vulnerable trees are located.

The loss of Ash trees will also have a significant ecological impact. There are over 40 arthropod obligate species that depend on the Ash tree for survival and would be threatened by the loss of trees. The ripple

[12] vtinvasives.org (accessed 3/8/23).

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

effects of the loss of these arthropods species and the interrelationships are not fully known at this point. Ash is a valuable tree for wood products and logging, so the economic impacts resulting from the loss of these trees could be significant.

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

Sustained cold leads to kill off of the adelgid insects. Mortality rates of even 91%, however, can still lead to population growth through the warm season because they reproduce asexually so it only takes one for the population to expand. The HWA mortality rate shifts each year based on temperature patterns throughout the year. As the climate warms, HWA mortality rates will decrease allowing this insect to increase its presence in Vermont.

Hemlock trees and whole stands of trees are showing signs of decline, but trees in Vermont have not been reported to have been killed from HWA alone. This is most likely because winter temperatures are cold enough to kill off a sufficient number of the HWA to give the tree a temporary reprieve. However, HWA does still weaken the trees to the point that other secondary stresses, such as funguses and disease, may result in their mortality. Another pest impacting this species, Hemlock elongate scale, was found recently for the first time in Guilford, Vernon, and Brattleboro.

HWA has not been identified in Windham, but it has been verified in adjacent towns including Jamaica and Townshend. In the Windham Region, it was initially found in Brattleboro in 2010 and is now found in approximately 15 towns in our area, and has been recently found in Springfield in Windsor County. HWA is moving south to north in lower elevations first, and is mostly throughout southern Vermont at this point.

Hemlock is a foundation tree species, and when hemlock stands die off invasive plant species tend to take over, causing wildlife habitat and water quality to decrease. Deer use hemlock stands in winter because of the cover a healthy tree provides, so there could be a detrimental impact to the deer population as a result of the loss of hemlock trees. Hemlocks provide shade to waterways, so their loss could mean warmer streams and lower water quality, potentially impacting aquatic life. While hemlock trees are comparatively less valuable than other tree species, it is used for logging and wood products so there are economic threats to its loss as well.

Asian Longhorned Beetle
The Asian Longhorned Beetle (ALB), *Anoplophora glabripennis*, is an invasive insect that feeds on certain species of hardwood trees, eventually killing them. ALB is native to eastern Japan, and Korea and was brought to the United States in packing material. ALB attacks a variety of native hardwood species, including maple, birch, elm, poplar, horse chestnut and willow. ALB prefers maples and does not feed on trees in the oak family. Upon hatching, the larvae tunnel through the heartwood of a host tree until fully grown. They then burrow out of the trunk as adult beetles. This process weakens the wood, making it prone to breakage, and can cause tree health to decline.

Outbreaks of this beetle pose a threat to healthy trees in forests in urban and suburban areas. The beetle has caused tens of thousands of trees to be killed in Massachusetts, New Jersey, and New York. The closest area to the Windham Region where the pest has been identified is Worcester County, Massachusetts (2008).[14] The State ANR has deployed flight intercept/pheromone traps for detection of ALB for the last several years. This monitoring included a site in Jamaica State Park in 2021, just to the south of the Windham town boundary.[15] About half of Vermont's trees are susceptible to Asian Longhorned Beetle and it will have a major impact if it ever becomes established in the state.

Symptoms and signs include oval to round wounds on the bark where the females have chewed out a site to deposit their eggs. Round emergence holes in the trunks and branches of trees. Piles of coarse sawdust at the base of trees. It is difficult to spot infected trees from the ground, so inspectors need to climb trees.

A primary concern with ALB is its potential impact on Maple trees and the state's maple syrup industry. Sugaring is also an important activity for residents, even if it is not done commercially. Sap can't be used once a maple is treated with insecticide, and the lag time before it can be used again is unknown. Fall foliage is a big draw for visitors to Vermont and Windham. The loss of tourism during the fall foliage season would have a significant negative economic impact.

Extent

Common habitat areas for invasive plant species include disturbed areas and along roadways and utility lines rights-of-way, both of which are present in Windham. While Windham has been less impacted by invasive plant species than communities in the Connecticut River Valley, there are still major roadways that traverse the town that are vectors for invasive species to expand. Waterways, such as the Williams River and Saxtons River, can also act as vectors for invasive plant species. Timbering activities are common in the Windham area, which result in land disturbance that provided a supportive environment for invasive plants.

Over half of the trees in Vermont are host species of one of these three main invasive insects, so the potential impact is great. EAB only feeds on Ash trees, which are 7% of Vermont's tree species and a strong component of beech and birch forest stands. Southeastern Vermont has primarily white ash and green ash, while black ash is less common as compared to northern Vermont. Ash trees along road rights-of-way have the highest potential for infestation of EAB.

Probability

The probability of invasive plants and insects impacting Windham is highly likely. Due to climate change and warmer weather patterns, it is anticipated that invasive plants and insects will have increasing impacts in Windham in the future. There are several invasive plants that are known to be present in town already, including Japanese Knotweed, Buckthorn, Wild Parsnip, and Wild Chervil. It can be assumed that other common invasive plants widely identified in the Windham Region, including purple loosestrife, Japanese barberry, multi-flora rose, cow parsley, garlic mustard, Asiatic bittersweet, and Common Reed, are also present in Windham.

[14] http://www.worcesterma.gov/city-manager/asian-longhorned-beetles

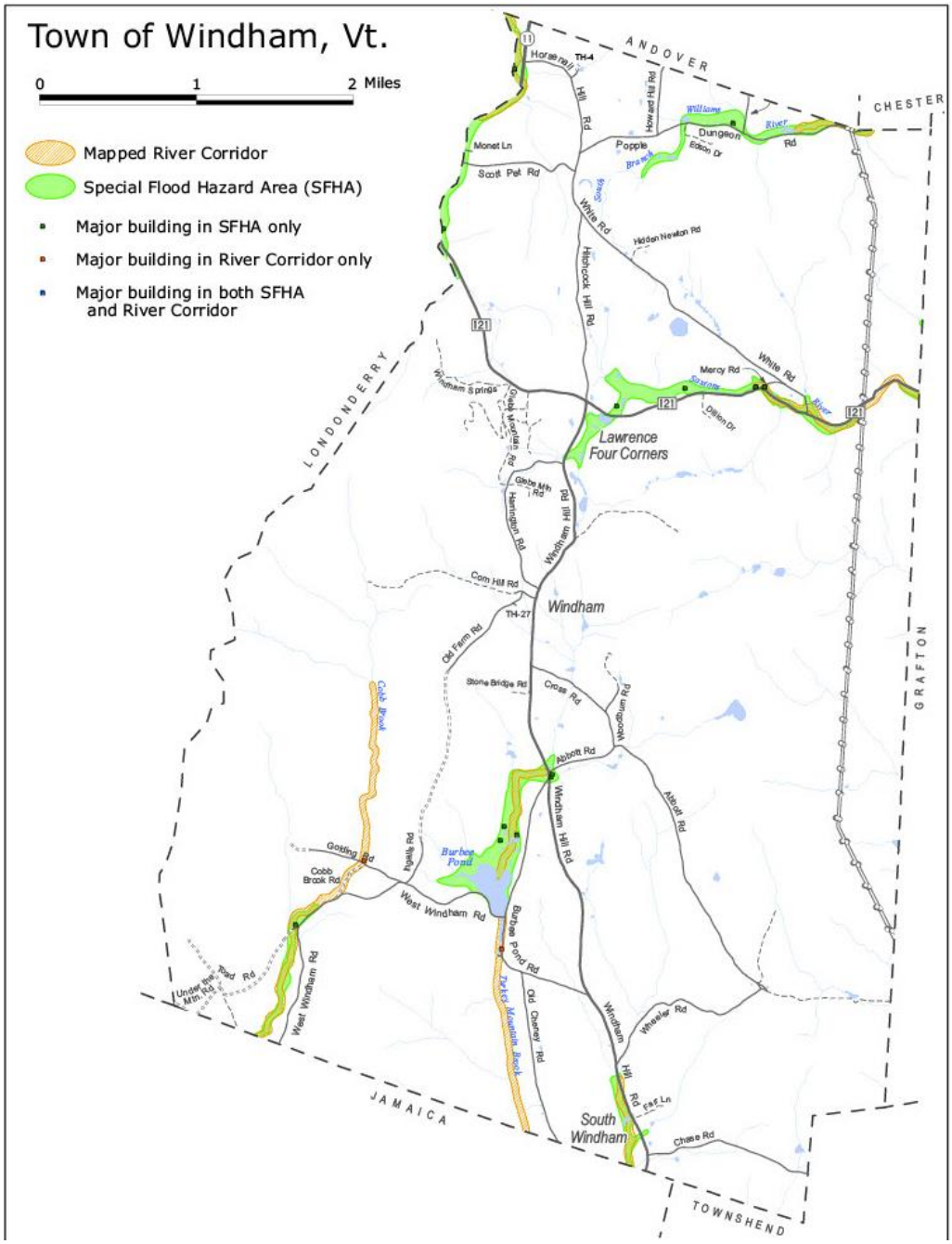
[15] Forest Insect and Disease Conditions in Vermont 2021, Agency of Natural Resources Department of Forests, Parks & Recreation

As mentioned earlier in this section, Emerald Ash Borer has not been confirmed in Windham, but due its confirmed presence in neighboring communities it is likely that the Emerald Ash Borer has found its way to Windham. Hemlock Woolly Adelgid has been confirmed in 15 other towns in the Windham Region, but is not yet confirmed in Windham. Additionally, certain invasive plant species are present in every town in the region. The Asian Longhorned Beetle is not currently present in Vermont.

ASSESSING VULNERABILITY

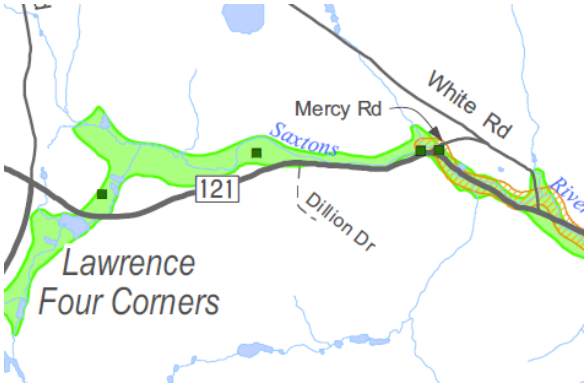
Structures in the SFHA and River Corridor

According to GIS mapping analysis completed by the Windham Regional Commission, there are 15 buildings within FEMA-designated Special Flood Hazard Areas (SFHAs), the mapped River Corridor, or both.[16] Of these, 13 buildings are only located in the SFHA, 5 buildings only in the River Corridor, and 3 buildings in both. The maps on the following pages show the location of these structures.

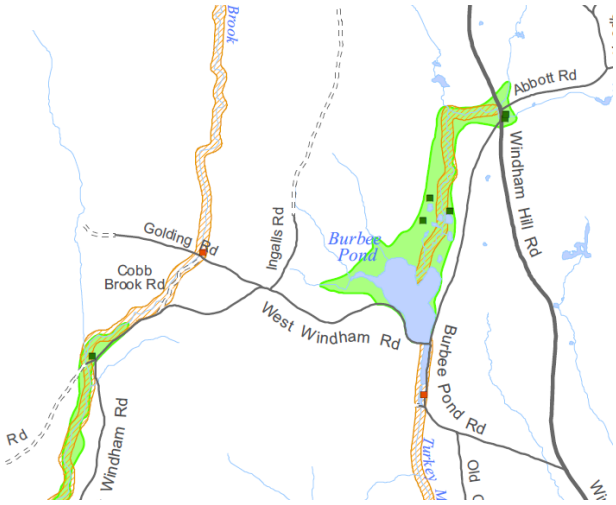


[16] GIS mapping analysis performed by WRC, March 3, 2023

There are two main areas in town where these vulnerable structures are located. There are four structure located along Route 121 between White Road and Windham Hill Road that are located in the Saxtons River SFHA.



The other area of town where there is a concentration of vulnerable structures is around Burbee Pond and in West Windham. There are two structures in the Turkey Mountain Brook SFHA adjacent to Abbot Road and Windham Hill Road. Three structures on the north side of Burbee Pond along Turkey Mountain Brook are located in the SFHA. In West Windham, one structure is located in the Cobb Brook SFHA and another one is located in the Cobb Brook River Corridor.



Properties within SFHAs that have a mortgage are required to purchase flood insurance. Data from Flood Ready Vermont shows that three of the buildings in the SFHA have flood insurance. Windham's participation in the National Flood Insurance Program (NFIP) gives residents access to discount flood insurance through the National Flood Insurance Program. Flood insurance can still be purchased privately, however it is more expensive. Development in SFHAs and River Corridors must meet additional construction standards as outlined in Windham's Flood and Fluvial Erosion Hazard Area Regulations, which is part of their zoning bylaws.

Repetitive Loss Structures

A Repetitive loss structure is an NFIP-insured structure that has had at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978.[17] According to FloodReady.Vermont.gov, Windham has no repetitive loss claims.[18] Severe repetitive loss (SRL) structures are NFIP-insured buildings that, on the basis of paid flood losses since 1978, meet either of the loss criteria described in the SRL section. SRL properties with policy effective dates of January 1, 2007 and later will be afforded coverage (new business or renewal) only through the NFIP Servicing Agent's Special Direct Facility (SDF) so that they can be considered for possible mitigation activities. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

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

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

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

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

In return for adopting floodplain management regulations, the federal government makes flood insurance available to the citizens of the community. In 1973, the NFIP was amended to mandate the purchase of flood insurance as a condition of any federally regulated, supervised or insured loan on any construction or building within the 100-year floodplain. In 2012, Congress passed the Biggert-Waters Flood Insurance Reform Act to reduce subsidies for structures built before the NFIP was instituted (called pre-FIRM structures). Over 50 percent of Vermont's NFIP policies are pre-FIRM, which means that flood insurance premiums for many will increase over the ensuing years.

While the NFIP floodplain management criteria are administered by states and communities, FEMA's role is to provide technical assistance and to monitor communities for compliance with the minimum NFIP criteria. Windham joined the NFIP on October 14, 2009 and is a member in good standing (CID 500290). The latest flood hazard area regulations were adopted in 2019 and are in the zoning bylaws. The latest Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) referred to in the development of this plan have an effective date of September 28, 2007.

[17] https://www.fema.gov/national-flood-insurance-program/definitions

[18] Report listing repetitive losses is available here:
https://floodready.vermont.gov/sites/floodready/files/documents/cisrpt_RL%206.26.18.PDF

The Floodplain Administrator reviews all development to determine if it is located in any floodplain boundaries. If so, the Administrator reviews the application to ensure that all relevant regulations are proposed to be adhered to and does any needed inspections before issuing a permit. ANR has 30-days to review all applications in floodplain boundaries and may offer comment to the town. ANR review opportunity is required before the town can issue a permit, and serves as a second technical review of applications which can assist the town in deciding whether to issue or deny a permit.

The latest record indicates that there are three active NFIP policies in Windham. These policies have a total value of $950,000. There have been no NFIP claims paid in Windham since they joined NFIP in 2009. The Town works with the elected officials, Windham Regional Commission, the state and FEMA to correct any compliance issues and prevent further NFIP compliance issues through continuous communications, training and education.

Vulnerable Community Assets in Windham

The town has identified the following critical community facilities. None of these structures are located in a SFHA or River Corridor. These structures are susceptible to damages associated with high winds and wildfires, although as noted earlier the risk of wildfire is very low. These structures are also vulnerable to heavy snow events and ice storms, but are not any more at risk than other structures in town.

- Windham Town Office (5976 Windham Hill Road): Town office is located adjacent to Windham Elementary School. The building was erected in 2001. The building includes office space for the Town Clerk, Town Listers, Town Treasurer, Planning Commission, Conservation Commission, and Zoning Board of Adjustment. Serves as the Emergency Command Center and a community Warming Center during the event of an emergency.
- Windham Town Garage (6626 Windham Hill Road): offices for town road crew and garage space for town trucks and equipment. The town is currently considering constructing a new salt shed on the property to replace the existing one.
- Windham Meeting House (26 Harrington Road): Structure built in 1802. Contains the Windham Town Library.
- Windham Volunteer Fire Department (290 White Road): offices for volunteer fire company and garage space for vehicles and equipment.
- Windham Elementary School (5940 Windham Hill Road): Serves Pre-Kindergarten through 6th grade. The building includes two classrooms, an auditorium, and offices.

Vulnerable Populations in Windham

Natural hazards do not impact all community members equally and some populations are more vulnerable to the effects of disasters than others. This is often referred to as the social vulnerability associated with a hazard event. Communities that are disproportionately likely to be affected by disasters include people with lower socioeconomic status, the elderly and youth, people with limited English proficiency, and persons with disabilities, including cognitive, physical, and sensory impairments. The needs of these groups to be considered in all three phases of a disaster:

- *Preparedness*: Which groups in the community are less likely to prepare for disasters and may lack necessary supplies.
- *Response*: Emergency responders may have a more difficult time contacting certain populations. Some residents may be more likely to need emergency medical care during disaster events.

- *Recovery*: Some groups will be more impacted than others in terms of economic and social stress, and not all residents will have the same ability and resources to recover and rebuild following a disaster.

The 2020 Town Plan indicates that Windham's population is ageing. Between 2000 and 2019 there was a clear trend in the increase in residents aged 60 or older and a significant decrease in residents aged 25 to 34. The Town Plan notes that by 2020, 39 percent of residents are expected be 65 years of age or older. According to the 2015-2019 American Community Survey, the median household income for Windham is $63,000. This compares to an average of $58,514 for the Windham Region. In 2019, the poverty rate in Windham was 10.9%, slightly less than the Windham County poverty rate of 13.7%. Elderly residents and those with lower socioeconomic status in the town are more likely to be affected by a natural disaster and the town should be aware of this in the planning, response, and recovery phases of a disaster.

Changes in Development

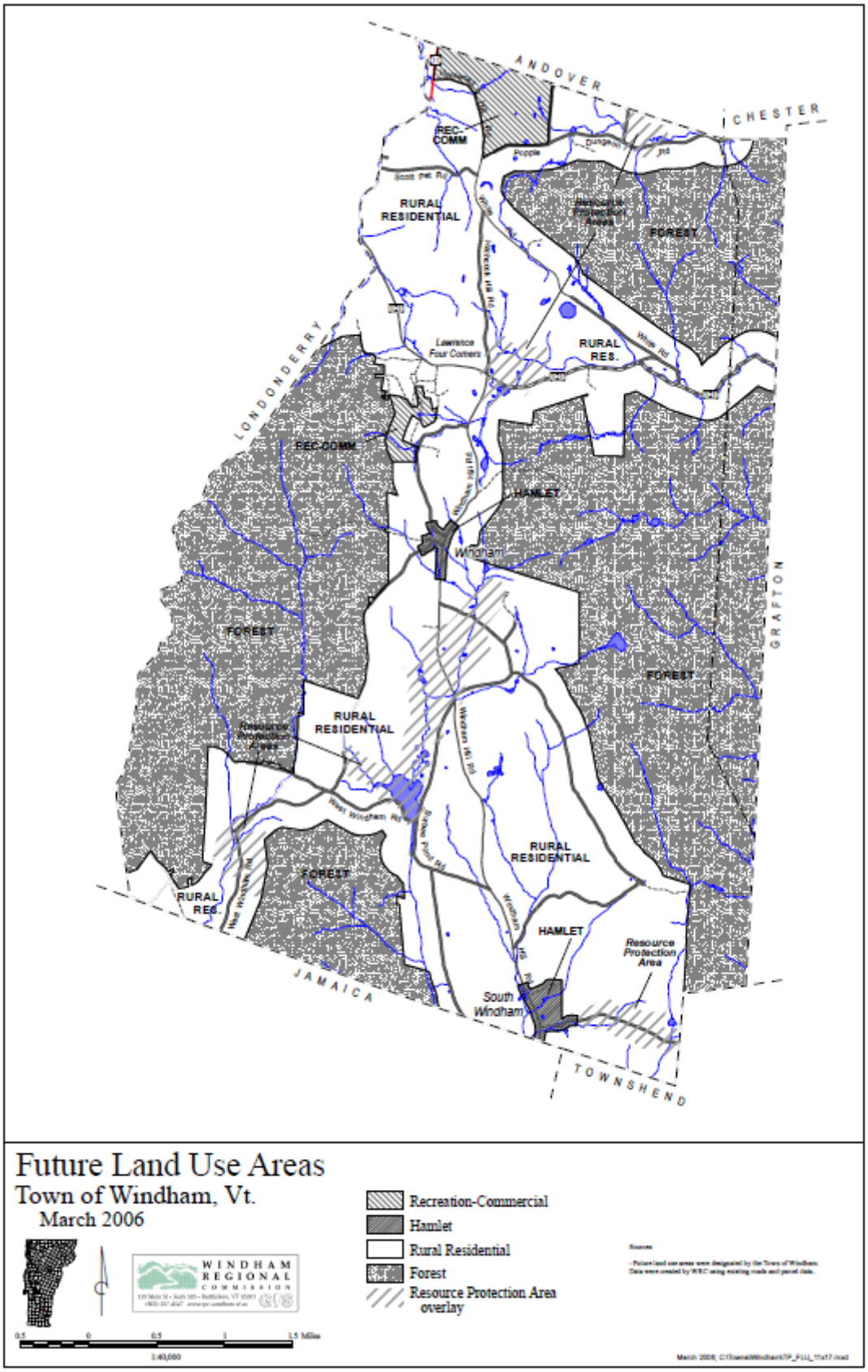
There have not been many significant changes to the built environment of Windham since the LHMP was last completed in 2015. The Town ranks as the fourth smallest town in the Windham Region. The 2020 US Census reported Windham with a population of 449 residents. This is an increase in only 30 residents since 2010. After experiencing a decrease of over 50 percent during the first half of the 20th Century, Windham began to experience population growth. From 1970 to 2020, Windham's population has more than doubled. Population charts are shown in the Town Profile section of this plan.

Windham has seen this population growth as a result of its quiet and pristine rural beauty. The growth in population in the last several years has been due to a fairly constant trend of seasonal homeowners becoming full time residents and new landowners building permanent homes. The town anticipates continuing to see similar slow population growth in the upcoming years.

Recent development in Windham has been overwhelmingly residential in nature. Most of this residential development is located along Windham Hill Road or on unpaved secondary roads that branch off of this road. It is generally characterized as scattered, low-density single-family development. There are pockets of more dense residential uses in Windham Center, South Windham and near the former Timberside Ski Area. Because residential properties in Windham do not have public sewer systems, residences tend to be located where soils are more suitable for individual wastewater disposal systems. Approximately 2 – 3 new residences are built per year.

In 2019, the Nature Conservancy purchased the 3,500-acre Glebe Mountain Natural Area on the western side of Windham for conservation purposes. This tract of land spans the towns of Windham and Londonderry and had previously been a private hunting preserve and a proposed site of a 27-tubine wind farm. Under the Nature Conservancy's ownership, the property became protected from future development. In October 2022, the Nature Conservancy announced that the Glebe Mountain property will be added to the Silvio O. Conte National Fish and Wildlife Refuge. The conservation of this large swath of land in Windham has implications for future land use in the community.

The future land use map is shown at the end of this section of the plan. Future land use is discussed in the 2020 Town Plan. Windham has adopted zoning and subdivision regulations to implement the future land use policies in the Town Plan. Overall, Windham envisions themselves remaining a rural town dominated by forest land. They would like to maintain the existing character and compact development pattern of the historic hamlets of South Windham and Windham Center. The plan accommodates additional growth in rural residential areas surrounding the historic hamlets.


ANDOVER
CHESTER
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TOWNSHEND
REC-COMM
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HAMLET
Windham
Lawrence Four Corners
Resource Protection Area
South Windham
Future Land Use Areas
Town of Windham, Vt.
March 2006
WINDHAM REGIONAL COMMISSION
Recreation-Commercial
Hamlet
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Resource Protection Area overlay
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MITIGATION STRATEGY

Local Hazard Mitigation Goals for this Plan
The Hazard Mitigation Goals as outlined below were agreed up by consensus among the Planning Committee during meetings for the development of this plan:

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

Town Plan Policies that Support Mitigation
The 2020 Windham Town Plan includes a number of policies and action items that relate to hazard mitigation. Relevant policies are highlighted below:

Community Utilities, Facilities, and Services Policies
- Provide as efficient, effective, and convenient municipal services as is possible keeping within the financial capabilities of the Town.
- Maintain funding for town garage equipment.
- Maintain funding for the Meetinghouse.
- Maintain effective safety services.
- Support the well-being and quality of life for seniors in Windham.
- Advocate for communication and internet upgrades to the latest technology in Windham.

Local Emergency Planning Policies
- Land subject to periodic inundation flooding and fluvial erosion hazards shall be limited to development which will not restrict, accelerate, or divert the flow of flooded waters and thereby endanger the health, safety, and welfare of the public during flooding.
- All new public and private roads and driveways shall be properly constructed so that they do not contribute to the damage of Town roads from run-off.
- The Town will actively pursue emergency preparedness.

Natural Resources Policies
- Direct development away from unsuitable areas.
- Preserve and protect the natural scenic beauty and related natural resources in Windham.
- Preserve the natural conditions of watercourses and their shorelines.
- Retain wetland areas and vernal pools and their buffers in their natural state for the provision of wildlife habitats, retention areas for surface runoff, recreation and resource value.

- Stay informed of new State and Federal data and mapping resources related to Flood Hazard Areas and work with downstream communities to mitigate possible flood hazards.

Transportation Policies

- Maintain a safe and functional road system that respects the integrity of the natural environment.

Land Use Policies

- Preserve the character, scenic landscape and environmental well-being of Windham through the designation of distinct zoning districts.
- Preserve and protect Windham's headwaters and watershed areas as a high priority to help ensure the health and safety of the town and area residents.
- Require that all development decisions, especially those involving land in the forest districts, at higher elevations and near surface water resources contain a review of possible stormwater runoff consequences for downstream settlements in Windham and neighboring Towns.
- Require that development projects integrate natural features and resources so that the losses of these are minimized.
- Encourage the maintenance of open land in order to provide a diversity of habitat.

Economic Development Policies

- The town prohibits any commercial or industrial operations on lands 2,000 feet in elevation or higher in Forest Districts other than forestry and will not support any commercial or industrial activity that exceeds the capacity of its public infrastructure including emergency response assets.
- The town will encourage economic development activity that also will preserve the natural environment that has long characterized the area.

Past and Ongoing Mitigation and Maintenance Efforts

Below is an update on prior identified hazard mitigation projects that were listed in the 2015 Windham LHMP. The town reviewed these actions and provided the current status on each item.

	Responsible Party	**Timeframe**	**Funding Source**	**Project Priority**	**Current Status as of 2023**
Upsizing White road (TH 9) culvert to 48" CMP - to meet current Codes and Standards – currently its 30" culvert	Road commissioner and Vtrans	Spring to fall 2015 begin and end	Structures grant from Vtrans 90% / 10% Town	High	**Completed**
Upsize Abbott road (TH 17) culvert to a proposed 10' x 6' box culvert – currently a 6' corrugated steel culvert, undersized and rotted out	Road commissioner and Vtrans	Spring to fall 2016 begin and end	Structures grant from Vtrans 90% / 10% Town	High	Town Engineer has completed initial design work. This project has been included in the LHMP update.

	Responsible Party	Timeframe	Funding Source	Project Priority	Current Status as of 2023
New bridge on Rte 121 (TH 2) - Bridge 5 - Proposed 16' x 7' bridge or box culvert – currently a 6' corrugated steel pipe exists (culvert 25), undersized, washed out multiple times	Road commissioner and Vtrans	Spring to fall 2016 begin and end	Structures grant from Vtrans 90% / 10% Town	High	Scheduled for construction in 2024
New bridge 22 on Mercy Lane (TH 9) - proposed 20' x 7' bridge – currently a 6' corrugated steel culvert exists (culvert 1), alignment is poor, washed out multiple times, undersized	Road commissioner and Vtrans	Spring to fall 2017 begin and end	Structures grant from Vtrans 90% / 10% Town	High	Town inspected and culvert is in fair condition. This project has been included in the LHMP update but will be changed to "Low" priority.
Bridge 14 deck and abutment work on Rte 121 (TH 2) - existing 10' x 6.3' structure	Road commissioner and Vtrans	Spring to fall 2015 begin and end	Structures grant from Vtrans 90% / 10% Town	High	Not completed. This project has been included in the LHMP update.
Educate town residents on safe use of generators to prevent safety issues through article in News and Notes	Selectboard Chair	This will be in the March-April 2015 issue	Town funding	High	**Completed and ongoing**
Develop management structure for handling the existing emergency shelter and a phone tree for use during emergencies.	Emergency Shelter Manager	Begin Spring 2015 and end Dec 2015	Town funding	Medium	**Completed and ongoing**
Town Highways 6 and 3, Volunteer Fire Company is located on Town Highway 3 and this road sees a lot of damage from frost heaves. These roads need repaved for safe passage of the fire trucks. Action is repaving these roads.	Road commissioner	Begin and end Summer 2016	Vtrans Roads and Structures grant	High	**Completed**
Replace 30 year old fire truck for a new truck with a higher capacity for holding water.	Fire Chief or President	Has been ordered, delivery unknown	Town and Fire Department and Loan	High	**Completed**
Article in News and Notes stating that burn permits are required and why. Burn permits are not always gotten, so people may not be aware of their need.	Marcia Clinton on the Fire Department	Spring 2015 for May/June issue	Town budget	Medium	**Completed and ongoing**

	Responsible Party	Timeframe	Funding Source	Project Priority	Current Status as of 2023
Development of fluvial erosion bylaw	Selectboard and WRC	Summer to Fall 2015	Town budget / WRC dues	High	**Completed**
Landowner outreach to provide knowledge and tools for them to make decisions for better flood resiliency. Windham is working with Grafton, Bellows Falls and Westminster are working together on this.	Selectboard and WRC	Application due May 2015 / Summer 2015 begin-end of 2016	High Meadows Grant	Medium	**Completed**
Develop a maintenance program for culvert checks and cleanouts, for prioritizing culvert projects.	Road foreman and Frank Seawright	Oct 2014 began - end Fall 2015	Town budget	High	**Completed and ongoing**
News and Notes article about letting faucets drip to avoid pressure buildup and bursting pipes.	Selectboard Chair	March-April 2015	Town funding	High	**Completed and ongoing**
Relocate Fire Company to more central location in Windham. Consolidation of the town garage in one location would be ideal. Current location is in the very north of town and leads to longer response times.	Fire Company	begin 2016 and end 2019	Donations and Town funding; hopefully grants	Medium	Not completed. This project has been included in the LHMP update.
Town highway heavy equipment needs upgraded. Grader is inadequate for the terrain of the town. Loader is getting to the end of its useful life. Inadequate equipment means that they can't access all areas of the town.	Road Commissioner	Begin Spring 2015 and end Spring 2015	Unknown, will be seeking grants	Medium	**Completed**
Town shelters are inadequate for long term use. There is a kitchen in one shelter but no showers, and showers in the other shelter but no kitchen. There is also no generator for the meeting house shelter.	EMD and Shelter Manager	Summer 2016 to Summer 2017	Town and emergency grants	Low	Partially completed but town shelter has no overnight capability. Town directs residents to regional shelter at Flood Brook School in Londonderry

	Responsible Party	Timeframe	Funding Source	Project Priority	Current Status as of 2023
Open up connection between Old Farm Road and Ingalls Road, which has been left to go rough. Ingalls Road has a steep grade at the bottom so this would be a secondary out for houses on that road. Road crew could cut down vegetation and bring in material to make the road passable by a truck.				Medium	Not completed. This project has been included in the LHMP update.
Relocate town garage, preferably to a new building that can consolidate and house both the town garage and the fire company. Issue is that there is inadequate storage of equipment for fire company, inadequate storage of items needed for emergency shelters in town, currently no isolation area in town, and better facilities are needed for housing crew members overnight for emergency maintenance in early hours during snow storms. Current buildings are inadequate and roof needs to be replaced on current town garage anyway.				High	Not completed. This project has been included in the LHMP update.

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

1. Leaf removal and ditch cleaning are maintenance activities done annually and as needed by the road crew. If ditches are being eroded, the crew may also stone line them. Inspections completed in the spring and fall of each year.

2. Windham regularly updates their culvert inventory. The last update was done in 2019. Updates include detailed condition information for every culvert and account for changes from the last update. The road crew inspects culverts each year in the spring and identifies culverts that need to be replaced that year.

3. The road crew regularly inspects trees and brush that could cause hazards along roadways.

4. Green Mountain Power prunes trees around power lines as needed. GMP is currently marking and taking down Ash trees proactively along its power lines.

5. The town maintains a warming and cooling center at the town office. Information on the emergency shelter is shared in the News and Notes community newsletter, on Front Porch forum and Facebook, and on sandwich board signs outside of the town office.

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

7. The town has an active Planning Commission, Zoning Board of Adjustment, and Floodplain Administrator.

8. The Windham Volunteer Fire Company completes annual inspections and maintenance of dry hydrants in town.

9. The town uses the News and Notes community newsletter to share information with residents about burn permit requirements.

10. The town LEMP includes contact information in the event of an emergency. The town has worked with Windham Regional Commission to develop a contact list for elderly and vulnerable residents to contact in the event of an emergency.

Identification of Mitigation Actions

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

Mitigation actions are listed in priority order by hazard. These are new actions and actions carried over from the previous Hazard Mitigation Plan. The following criteria were used in establishing project priorities. The ranking of these criteria is largely based on the best available information and best judgment as many projects are not fully scoped out at this time. Prioritization was done during the meetings for the plan development in discussions among participants and guided by the WRC Planner.

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

The table on the following page was reviewed at the public meeting on January 25, 2023 to assist in consideration of action types:

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

Cost-Benefit Analysis

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

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

Cost Estimates

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

Benefit Estimates

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

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
Flooding/ Fluvial Erosion	Abbot Road culvert is currently a 6' corrugated steel culvert that is undersized and rotted out on bottom. Culvert is not adequately sized to manage runoff and can result in flooding and erosion.	Upsize Abbott Road culvert to a proposed 10' x 6' box culvert	**Road Foreman**, Selectboard	Complete by 2027	VTrans Structures grant; Better Roads grant; Town match	Mitigation	High/ High	High	Town's consultant engineer has completed initial design work for project
Flooding/ Fluvial Erosion	Bridge #5 on Route 121 is a 6' corrugated steel pipe that is undersized and has washed out multiple times during heavy rain events.	Replacing existing culvert with a new 16' x 7' bridge or box culvert	**Road Foreman**, Selectboard	Complete in 2024	VTrans Structures grant; Better Roads grant; Town match	Mitigation	High/ High	High	Consultant firm has completed 60% design plans. Project must complete ROW and NEPA review prior to 90% design. Construction anticipated for Summer 2024.
Flooding/ Fluvial Erosion	Bridge #14 (existing 10' x 6.3' structure) is in poor condition and need to be upgraded.	Complete redecking and upgrades to abutment for Bridge #14	**Road Foreman**, Selectboard	Start in 2024, Complete by 2028	VTrans Structures grant; Better Roads grant; Town match	Mitigation	High/ High	High	
Flooding/ Fluvial Erosion	Culvert #25 on Route 121 is in poor condition and regularly washes out during heavy rain events.	Upgrade Culvert #25	**Road Foreman**, Selectboard	Start in 2024, Complete by 2028	VTrans Structures grant; Better Roads grant; Town match	Mitigation	High/ High	High	

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
Flooding/ Fluvial Erosion	Fluvial erosion is encroaching into the base of West Windham Road.	Re-establish the course of the stream and develop a plan to stabilize bank for long term.	**Road Foreman**, Selectboard, VT ANR	Start 2023, Complete in 2024	VTrans Structures grant; Better Roads grant; Town match	Mitigation	High/ High	High	Town currently working with ANR to re-establish original course of stream
Flooding / Fluvial Erosion	Fluvial erosion and inundation flooding are some of the principal hazard concerns in Windham. Because climate change has altered the conditions in town, leaders need to have current understanding and good tools to manage watershed resources and prevent flooding and erosion where possible.	Train at least one town personnel and one member of the selectboard in the Vermont Flood Training course to be able to guide the leadership of the town in the use of tools available on Vermont Flood Ready, the basics of floodplain and river corridor dynamics, and how to properly manage development in these hazard areas.	**Selectboard**, Planning Commission, Road Foreman, Zoning Administrator	As available and needed	Town Funding	Preparedness	Low/ High	Medium	

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
Flooding/ Fluvial Erosion	Training of Zoning Administrators is vital to ensuring the town carries out required duties for utilizing and enforcing flood hazard and river corridor bylaw regulations.	The Zoning Administrator and Planning Commission members should take advantage of available training opportunities.	Zoning Administrator, Planning Commission	As available and needed	Town Funding	Preparedness	Low/ High	Medium	
Flooding/ Fluvial Erosion	Popple Dungeon Road is prone to erosion from South Branch Williams River during heavy rain events	Inspect and upgrade culverts as needed and complete bank armoring along riverbank in proximity to road	**Road Foreman**, Selectboard	Start in 2024, complete by 2028	VTrans Structures grant; Better Roads grant; Town match	Mitigation	High/ High	Medium	
Flooding/ Fluvial Erosion	Two culverts at intersection of Windham Hill and Abbot Road have difficulty containing Turkey Mountain Brook during heavy rain events	Upgrade culverts	**Road Foreman**, Selectboard	Start in 2024, complete by 2028	VTrans Structures grant; Better Roads grant; Town match	Mitigation	High/ High	Medium	

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
Flooding/ Fluvial Erosion	Dam at southern end of Burbee Pond. Properties downstream would be impacted in event of a failure.	Monitor and work with VT ANR as needed.	Selectboard, Emergency Management Directors	Ongoing	N/A	Preparedness	Low/ Low	Low	Regulated by VT DEC. Last inspection 8/6/2007. Classified as "Low" hazard potential
Flooding/ Fluvial Erosion	Dam at settling pond for the talc mine on White Road. Properties downstream would be impacted in event of a failure.	Monitor and work with VT ANR as needed.	Selectboard, Emergency Management Directors	Ongoing	N/A	Preparedness	Low/ Low	Low	Regulated by VT DEC. Last inspection 10/24/2012. Classified as "Low" hazard potential. Property owner is monitoring regularly.
Flooding/ Fluvial Erosion	Culvert #1 on Mercy Lane is a 6' corrugated steel culvert that is undersized and has poor alignment. Culvert has washed out multiple times during heavy rain events.	Replace culvert with a new 20' x 7' bridge	**Road Foreman**, Selectboard	Start in 2024, complete by 2028	VTrans Structures grant; Better Roads grant; Town match	Mitigation	High/ High	Low	

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
Snow/Ice Storms, High Winds, Extreme Cold	The town has a warming center located in the Town Office, but no overnight capacity.	Explore potential upgrades to the Town Office to allow for overnight capacity in event of emergency.	**Selectboard**, Emergency Management Directors	Ongoing	Town Funding	Preparedness	High/ High	High	
Snow/Ice Storms, High Winds, Extreme Cold	Downed trees as a result of snow, ice, or winds can result in power outages that especially impact vulnerable populations.	Maintain trees along town roads in proximity to power lines	**Road Foreman**, Selectboard, VTrans	Ongoing	Town Funding	Preparedness	Medium / Medium	High	
Snow/Ice Storms, High Winds, Extreme Cold	Downed trees as a result of snow, ice, or winds can result in power outages that especially impact vulnerable populations.	Support Green Mountain Power efforts to upgrade power lines and to underground lines where appropritate to increase system resilience.	**Selectboard**	Ongoing	N/A	Preparedness	Low/ Medium	Medium	

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
Snow/Ice Storms, High Winds, Extreme Cold	Snow/ice storms and high winds can result in power outages increasing exposure risks to cold weather for vulnerable populations.	Educate residents and provide information on town's website on location of town emergency shelters and proper use of backup generators	**Selectboard**, Emergency Management Directors	Ongoing	Town Funding	Preparedness	Low/ High	Medium	
Invasive Species	Invasive plant species have potential negative effects on public infrastructure.	Develop plan to monitor and remove invasive plant species along roads	**Road Agent**, Conservation Commission	2024	Town Funding, Volunteer Time	Mitigation	Low/ Medium	High	
Invasive Species	Training and education for community members to raise awareness about invasive species.	(1) Host a first detector meeting; (2) provide information about identifying and managing invasive species on the town's website.	Conservation Commission	2025	Town Funding, Volunteer Time, ANR Funding	Preparedness	Low/ Low	Low	

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
Wildfires	Windham relies on an all-volunteer fire company to respond to wildfires. The town is part of a regional mutual aid system that provides backup support as needed.	Ensure Fire Company has basic tools for fighting a wildfire	**Windham Fire Company**, Selectboard	Ongoing	Town Funding	Preparedness	Low/ High	High	
Wildfires	Many wildfires result from property owners conducting improper burn piles or from not removing fallen trees and limbs.	Educate property owners of property maintenance to reduce wildfire risk.	**Windham Fire Company**, Selectboard, Emergency Management Directors	Ongoing	Town Funding	Preparedness	Low/ High	Medium	
Wildfires	Locations at the interface between development and wilderness areas are more vulnerable to potential wildfires.	Complete mapping of potentially vulnerable areas more prone to wildfires.	**Selectboard**, Windham Regional Commission	2025	Town Funding	Preparedness	Low/ Low	Low	

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
All Hazards	Universal support for vulnerable populations is key to health and safety in disasters.	Maintain 'Vulnerable Population Phone Tree' to connect with home health and social service partners and identify vulnerable populations	**Emergency Management Directors**, Selectboard	As needed	Town Funding	Preparedness	Low/ High	High	
All Hazards	Basic training on ICS is important for ensuring that local officials can effectively participate during town response to emergency events.	ICS-100 & ICS-402 training for new town officials who may be needed to assist in town emergency response activities	Town Officials	As available and needed	Volunteer time / No cost training	Preparedness	Low/ High	High	

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
All hazards	Residents are not fully aware of local hazard mitigation and local emergency management plans.	(1) Include information on local hazard mitigation and local emergency management plans in Town Annual Report and website. (2) Urge residents to sign up for VT-Alert and respond to warnings.	**Emergency Management Directors**, Selectboard	Ongoing	Town Funding	Preparedness	Low/Low	Medium	
All Hazards	WebEOC is the online incident management system used by the state emergency operations center to coordinate statewide emergency response.	Ensure that EMD and other town officials get WebEOC training	**Emergency Management Directors**, Selectboard	As available and needed	Town Funding	Preparedness	Low/High	Medium	

HAZARD ADDRESSED	ISSUE DETAIL	ACTION	RESPONSIBLE ENTITY/ PARTNERSHIP	Start/ Complete TIMELINE	POTENTIAL FUNDING	MITIGATION/ PREPAREDNESS	COST/ BENEFIT	PRIORITY	Notes
All Hazards	The settlement of West Windham has only one road providing access in and out of this area of town. If the principal access, West Windham Road, was inaccessible due to a hazard event residents would be isolated.	Upgrade the Class 4 segment of road between the ends of Old Farm Road and Ingalls Road to provide an alternatives means of accessing West Windham.	**Road Foreman**, Selectboard, VTrans	Start in 2024, complete by 2028	Town Funding	Preparedness	High/ Medium	Medium	
All Hazards	The existing facilities for the town garage are inadequate in terms of storage space for equipment and vehicles	Relocate town garage to a new building in a more central location.	**Selectboard,** Road Foreman	Start in 2024, complete by 2028	Town Funding	Preparedness	High/ Medium	Medium	Town has received a grant to upgrade salt shed at the town garage property, which should help to improve operations
All Hazards	Existing facilities for fire company are inadequate in terms of storage space for equipment, vehicles, and overnight facilities.	Construct new building to meet space and facility needs on existing property and adjacent site (owned by fire company)	**Fire Department,** Selectboard	Start in 2026, complete by 2029	Grants, Fundraising, Town Funding	Preparedness	High/ Medium	Medium	

Implementation of Mitigation Actions / Capabilities

Barriers to Implementation:
1. Financial constraints of town budget
2. Limited staff at town level
3. Emergency staff in Windham is all volunteer
4. Small population means limited tax base
5. Large number of second homes

Capabilities to build upon for implementation:
1. Town cohesion and social capital
2. Active Selectboard
3. Active Planning Commission
4. Engaged town employees
5. Full-time road agent and road crew employees
6. Great volunteer base to carry out projects
7. Windham Regional Commission assistance when needed
8. Flood and fluvial erosion hazard regulations in place in zoning bylaws

Recognizing that every community faces barriers when it comes to project implementation, Windham is in a good position overall. There are committed volunteers and staff who make the town function well. Windham is not struggling financially, but they do have a limited tax base because they have a small residential population and very limited commercial uses. Given the town's remote location it historically has had a "do it yourself" mentality that has served the community well in terms of getting work done.

The town works closely with the Windham Regional Commission to identify resources and funding to help implement mitigation actions. The town works closely with VT Department of Environmental Conservation, Agency of Natural Resources, and the Army Corps of Engineers when doing any work in streams or rivers. Additionally, the town has adopted the latest VTrans Road Standards for road, culvert, and bridge improvement projects. With the support of these agencies and the Windham Regional Commission, Windham is capable of carrying out all of the mitigation actions outlined in this plan.

Existing Authorities, Policies, Programs and Resources
The following policies, programs, and activities related to hazard mitigation have been put in place and/or are being implemented by Town of Windham:

Plans and Studies

Capability	Description	Improvement Opportunity
Town Plan	Plan for coordinated town-wide planning for land use, municipal facilities, etc.	None identified. Town Plan was adopted in 2020 and includes a Local Emergency Planning section and numerous policies that support the hazard mitigation planning process.
Stormwater Plan	Plan that identifies stormwater improvements for municipal roads.	Town received Municipal Roads General Permit on 3/21/2013. The permit expires 1/25/2028.
Local Emergency Management Plan (LEMP)	Municipal procedures for emergency response.	None identified. Updated annually.

Invasive Species Management Plan	Plan that provides guidance on effective management of invasive species.	Development of Invasive Species Management Plan is listed as a mitigation action.
Culvert Inventory	An inventory of the size, material, condition and location of culverts. Updated annually by Public Works Department.	None identified. Culvert Inventory last updated in 2019 by WRC. Will be updated as mitigation actions completed.
School Emergency Response Protocol	School procedures for emergency response	None identified. Schools maintain their own Emergency Response Plans per state regulations.

Administrative Capacity and Capability

Capability	Description	Improvement Opportunity
Emergency Management Director	Prepares plans and procedures for responding to natural disasters other emergencies and leads response efforts.	Town has two co-EMDs. Mitigation actions includes providing EMDs with training opportunities as needed.
Planning Commission	Municipal body responsible for planning for the community, including maintaining the town plan, zoning bylaws, and subdivision regulations.	Encourage Planning Commission members to complete Vermont Flood Ready training
Zoning Board of Adjustment	Municipal body responsible for evaluating and deciding proposed conditional uses and variances and waivers from bylaws.	None identified.
Zoning/Floodplain Administrator	Administrative officer responsible for administering zoning and floodplain bylaws.	Ensure personnel have opportunity to complete trainings on zoning and floodplain bylaw administration
Tree Warden	Responsible for trees on public property, including town properties, schools, and within public right-of-way.	None identified.
Selectboard	Legislative body of the town for all purposes required by the state.	Ensure that new Selectboard members that may be needed to assist with emergency response complete proper training
Mutual Aid Agreements – Emergency Services	Agreement for regional coordinated emergency services.	None identified. Southwest New Hampshire Mutual Aid – written agreement/contract for Fire/Ambulance and HazMat
VEM Training	Training provided by state to ensure emergency responders are adequately prepared to respond to emergency incidents.	Identified as a mitigation action item in LHMP

Highway Department	Municipal department responsible for overseeing all aspects of municipal road network, including maintenance and construction.	None identified.
Town Clerk & Treasurer	Responsible for receiving and recording town archives, recording deeds, filing vital statistics information, running treasury.	None identified

Financial Resources

Capability	Description	Improvement Opportunity
Town Budget	Annual municipal operating budget, approved at Town Meeting	None identified
Taxing Authority	Ability to assess and collect property taxes.	None identified

Zoning and Regulations

Capability	Description	Improvement Opportunity
National Flood Insurance Program (NFIP)	Provides ability for residents to acquire flood insurance.	None identified.
SFHA bylaws	Regulates development in FEMA identified SFHAs.	None identified. Currently included in zoning bylaws.
Zoning	Regulates the development and division of land, standards for site access and utilities	None identified. Zoning bylaws regularly reviewed and updated by Planning Commission.
Building Code	Codes for fire and building safety are in place for multi-family structures and are regulated by the Division of Fire Safety. There are also Statewide Standards for Energy Efficiency and Electrical Safety for buildings.	None identified.
Road Standards	Design and construction standards for roads and drainage systems.	None identified. State road standards adopted.
Wetland Protections	Protection of environment, water resources, wildlife, biota. Protected by 1990 Vermont Wetland Rules	None identified.
River Corridor bylaws	Regulates development in River Corridors as identified by Vermont ANR.	None identified. Fluvial erosion hazard regulations are included in the zoning bylaws.

Outreach and Education

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

PLAN MAINTENANCE PROCESS

Monitoring and Updating the Plan – Yearly Review

Once the plan is approved and adopted, the Emergency Management Directors (EMD) and the Planning Commission, along with interested and appointed volunteers and stakeholders, will continue to work with the Windham Regional Commission to monitor and evaluate the plan throughout the next 5-year cycle. The plan will be reviewed annually before Town Meeting at a Selectboard meeting along with the review of the town's Local Emergency Management Plan (LEMP). This meeting will allow town officials and the public to discuss the town's progress in implementing mitigation actions and determine if the town is interested in applying for grant funding for projects that can help mitigate future hazard events. This could include bridge and culvert replacements, road replacements and grading, and emergency shelter improvements. Windham Regional Commission's emergency planner will assist the EMD in Windham with this review, as requested by the Town. Progress on actions will be tracked using a table that WRC will provide to the Town. There will be no changes to the plan, unless deemed necessary by the Town; if so the post disaster review procedure will be followed.

Plan Maintenance – 5 Year Update and Evaluation Process

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

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

2. The WRC Emergency Planner will guide the Committee through the update process. This update process will include advertised public meetings. At these meetings the Committee will use the existing plan and update as appropriate guided by the WRC Emergency Planner to address:
   - Update of hazard events and data gathered since the last plan update.

- Changes in community and government processes, which are hazard-related and have occurred since the last review.
- Changes in community growth and development trends and their effect on vulnerability.
- Progress in implementation of plan initiatives and projects.
- Incorporation of new mitigation initiatives and projects.
- Effectiveness of previously implemented initiatives and projects.
- Evaluation of the plan for its effectiveness at achieving its stated purpose and goals.
- Evaluation of unanticipated challenges or opportunities that may have occurred between the date of adoption and the date of the report, and their effect on capabilities of the town.
- Evaluation of hazard-related public policies, initiatives and projects.
- How mitigation strategy has been incorporated into other planning mechanisms
- Review and discussion of the effectiveness of public and private sector coordination and cooperation.
- Impacts of climate change and how the local environment is changing due to climate impacts

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

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

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

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

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

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

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

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

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

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

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

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

Post-Disaster Review/Update Procedure

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

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

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

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

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

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

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

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

- Provide hazard mitigation information on the town's website an in the town newsletter.
- Post the hazard mitigation plan on the town's website
- Schedule and advertise a planning meeting each year before Town Meeting. Review mitigation actions completed to date and plan for projects to undertake in upcoming year.
- Seek participation from key players in addition to general public interest:
    - Selectboard
    - Planning Commission
    - Conservation Commission
    - Road Crew
    - Windham Elementary School
    - Fire & Rescue
    - Police
    - Emergency Management/ 911 Coordinator
- Make the public aware of public meetings for next plan update process using town's website, online forums, and town newsletter.

APPENDIX

1. Adoption Form for Local Governing Body
2. Flyer for Draft Hazard Mitigation Plan Public Meeting on December 7, 2022 posted at Town Office
3. December 7, 2022 Public Meeting Agenda
4. December 7, 2023 Public Meeting Notes and Attendance
5. Flyer for Draft Hazard Mitigation Plan Public Meeting on January 25, 2023 posted at Town Office
6. January 25, 2023 Public Meeting Agenda
7. January 25, 2023 Public Meeting Notes and Attendance
8. Community Survey Results
9. Email correspondences from Planning Committee members and members of the public during development of draft LHMP
10. Email sent to Planning Committee for review of draft LHMP
11. Comments received during Planning Committee review period
12. Emails sent to adjacent towns/RPCs and organizations that sustain community lifelines for public comment on draft LHMP
13. Flyer advertising availability of Draft LHMP for public comment
14. Damage photos from Tropical Storm Irene

1. Adoption Form for Local Governing Body

Certificate of Adoption
Town of Windham, VT
Selectboard

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

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

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

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

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

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

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

Duly adopted this _____ day of _____.
date *month, year*

SELECTBOARD

_____
Kord Scott, Chair

_____
George Dutton, Vice Chair

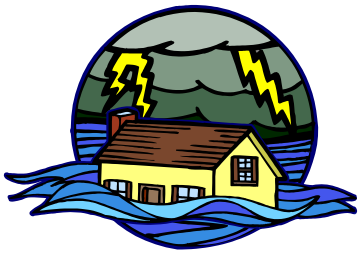
_____
Michael Pelton

ATTEST

_____
Ellen McDuffie, Town Clerk

2. Flyer for Draft Hazard Mitigation Plan Public Meeting on December 7, 2022 posted at Town Office

Update of the Windham Local Hazard Mitigation Plan Public Meeting Announcement



December 7, 2022
Time: 6:00 - 7:30 PM

Via Zoom: See Town website (https://townofwindhamvt.com)

or use the following link: https://us02web.zoom.us/j/6346663175

Meeting ID: 634 666 3175

Call-in option: (646) 558-8656

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

For more information, contact:
Matt Bachler at 802-257-4547 x112 or mbachler@windhamregional.org

WINDHAM REGIONAL COMMISSION

3. Agenda for Public Meeting on December 7, 2022

Windham Local Hazard Mitigation Plan
Update Meeting #1
December 7, 2022, 6:00 – 7:30 p.m.
Via Zoom

Agenda

1. Overview of Updating the Weston Local Hazard Mitigation Plan

- Purpose
- Process

2. Hazards

- Review existing Windham Local Hazard Mitigation Plan
- Discuss hazard events that have occurred recently
- Complete hazard ranking worksheet
- Discuss survey results
- Decide what hazards the updated Plan will address
- Mark up map with local hazard notes

3. What to think about for the next meeting

- Discuss date for next meeting

4. Public Meeting Notes and Attendance - December 7, 2022

Windham Local Hazard Mitigation Plan Update Public Meeting
Wednesday, December 7, 2022 at 6:00 p.m. via Zoom
Meeting notes prepared by Matt Bachler, Windham Regional Commission

Attendance
Matt Bachler: Windham Regional Commission
Bill Dunkel: Planning Commission Chair, Energy Committee member, WRC Commissioner
Imme Maurath: Co-Emergency Management Director
Richard Pare: Town Road Foreman
Ellen McDuffie: Town Clerk, President of Windham Community Organization
Kathy Jungermann: Co-Emergency Management Director
Jim McCandless: part-time resident, amateur radio operator
Joyce Cummings: Assistant Town Clerk
Carrie Tintle: Assistant Town Clerk
Ron Tintle: Resident
Jon Gordon: Chief of Volunteer Fire Department
Tan Bronson: Member of Volunteer Fire Department, amateur radio operator
Marcia Clinton: Town Health Officer
Michael Pelton: Selectboard Member

Discussion on Hazard Events since 2015 Update
- Increase in extreme heat events
- Increase in invasive species. It was noted that GMP has removed a number of Ash trees in the town.
- VT Yankee has been decommissioned
- COVID-19 pandemic. There was a discussion on what role the town has in responding to these types of pandemics versus the State and Federal government.
- The town experiences numerous winter storms and extreme cold due to its high elevation. It was noted that these events become more of a concern when there are also power outages.
- A tornado impacted the town in 2019.
- 2 roads were washed out during heavy rain events in July and August 2021.

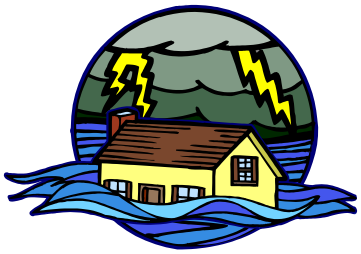
Hazard Assessment Ranking
- Meeting participants completed an online survey in Google Forms to rank hazards based on probability and potential impact to the community. As a result of the survey, the following hazards were prioritized:
    - Inundation Flooding & Fluvial Erosion
    - Snow/Ice/Cold/Wind
    - Invasive Species
- The group decided to also include Wildfires as a priority hazard for the community. Wildfires are included in the 2015 plan and the town is vulnerable because of the large area of forested land in the community. The town has a small volunteer Fire Department with limited equipment for fighting wildfires.

Review of Town Map

- The group reviewed the VT ANR Atlas online and identified areas in town prone to flooding and erosion.
- Popple Dungeon Road – prone to erosion from South Branch Williams River during summer rain events.
- Town recently completed stone lined ditching on dirt portion of Route 121 along Saxtons River which is improving conditions.
- July 2021 rain event caused flooding and erosion around intersection on Windham Hill Road, Abbott Road, Burbee Pond Road
    - 2 culverts at intersection of Windham Hill Road and Abbot Road were struggling to contain Turkey Mountain Brook during this event.
- There is an old stone dam at southern end of Burbee Pond. Condition of dam is unknown and if it were to fail there would be a significant impact to residential properties downstream with driveways that cross Turkey Mountain Brook.
- There is a holding pond for a talc mine off White Road. Condition of dam is unknow. It was noted there was a dam failure in 2002.
- The group noted other settling sites for old talc mines in town.
- Fluvial erosion where Cobb Brook comes in adjacent to West Windham Road.
- Wheeler Road was washed out in TS Irene and in 2021. Road was closed for 2 months and residents were required to use a long detour.
- Chase Road experienced erosion during July 2021 storms.
- Wildfire concerns due to accumulated brush and dead standing trees.

5. **Flyer for Draft Hazard Mitigation Plan Public Meeting on January 25, 2023 posted at Town Office**

Update of the Windham Local Hazard Mitigation Plan Public Meeting Announcement



January 25, 2023
Time: 6:00 - 7:30 PM

Via Zoom: See Town website (https://townofwindhamvt.com)

or use the following link: https://us02web.zoom.us/j/6346663175

Meeting ID: 634 666 3175

Call-in option: (646) 558-8656

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

For more information, contact:

Matt Bachler at 802-257-4547 x112 or mbachler@windhamregional.org

WINDHAM REGIONAL COMMISSION

6. Agenda for Public Meeting on January 25, 2023

Windham Hazard Mitigation Plan
Public Update Meeting #2
January 25, 2023, 6:00 - 7:30pm
Via Zoom

Agenda

1. Summary of December 7th Public Meeting
2. Review Results of Community Survey
3. Review the current Mitigation Action Table from the 2015 Plan
4. Create an updated Mitigation Action Table
5. Discuss gaps and capabilities with implementation

7. Public Meeting Notes and Attendance - January 25, 2023

Windham Local Hazard Mitigation Plan Update Public Meeting
Wednesday, January 25, 2023 at 6:00 p.m. via Zoom
Meeting notes prepared by Matt Bachler, Windham Regional Commission

Attendance
Matt Bachler: Windham Regional Commission
Bill Dunkel: Planning Commission Chair, Energy Committee member, WRC Commissioner
Imme Maurath: Co-Emergency Management Director
Kathy Jungermann: Co-Emergency Management Director
Jim McCandless: part-time resident, amateur radio operator
Joyce Cummings: Assistant Town Clerk
Marcia Clinton: Town Health Officer
Kord Scott, Selectboard Member
Frank Seawright, Windham resident

Review of Community Survey
- Question regarding identifying grant sources to help the town complete mitigation projects. Matt noted that the mitigation action table will including a funding sources category that identifies potential grants for projects.
- Bill noted that the zoning bylaws were amended in 2019 to include regulations to restrict development in areas with steep slopes.

Review of Hazard Mitigation Action Table from 2015 LHMP
- Action: develop management structure for handling the existing emergency shelter and a phone tree for use during emergencies.
    - Town has a warming and cooling center, but no overnight capability.
    - LEMP includes phone trees
    - Contact list prepared by WRC for older and vulnerable residents
    - Town will be distributing survey to find out want residents' needs are and what resources they have available.
- Action: article in News and Notes about burn permit requirements.
    - Included every year
- Action: town shelters are inadequate for long term use.
    - EMDs direct residents to regional shelters in Brattleboro and Flood Brook School in Londonderry

Review of Hazard Mitigation Action Table for LHMP Update
- Proposed action: provide ZA/Flood Administrator with training on administration of floodplain and river corridor regulations in the zoning bylaws.
    - Bill noted that VT ANR assisted with writing the zoning bylaws and that they are very technical. It would be beneficial to provide training for the ZA and the Planning Commission.

- Invasive species: would be helpful to get information from ANR on proper removal, especial concern are poisonous parsnip and Japanese knotweed.
- Proposed action: educate residents and provide information on town emergency shelters
    - Currently provided in News and Notes, shared on Front Porch forum and Facebook, use sandwich board sign outside warming center
- Issue: fluvial erosion on West Windham Road from Cobb Creek
    - Town is currently working with ANR on this issue. The erosion is encroaching into the base of the road.
    - Excavator has re-established the original course of the stream.
    - Developing a plan to stabilize the bank for the long term.
- Proposed action: inventory of fire ponds and creation of a maintenance plan.
    - Fire Company has an inventory and does yearly maintenance.
- Noted that Co-EMDs have completed ICS-100 & ICS-402 trainings.
- Noted that the cost for upgrading the Class 4 segment between Old Farm and Ingalls should be "High" and not "Low"
- Noted that the town has received a grant to upgrade salt shed at garage facility. Town is currently in discussions about a piece of property the garage could be relocated to. Holding off on accepting grant until concluding these discussions.

Potential Barriers and Capabilities

- Noted that all of the town officers are volunteers and carrying out these projects would require more time and responsibility.

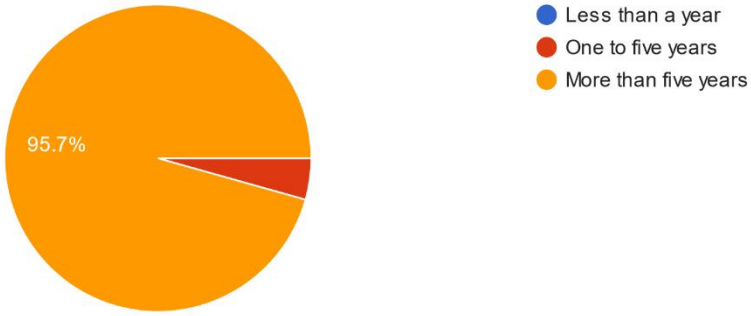
Other Discussion

- Recommendation for how to review plan on an annual basis.
- Concern about current plan being expired and wanting to avoid this happening again. How does the town come up with a plan to ensure plan is updated before expiration next time?
- If the town wants to update the plan before it expires, what is the process for that?
- Would be helpful to receive notification about plan expiring soon.

8. Windham Hazard Mitigation Plan Community Survey Results

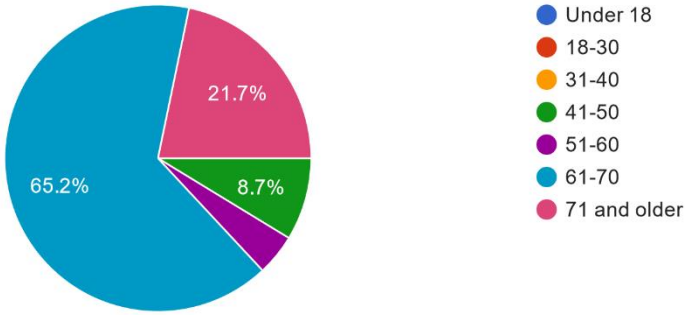
How long have you lived in or owned a business or property in Windham?

23 responses



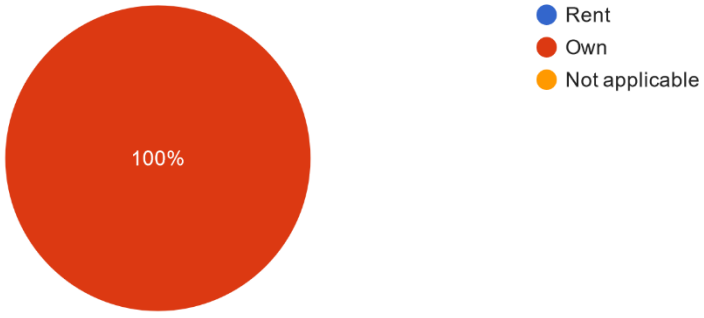
What is your age?

23 responses



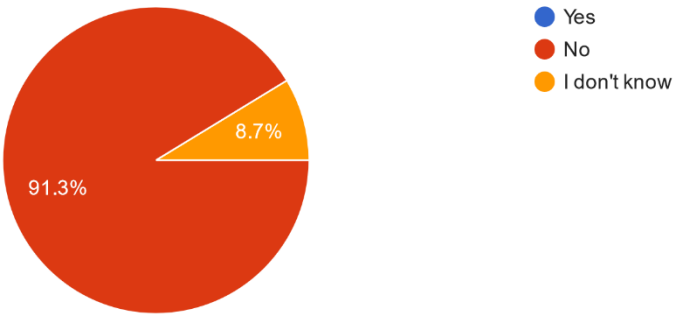
If you live in Windham, do you own or rent the home you live in?

23 responses



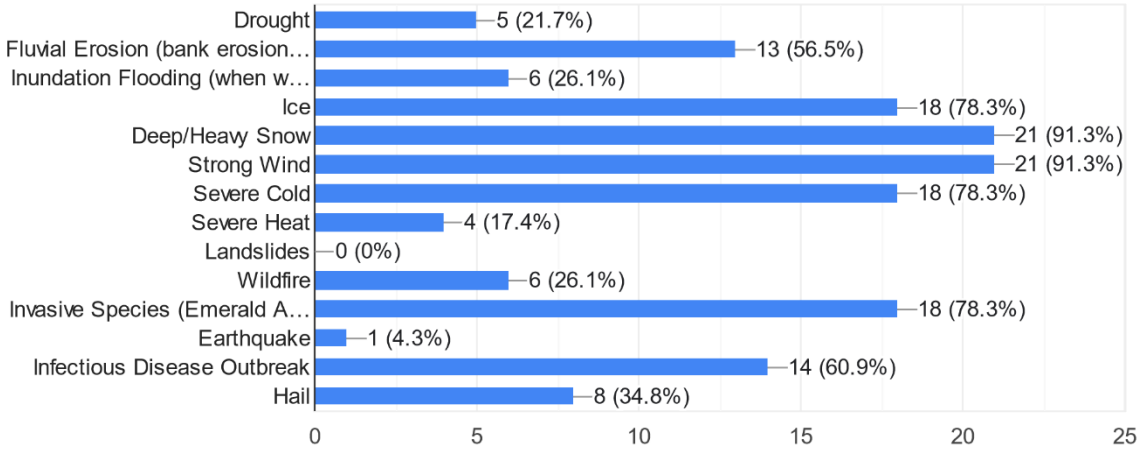
Is your home or business property located in a designated floodplain?

23 responses



Which of the following natural hazards have you or someone you know experienced while living or doing business in Windham? (select all that apply)

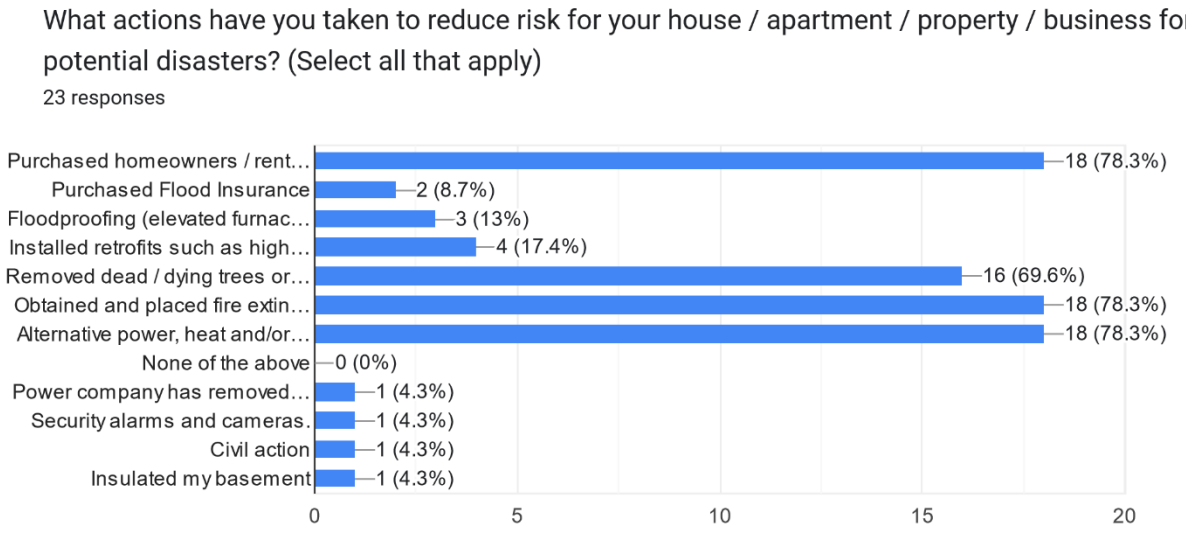
23 responses



What are the top three hazards that you feel will impact you in the next five years?

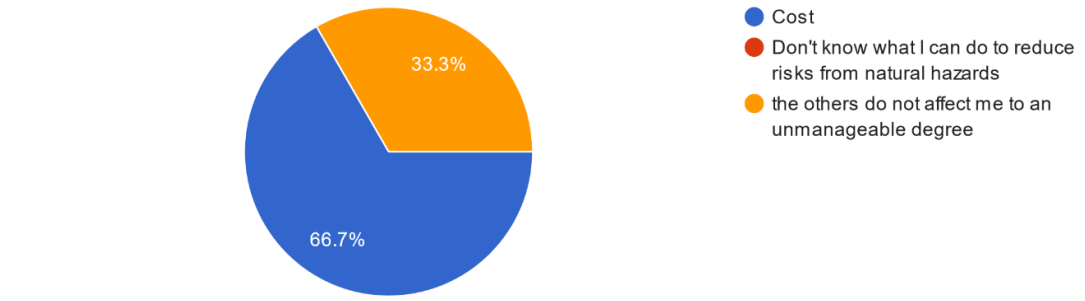
- POWER OUTAGES, WIND, ICE STORM
- extreme weather events, power outages, drought-related stresses
- Deep heavy snow; strong wind; severe cold
- Severe storms - high wind, torrential rain; ice storms
- Infectious disease, heat, wind.
- Heavy snow
- Fluvial Water flow damage, Excessive Lumbering, Wildfire
- Strong winds/power outages, invasive species, wildfires
- Wind damage, drought, flooding

- Uncertainty of weather, uncertain road conditions, expedient political response to worsening climate change
- flood, erosion, wind damage
- Ice storm (extended period of loss of power), wind storm (extended period of loss of power), snow storm
- Inundation Flooding, Fluvial Erosion, Ice
- Wind, freezing,andice
- Flooding, lack of broadband leading to loss communications, civil unrest
- heavy snow, fluvial erosion, invasive species
- Strong wind, severe cold, Invasive species
- Ice , heavy snow, flooding
- Flooding, Ice, Erosion
- Severe cold and heat and invasive species
- I most worry about a wild fire
- Overgrown trees getting old/threatening house, 2) Overgrown trees interfering with power lines & internet, 3) wind breaking apart said trees
- Wet heavy snow - causing tree damage/power outages, severe thunderstorms - causing lightning strikes, lengthy power outages, damages to appliances, ice storms/severe wind damage



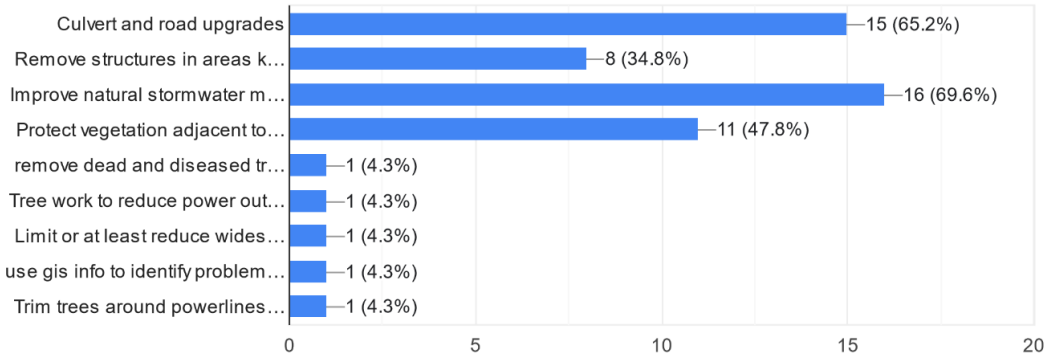
If you have not taken action to reduce risk, what are the barriers? (Skip if you have taken actions.)

3 responses



What cost effective measures should the Town take to lessen damage from disasters? (select all that apply)

23 responses



Thank you for taking time to fill out this survey. Is there anything else you would like to tell us about Natural Disasters in Windham?

- Strength zoning regulations to prohibit development of sensitive areas such as high elevations and steep slopes. It may be written in our zoning but needs to be enforced!
- power outages are the most bothersome effect of natural disasters that effect us. We have a generator and it helps but it isn't hooked up to our water supply so that is a challenge of extended power outages.
- Not that I can think of at this moment. Thank you.
- Given the very limited town resources, explore possible resources/funds from State of Vermont, Federal, Non-Profit groups. Also learn what neighboring towns think and are doing to manage their natural hazard potential issues, and coordinate if feasible.
- Discuss better measures with Green Mountain Power to prevent the high number of power outages, make use of natural resources to create backup power/install solar farms, create a public shelter if that is not already in place.
- Too much for this brief survey
- It's not bad at all. Just stay home when it's icy and tend to your property.

9. Email correspondences from Planning Committee members and members of the public during development of draft LHMP

Matthew Bachler

From: Frank <fseawright@vermontel.net>
Sent: Wednesday, December 7, 2022 6:17 PM
To: Matthew Bachler
Subject: I cannot join the meeting tonight, but this is what I would have said.

My topic will be hazard mitigation and building on steep slopes. You all know most of the reasons to avoid building there, but some important reasons are not often mentioned when this topic is being discussed.

First to the commonly known reasons.

- Gravity. We all know that water and objects will roll downhill. The first settlers here knew that and built in the flattest and most convenient spots they could find.
- That urge is still in practice today, but most of the easy sites in Windham are already taken. Finding a large enough and relatively flat site sufficiently distanced from streams, wetlands and abutting parcels and convenient to a town maintained road is the first obstacle to overcome.
- Engineers say they can build anywhere. That is a dangerous thing to say because it is true. The anywhere referred to in this context very likely will be inappropriate. And that is why zoning laws are needed.
- The site will almost surely be on a steeper slope and present all the problems of storm water runoff management. These sites will likely be more expensive to build on, require a longer driveway over steeper terrain, require tree removal and disturbing the soil contributing to water runoff. This will not be the often yearned for "Affordable housing."
- Practically all of Windham is considered to be prime wildlife habitat and a valuable connecting block.

But here's some things about building on steeper slopes that are not often discussed.

- A steep driveway may be dangerous year round, but is even more so during snow and ice season. Easy solution is to hire a local person to plow and sand it. Ha! Just try to find one.
- But the owner is not the only person endangered by a steep and icy driveway. Ambulance and fire truck drivers as well as electric line repairmen – all professionally bound to answer such calls- are unnecessarily placed at risk. So, you say, they had no business building there so its their own doing. I say, strengthen zoning regulations to prevent people building in inappropriate places.
- If you examine the set of maps of Windham's water catchments I made you'll notice that all of Windham's streams originate in Windham. They all run noticeably straight out of Windham draining north, east and south.
- Another thing to notice about the water catchments is that the boundaries of each one is a mountain ridge. Over long time frames the ecosystem has adapted to water flow as dictated by the terrain and we should be very circumspect about undoing in weeks what evolved over thousands of years.
- Windham is not likely to suffer flooding such as seen in Eastern Kentucky this July or the November flooding in Ischia, Italy. In both these instances attribution is given to building on steep slopes. We cannot suffer flooding such as happened in these two places, but when we send all our water speeding downhill to the north, east and west we certainly can exacerbate it for our surrounding neighbors- most notably Grafton. We are a hazard to them that only we can mitigate.

- And, of course, there's climate change. V.I. Lenin reportedly said "there are decades when nothing happens and then there's weeks in which decades happen." We can go for decades without flooding our neighbors but when it happens it can be awful - recall Hurricane Irene just about a decade ago.
- I don't have data on this but I believe our winter-time precipitation is becoming more rain that freezes on the ground and that creates an especially dangerous situation on a steep driveway. Zoning. Don't build long and steep driveways.

End

Matthew Bachler

From: K Jungermann <bsgkj@myfairpoint.net>
Sent: Friday, December 9, 2022 10:19 AM
To: mbachler@windhamregional.org
Subject: Regarding the Windham LHMP

Hello Matthew,
I attended the 12/7 LHMP meeting for Windham.
I'd like to add an area of concern to the Flash Flood/torrential downpour hazard profile.
During the July 2021 Storm, the 2 culverts at the Intersection of Windham Hill Road and Abbott Road were hard pressed to keep up with the roiling Turkey Mountain Brook. I'm located at 5690 WHR and observed the stress the storm put on these 2 culverts.
Both the survey the group filled out, and the ANR maps you shared, made for a very successful first meeting.
Thank you,
Kathy Jungermann
CO-EMD Windham

10. Email sent to Planning Committee for review of draft LHMP

Tue 5/16/2023 11:01 AM

MB

Matthew Bachler <mbachler@windhamregional.org>

First Draft - Windham Local Hazard Mitigation Plan Update

To 'Frank'; 'Bill Dunkel'; 'Carrie Tintle '; 'Ellen McDuffie'; 'George Dutton '; 'Imme Maurath'; 'James Lawler'; 'Jim Mccandless '; 'Jon Gordon'; 'Joyce Cumming'; 'Kathy Jungerman'; 'Kord Scott '; 'Marcia E. Clinton'; 'Michael Pelton'; 'Mickey Parker-Jennings'; 'Richard Pare '; 'Tan Bronson'

You replied to this message on 5/30/2023 1:16 PM.

Windham LHMP Update 2023_DRAFT_5-15-23.pdf
5 MB

Windham LHMP Mitigation Actions 5-15-23.xlsx
23 KB

Good morning,

Thank you again for your participation at the planning meetings in December and January for the Windham Hazard Mitigation Plan update project. Please see attached a first draft of the updated plan. I am also attaching a copy of the proposed mitigation actions in Excel format. This table is included in the plan as well, but I wanted to provide it separately for convenience. You'll see there is some information in the mitigation action table specifically on the timeframe for road and culvert projects that I will need input on from the town. Please note this draft is being distributed only for internal town review and is not yet ready for public comment

Please review the draft and provide any comments to me by Friday, June 2nd. I will incorporate the comments and prepare a revised final draft for public comment, which can be scheduled for mid-June. You can either call or email me with your comments. I can be reached at mbachler@windhamregional.org or (802) 257-4547, ext. 112.

Thank you for your time and input!

Best,
Matt

Matthew Bachler, AICP
Senior Planner
Windham Regional Commission
139 Main Street, Suite 505
Brattleboro, VT 05301
(802) 257-4547, ext. 112
www.windhamregional.org

11. Comments received during Planning Committee review period

Comments on the first draft of Windham LHMP

Page 2: Under Town Profile, last sentence of paragraph 3, Tater Hill is no longer in operation.

Page 3: Under Existing Authorities, please omit Administrative Assistant in the first sentence.
Under Emergency Services, paragraph 2. Change LEOP to LEMP.
Also, the elementary school and the town office are NOT designated Red Cross Shelters.

Page 7: Under Documentation of the Plan Update Process. Please add the following responsibilities to the team members who assisted with the update.
Kord Scott, add Windham Road Commissioner.
Michael Pelton, add local business owner.
Imme Maurath, add Windham grant administrator.
Kathy Jungermann, add Windham town auditor and Windham News and Notes staff.
Bill Dunkle, change WRC commissioner to Windham representative to the WRC.
Marcia Clinton, add Justice of the Peace.

Page 41: Under Vulnerable Community Assets: bullet point #1, omit Administrator and replace with Town Treasurer. Also, in the last sentence change shelter to Warming Center.
Under Windham Meeting House, bullet point #3, The Meeting house only contains the Windham Town Library, please omit Town Hall.

Item #13 on the chart indicates that the town has a warming and a cooling center in the Meeting House, currently we are only able to offer a Warming Center in the Town Office.

Matthew Bachler

From: Marcia Clinton <mclinton@vermontel.net>
Sent: Friday, June 2, 2023 5:08 AM
To: Matthew Bachler
Subject: Windham Local Hazard Mitigation Plan

I just finished reading your draft. Quite a bit of work. On page 46 you spelled my name wrong. On page 47 there are suggestions to combine the town garage and the fire company into one building. That will not happen. Last night there was the monthly meeting of the Fire Co. and a discussion of a new building. It is not feasible to repair the old one. Presently the Fire Co. owns a good size parcel of its own land there. A few years ago land behind the firehouse was up for sale and when the price came down they bought it. So there are no plans to buy another piece of land. And this is a volunteer organization and wants to be on its own. Construction cost of a new building was discussed and it would take at least 2 years before construction would begin. There is no need to change what you have written. I just wanted you to know what is going on.

12. Pictures of August 3, 2003 Flooding in Windham – pictures provided by Paul Wyman

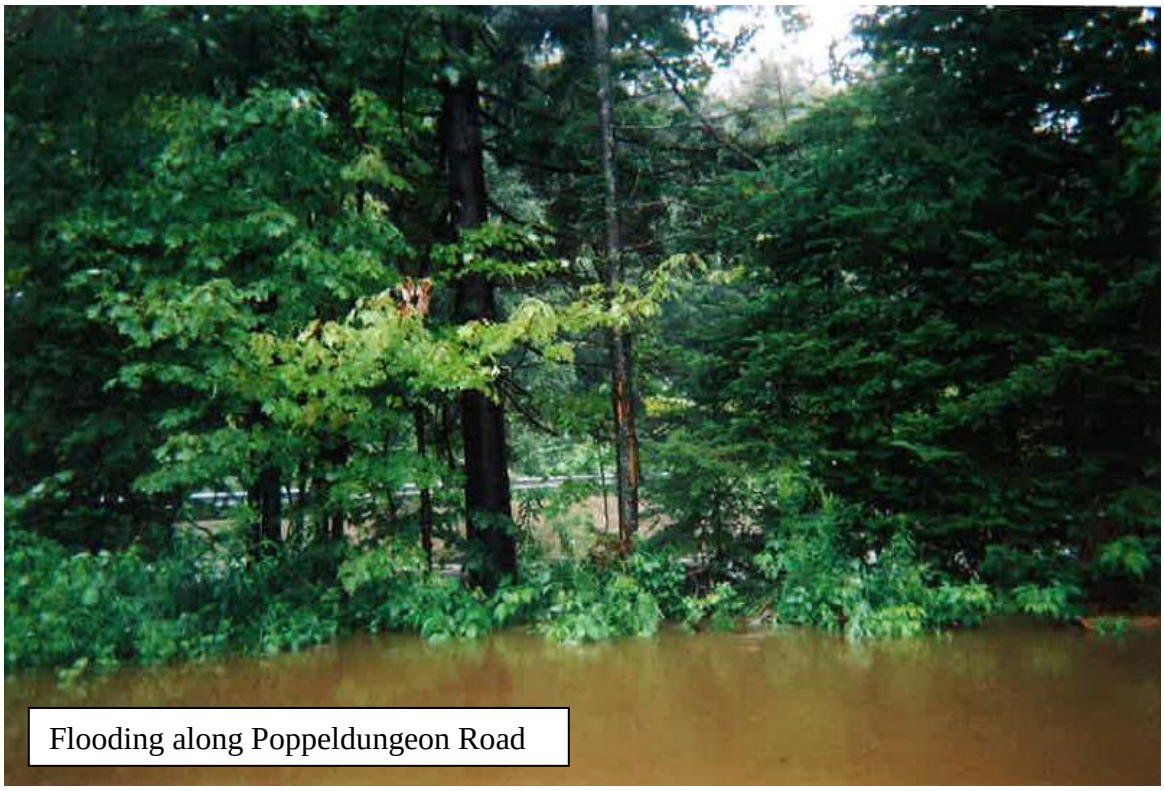
Headwaters of Williams River

Plugged culvert on Christmas Tree Road

Bridge on Poppeldungeon Road

Intersection of Poppeldungeon Road and Christmas Tree Road

Flooding along Poppeldungeon Road



Flooding along Poppeldungeon Road

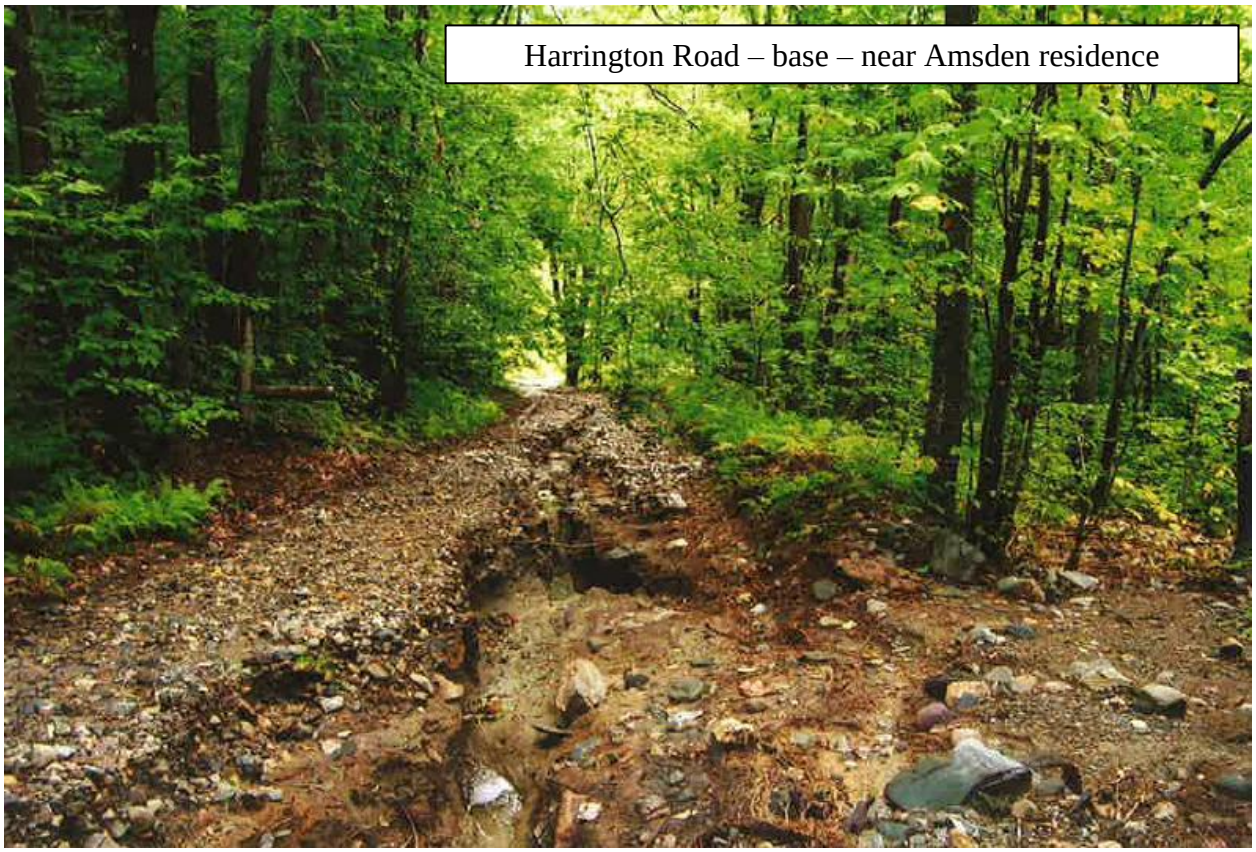
P. Photos of Damage in Windham during and after TS Irene (August 2011) – Photos provided by Heath and Mary Boyer

Mercy Road and Route 121

Wheeler Rd near intersection with Windham Hill Road

Wheeler Rd – private driveway

Harrington Road



Harrington Road – base – near Amsden residence

Popple Dungeon Road at Christmas Tree Road

Christmas Tree Road

Horsenail Hill Road

Mercy Road culvert at Route 121