Town of Orwell, Vermont

Single Jurisdiction All-Hazards Mitigation Plan

Final Plan Adoption Date: / /2026 *FEMA Approval Date: / /2026*

Orwell Fire Department and Town Garage

Orwell 2026 LHMP Executive Summary

Town officials and citizens of the Town of Orwell updated its All-Hazards Mitigation Plan in 2025 and 2026. They conducted a hazards inventory and risk assessment matrix, identify locations where hazards are known to the community, and identify potential mitigation projects associated with the hazards identified.

The hazard mitigation committee identified the following hazards as their **Highest Vulnerability**, based on probability, warning time, geographic impacts, property damage, and other concerns:

- **Severe Ice Storm (7.0)**
- **Severe Snow Storm (7.0)**

- **High Winds (6.0)**
- **Highway Accidents (6.0)**

High Vulnerability Hazards:

- **Structure Fire (5.25)**
- **Severe Heat (4.5)**
- **Hazardous Materials Spill (4.0)**
- **Drought (4.0)**

- **Invasive Species (4.0)**
- **Infectious Disease/Pandemic (3.75)**
- **Hail Storm (3.5)**
- **Wildfire (3.5)**

and **other Medium Vulnerability Hazards:**

- **Severe Cold (3.0)**
- **Shoreland Slide (3.0)**

- **Insect-borne Illness (2.50)**
- **Tornado (2.25)**

- **Flash Flooding and Erosion (2.0)**

For each hazard type, the committee described previous occurrences and extent, current vulnerability, future probability, and identified mitigation goals and actions.

MITIGATION GOALS AND OBJECTIVES:

Goal 1: Increase Community Awareness of Orwell's Vulnerability to Natural Hazards

Objectives: Inform and educate the community about the types of hazards the town is exposed to, where they occur, and recommended responses

Objective: Reduce impacts to existing buildings and infrastructure to the extent possible

Objective: Reduce impacts to future development and infrastructure to the extent possible

Objective: Reduce impacts to the town's natural and historic resources

Objective: Reduce impacts to public health

Goal 2: Reduce Vulnerability of People, Property, and the Environment to Natural Hazards

Objective: Provide mechanisms to enhance life safety

Objective: Reduce impacts to critical facilities and services

Goal 3: Increase Interagency Capabilities and Coordination to Reduce the Impacts of Natural Hazards

Objective: Continue to collaborate and coordinate with other agencies on planning, projects, hazard response, and funding opportunities

The hazard mitigation planning committee developed a prioritized list of future mitigation actions and projects, with care taken to include those projects which can be considered reasonable and feasible based primarily on capacity, cost, and political feasibility. These include:

Hazard	Future Mitigation Actions
All Hazards	• Support dedicated EMD personnel and communication accounts • Encourage citizen use of VT Alert and CARE registry
Severe Ice Storm	• Manage vegetation in the ROW to minimize/allow space for powerlines
Severe Snow Storm	• Maintain snow removal equipment and qualified personnel • support efforts by Green Mountain Power to mitigate power outages due to ice storms via pruning and tree removal activities.
High Winds	• Remove dead and dying trees from town rights of way as part of normal maintenance
Highway Accidents	• Support future reconstruction activities to reduce risk at the intersection of Rte. 22A and Rte. #73 west of the village.
Structure Fire	• Support Orwell Volunteer Fire Department
Severe Heat	• Maintain Orwell Library as emergency cooling shelter with generator and air-conditioning
Large-scale Hazardous Materials Spill	• Support ongoing HazMat training efforts of the Orwell Volunteer Fire Department
Drought	• support dry-well reporting, and groundwater protection efforts around both public and private water supplies.
Invasive Species	• Follow state recommendations to prevent spread of Poison Parsnip, Eurasian Milfoil, and Emerald Ash Borer
Infectious Disease	• Develop and maintain continuity planning and agreements for potential town staff shortages.
Hail Storm	• Provide hail-safety education materials on the town website
Wildfire	• Aggressively require outdoor burn permits prior to any outdoor burning and consider fines for violation. • Support ongoing wildland fire training efforts and wildland fire PPE and Tools by the Orwell Volunteer Fire Department
Severe Cold	• Develop and implement a Warming Shelter plan
Land/Rock/ Shoreland slide	• Maintain and enforce Shoreland Overlay District in zoning
Insect-borne Illness	• Provide mosquito-safety educational materials on the use of appropriate repellants and behavior patterns to reduce bites
Tornado	• Remove dead and dying trees from town rights of way
Flood/Flash Flood	• Stone Line ditches when work is being completed on any road.

A Hazard Mitigation Plan is dynamic and should not be static. To ensure that the plan remains current and relevant, it is important that it be updated periodically. The hazard mitigation plan should be reviewed by all new town officials and revised and updated in its entirety every 5 years.

The Town of Orwell will monitor and evaluate its hazard mitigation goals, strategies and actions annually as the town budget is created. In updates of the Municipal Plan by the planning commission, the concepts, goals and strategies from this hazard mitigation plan should be incorporated and used to inform municipal development strategies.

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1. Planning Process

Requirement 44 CFR § 201.6(c)(1)
(Document the planning process)

1.1. Current Plan Development Process

The Town of Orwell received a Hazard Mitigation Assistance grant from FEMA in 2022. The town issued a Requests for Proposals on September 14, 2022 and selected the Addison County Regional Planning Commission (ACRPC) as a consultant to update the Local Hazard Mitigation Plan and submit it to FEMA for approval.

The Town of Orwell Selectboard confirmed their intent to work through the process of writing an All-Hazards Mitigation Plan at a meeting of the Town Selectboard in **2025**. After the confirmation of funding availability, the Selectboard further showed their support of the plan by appointing the following residents of Orwell to a mitigation planning committee:

- Sandy Korda, Orwell Emergency Management Director
- Alex Kansky, Orwell Fire Department and Road Department
- Peter Ochs, Orwell First Response Squad and Middlebury Regional EMS
- Joe Pouliot, Orwell Select Board and Zoning Administrator
- Bob Arnebold, Orwell Fire Department

The committee met **October 2, 2025** to review the Hazard Mitigation Plan components and requirements and develop a strategy for outreach to public and other community stakeholders. At a **November 6, 2025** meeting, the committee completed a hazards inventory and risk assessment matrix to determine highest vulnerability hazards and locations. Following the February meeting, the committee reviewed Previous Hazard Mitigation Actions (from the 2018 plan) and posters were placed at Town Meeting Day for citizen input and feedback. ACRPC reached out to other TOWN officials and Emergency Responders in Vergennes for additional feedback on the hazards inventory and risk assessment. The committee met again on **April 23, 2026** to set overall mitigation goals, review existing policies, programs and resources, and to develop potential mitigation projects associated with the hazards identified.

The final plan draft was sent to the Town Selectboard for their **XXX XX 2026** regular meeting. Input on the draft plan was requested from the Town Selectboard and Planning Commission during open meetings. The town also made the plan available on its website www.TOWNvt.us to reach a broader distribution. A copy of the draft plan was sent via e-mail to the town clerks of the surrounding municipalities of Shoreham, Whiting, Sudbury, and XTOWN for distribution to appropriate town officials on **XXX XX 2026** with a request for review and edits by **XXX XX 2026**. No comments were received.

Based on comments from the complete public process, the draft plan was further edited and forwarded to Vermont's State Hazard Mitigation Officer for comments and preliminary approval on **XXX XX 20XX**. Suggested edits were identified by the SHMO on **XXX XX 20XX**. Appropriate edits were made and the draft plan received tentative selectboard approval before being sent back to the SHMO for a second review before being passed on to FEMA reviewers. Comments were received back from FEMA reviewers on **XXX XX 20XX**.

Changes were made to the draft plan based on FEMA recommendations and an updated draft was completed on **XXX XX 20XX**. Upon completion of this draft, the plan was returned to FEMA for

Approval Pending Adoption (APA) status. Upon receipt of the FEMA APA, the resulting document was adopted by the TOWN Selectboard on **XXX XX 20XX**.

1.2. Opportunities for Public Involvement

Multiple opportunities for public comment were made available during the planning process:

- A planning committee was appointed from volunteers and town officers at an open meeting of the Town Selectboard.
- A set of posters with overview information about the Hazard Mitigation Plan and an interactive chart for communities to rank their own vulnerability priorities was displayed at Town Meeting, March 7 2023 (Appendix 1)
- A copy of the draft plan was made available along with a comment sheet at the Town Office on XXDATE 2024. The Town Clerk was asked to encourage the public to read and comment on the draft plan. (No comments received)
- Meetings of both the Town Selectboard and the Town Planning Commission were open for public comment throughout the planning and draft phases of this plan. (No comments received)

Requirement 44 CFR § 201.6(b)(2) (Stakeholder Involvement)

1.3. Opportunities for Additional Comment

Additional opportunities for regional and state-level comments in the draft stage were provided throughout the planning process.

- A copy of the draft plan was posted on the ACRPC website www.acrpc.org for regional review and notice was given during the **XXX XX 20XX** ACRPC full commission meeting as to its availability. Commissioners were asked to review and pass along comments to (Andrew L'Roe) at ACRPC. No comments received.
- The **XXX XX 20XX** ACRPC newsletter included an announcement that a draft plan was available for public review and comment. That draft was posted in the ACRPC office and was available for public input during normal business hours with a comment sheet attached. No comments received.
- The neighboring Town Clerks of XTOWN, XTOWN, and XTOWN were notified of the posting via e-mail on **XXX XX 20XX**. The clerks were instructed to share the notice with the select boards, planning commissions and the general public. Comments were requested to be sent to Andrew L'Roe at ACRPC. No comments were received.
- A copy of the draft plan was provided to the State Hazard Mitigation Office for comments on XXXXXXXDATE. Comments were received on XXXXXXXDATE
- An updated copy was sent to DEMHS for submission to FEMA on XXXXXXXDATE
- FEMA Region 1 staff was sent a draft for comment on XXXXXXXDATE
- FEMA reviewers returned the draft plan XXXXXXXDATE for further edits which were completed and the edited plan sent back.

Requirement 44 CFR § 201.6(b)(3)
(Review of existing plans)

1.4. Extent of Review

Throughout the plan development process information from the following documents and sources were incorporated into the plan either as data or to inform the committee's prioritization process:

- 2026 Local Emergency Management Plan and Hot Weather/Cooling Shelter Annex
- 2024 Orwell Town Plan (support for the committee's prioritization process and section 2 narrative)
- 2022 Addison County Regional Plan (Goals related to public safety as well as energy and transportation resilience)
- 2018 State of VT Hazard Mitigation Plan (provided a listing of statewide hazard concerns)
- 2023 Draft State of VT Hazard Mitigation Plan
- 2022 Report of the State Fire Marshall (provided data to inform structure and wild fire risks)
- Federal Emergency Management Agency, www.fema.gov (provided official data on declared disasters)
- The Vermont Weather Book by David Ludlum (provided historic accounts of disasters for Section 4.3
- National Climatic Data Center website (provided information for Section 4.3)
- FEMA FIRMS dated 1986 (incorporated into maps)
- VT Center for Geographic Information data layers (incorporated into map products)
- State of Vermont Tier II reports, 2020-2022 (reviewed for Section 4.3)
- Orwell Annual Town Reports 2013-2024

2. Local Background

2.1. Community Background

The Town of Orwell is located on the shores of Lake Champlain in the southwestern corner of Addison County, Vermont. Orwell has a land area of approximately 47 square miles with around 10.5 miles of shoreline.

Orwell has two major roadways in addition to the 75 miles of town highways that comprise the transportation system. Route 22A is a major north/south regional truck route through town and Route 73 is an east/west highway that goes through the village and connects to Route 22A.

The population of Orwell has grown from 826 in 1960 to its current level of 1250 in 2017, a rate of growth of approximately .5% per year. Available housing data for the 10 years ending in 2016 indicates an average of just over 3 new homes per year were permitted. This rate has been relatively constant since the last mitigation plan in 2012. None of those homes were permitted within the Flood Overlay District, the only zoning district in which hazards are specifically identified. During the history of mitigation planning since 2007, no known housing starts have resulted in an increase in vulnerabilities for the community. As with most of the other towns in Addison County, Orwell homes are primarily single-family units (~89%), less than 2% are multi-family units and approximately 10% are mobile homes.

10-year Orwell Housing Growth

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
7	0	2	?	4	4	2	2	4	2	2

In Orwell, electricity is provided by Green Mountain Power (GMP). On-site wells and springs provide water for most of the town. A portion of the Town is served by a sewage treatment facility and the remaining homes have individual septic systems.

In Orwell, fire coverage is provided by the Orwell Volunteer Fire Department. Calls for structure fires occur on average less than two per year. The Report of the Fire Marshal indicates that 18 fires were reported in 2016. The fire department expands its firefighting capability through a mutual aid agreement with the Addison County Firefighters Association and with good working relations with other neighboring departments.

The town has a 1st Response Team Closely connected to the fire department with a 1st response vehicle for support. Ambulance transport is provided by the Middlebury Volunteer Ambulance Association and the nearest hospital services are provided by Porter Medical Center. Both are located approximately 20 miles North in Middlebury. The next closest hospital is located at the Rutland Regional Medical Center in Rutland approximately 35 miles distant. The nearest Level I Trauma center is located 50 miles North in Burlington. Law Enforcement support is provided by the VT State Police or through contract agreement with the Addison County Sheriff's Department.

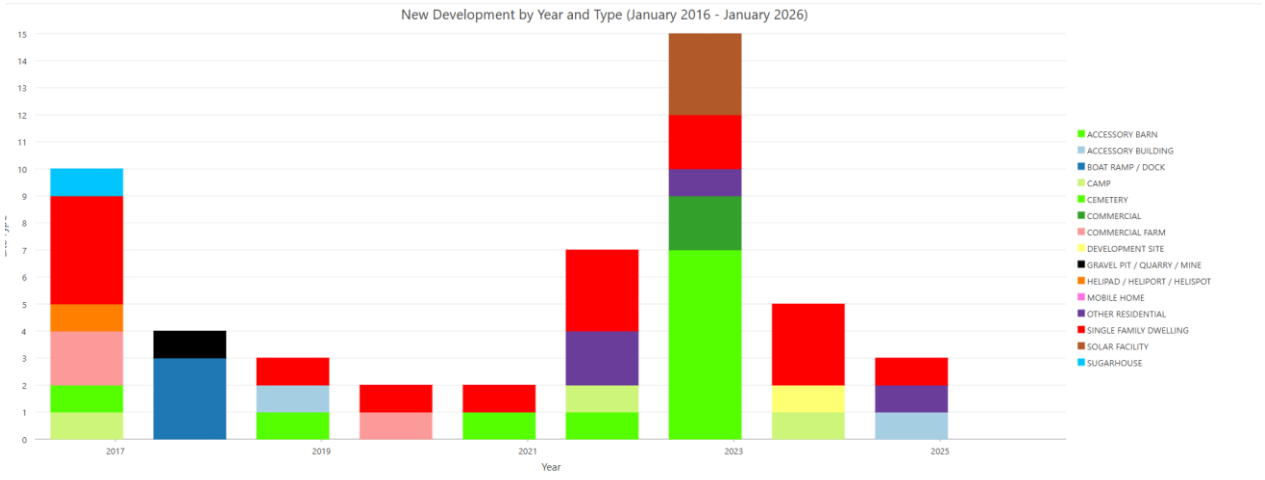
The Town uses a Local Emergency Management Plan (LEMP) to guide its response to larger incidents and the LEMP identifies several high hazard/vulnerable sites that are associated with flooding, fire and transportation accidents. Additionally, the LEMP designates the Town Hall and the Fire Station as possible emergency operations centers during a larger disaster and the Town Hall and Village School as potential community shelters. Other Essential Facilities include the Town Clerk's Office.

Zoning Regulations

The town of Orwell enforces a set of Zoning Regulations, most recently adopted on March 5, 2019. Town of Orwell Zoning Regulations are intended to provide for orderly community growth and to further the purposes established in the Orwell Town Plan. The regulations require that dwellings comply with all applicable State and Federal health and safety regulations. Where these regulations impose a greater restriction upon the use of a structure or land than are required by any other statues, ordinances, rules, regulation, permit, easement or agreement, the provisions of these regulations shall control.

The Zoning Regulations contain a set of Flood Hazard Area Regulations in order to promote the public health, safety, and general welfare, to prevent increases in flooding caused by the uncontrolled development of lands in areas of special flood hazard, and to minimize losses due to floods. These regulations apply to all lands in the Town of Orwell identified as areas of special flood hazard on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), dated September 18, 1986, and any revisions.

The Development Review Board (DRB) and Planning Commission (PC) are responsible for establishing zoning regulations. The DRB/PC also reviews subdivision requests and decides on exceptions to those regulations in the form of variances and conditional and special use permits. The Zoning Administrator receives, reviews, and issues standard building applications, and may only issue a required Certificate of Occupancy following inspection when a structure is completed.



Land Use and Development Ordinances

Four distinct areas within the town have been identified with concomitant guidelines for future planning in these areas. These Future Land Use Areas include the:

1) **Village Center Area** representing the historic and functional hub of Orwell. It contains public institutions (town hall, school, library, churches), small businesses, and closely spaced homes arranged in a traditional 19th-century village pattern.

2) **Rural Planning Area**, which covers **most of the town's land area** and is dominated by agriculture, forestland, and low-density housing on large lots. Its purpose is to maintain traditional rural character with productive farmland, scattered homes, forests, and historic farmsteads. Since septic constraints previously encouraged large lots, many parcels are 10–25 acres.

3) **Lake Champlain & Sunrise Lake Shoreline Planning Area, which** includes the shorelands of Lake Champlain and the small portion of Sunrise Lake within Orwell. It contains a mix of seasonal camps, converted year-round homes, marinas, recreation businesses, conserved farmland, and the Mount Independence historic site. The shorelines contain environmentally sensitive resources: wetlands, habitat, archaeological sites, and scenic views.

4) **Conservation Planning Area, which** includes conserved lands, public lands (state WMAs, Mount Independence, Town Green), wetlands, floodplains, steep slopes, deer wintering areas, and other environmentally fragile locations.

Orwell Land Use Regulations includes 5 districts: a Village District and Neighborhood Commercial District, a Medium Density Residential District, a Rural District, and a Conservation District. There are also two overlay districts:

Shoreland Overlay District- intended to protect areas along the shorelines of Lake Champlain, East Creek, and Sunrise Lake and to reduce the rate of shoreline erosion. It encourages recommendations to retain and plant shoreline vegetation, use of proper stormwater management techniques, and requires keeping development set back from the waters edge.

The Flood Hazard Overlay District representing the federally determined special flood hazard area 1% (aka 100-year) floodplain zones surrounding Lake Champlain, East Creek, the Lemon Fair River, as well as several tributaries and a number of ponds in the southeastern part of town. These areas are limited in size and contain other constraints for development and thus will remain sparsely developed.

The Town is a member in good standing of the National Flood Insurance Program since 1985 and as such has adopted zoning by-laws designating Flood Hazard Areas including associated regulations for administering those areas. In Orwell, those floodplain regulations are administered by the Zoning Administrator as part of their regular duties. The Vermont FloodReady Website indicates that there are potentially 40 buildings (3% of all structures) currently in the 1985- mapped FEMA Special Flood Hazard Area (SFHA, aka 100-year floodplain). All of these are along the edge of Lake Champlain. None of these is being insured through the NFIP and therefore there are no repetitive loss structures located in the Town of Orwell.

Table. Orwell Community Assets

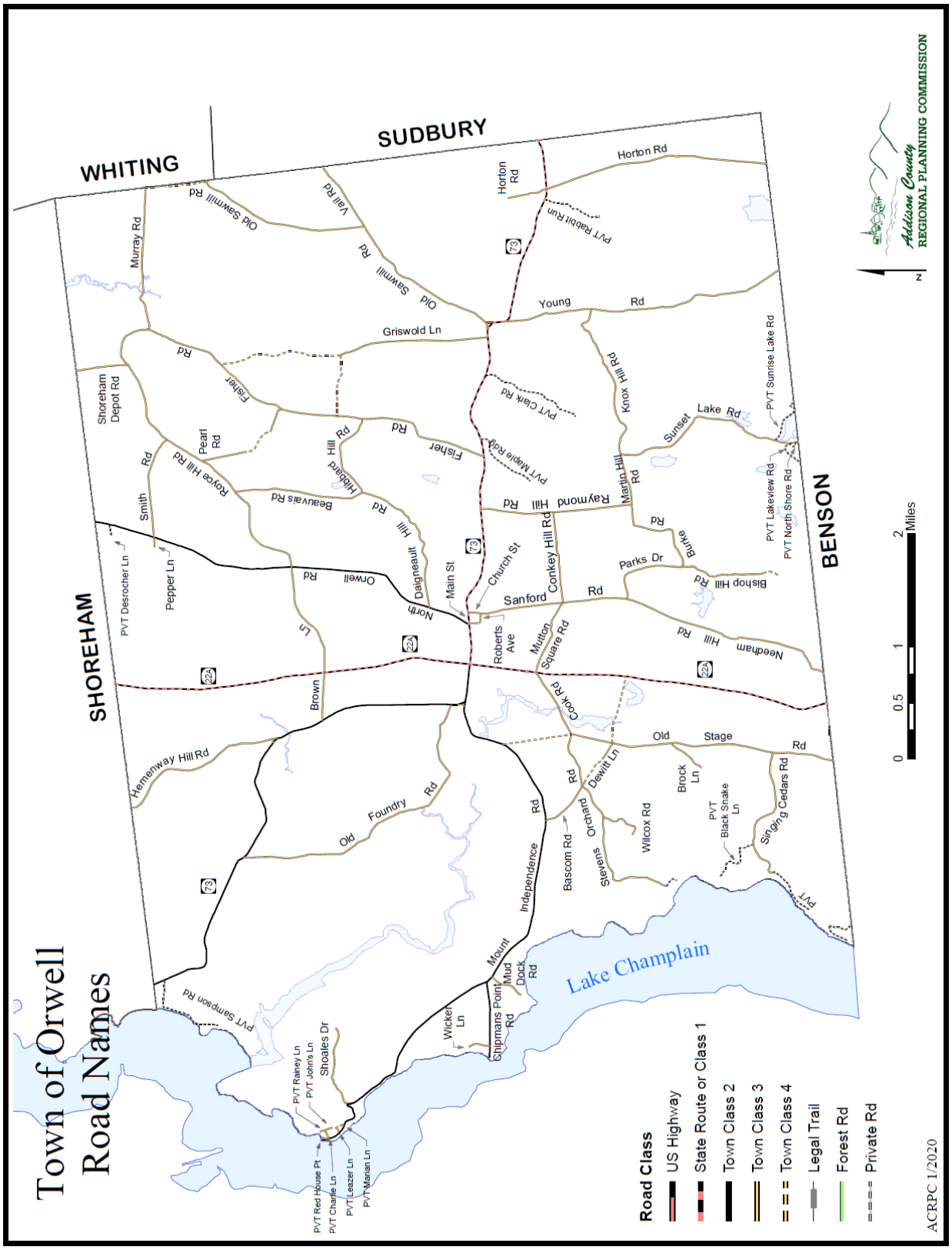
		Potential Hazard Vulnerabilities																			
Category	**Assets**	Widespread-Long term Power Outage	Severe Heat	Severe Cold	High Winds	Heavy Snow	Ice storm	Lightning Strikes	Drought	Infectious Disease	Insect-borne Illness	Structure Fire	Fluvial Erosion	Inundation Flooding	Invasive Species	Highway Accident	HazMat Spill	Wildfire	Hail storm	Landslides	Earthquake
People																					
Underserved Communities	Older Residents	X	X	X		X	X			X	X										
	People with Disabilities	X	X	X		X	X			X	X										
	Families with Children																				
Socially Vulnerable Communities	Agricultural Workers		X	X						X	X						X				
	Short-term Visitors (Summer, Marinas, Air BnBs)	X	X	X		X	X	X		X	X										
Public Workers	Town Office Staff	X								X											
	Town Road Crew		X	X	X		X	X				X				X	X				
	Volunteer Fire Department									X						X	X	X			
	Volunteer First Response									X						X	X				
	Sewer Dept. staff																				
Structures																					
Facilities	Town Office											X					X				
	Town Hall											X									
	Orwell Free Library											X					X				
	Town Garage/Fire Department											X									
	USPS Post Office											X									
	Orwell Village School											X									
Lifelines	Gas Station															X	X				
	Private Water Wells								X								X				
	Cell Tower on James Farm Silo							X				X									

Orwell Community Assets Table (page 2) **Potential Hazard Vulnerabilities**

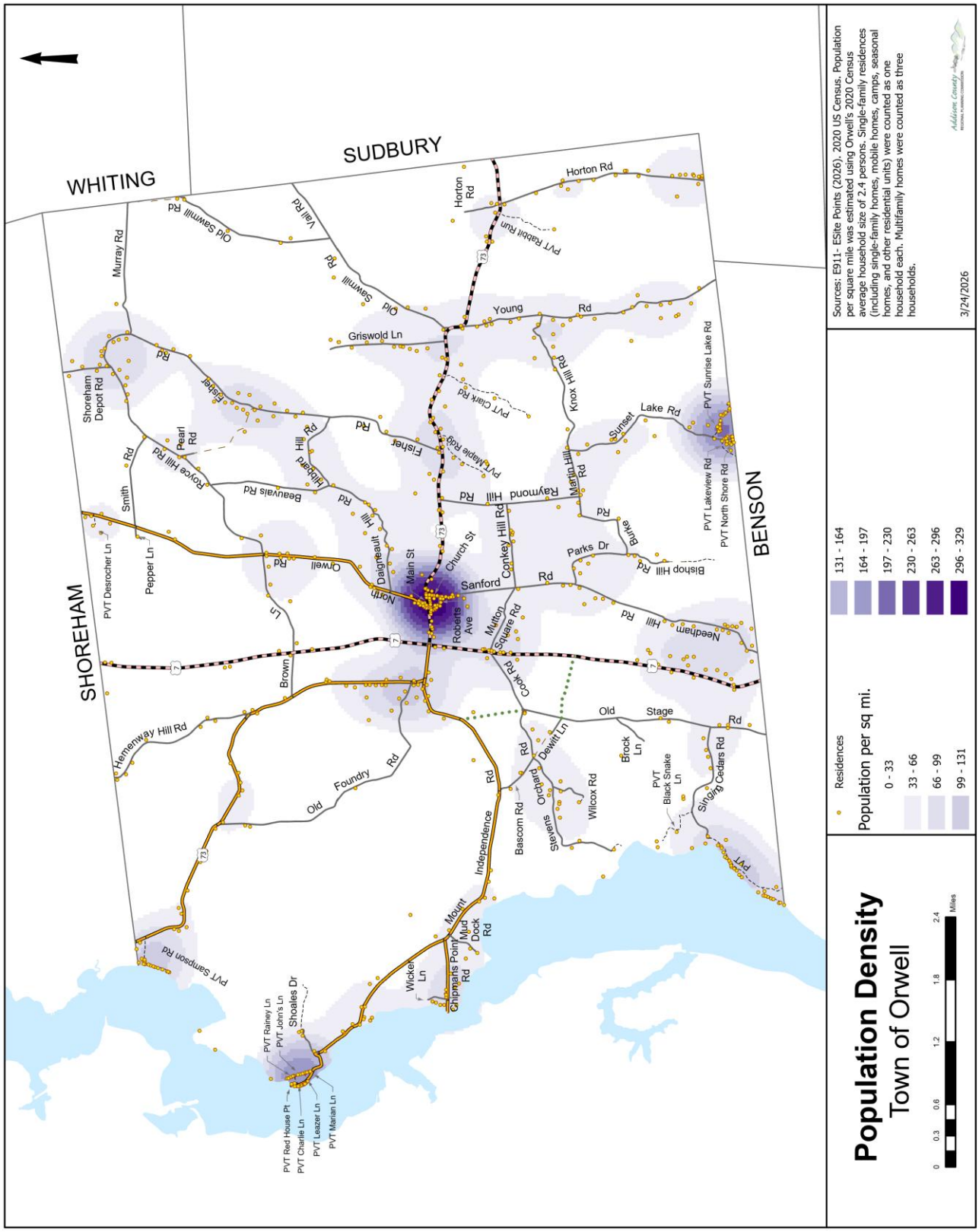
Category	Assets	Widespread-Long term Power Outage	Severe Heat	Severe Cold	High Winds	Heavy Snow	Ice storm	Lightning Strikes	Drought	Infectious Disease	Insect borne Illness	Structure Fire	Fluvial Erosion	Inundation Flooding	Invasive Species	Highway Accident	HazMat Spill	Wildfire	Hail storm	Landslides	Earthquake
Critical Infrastructure	Town sewer plant												X			X					
	Bridges (6)												X			X					
	Major Roads																				
	Route 22A					X								X		X	X				
	Route 73					X										X	X				
													X								
Future	Residential Buildings											X						X			
	Village Area											X									
Systems																					
	Town sewer system																				
Networks	Powerlines	X			X	X	X														
Capabilities	Broadband Internet lines				X	X	X														
Natural, Historic, and Cultural Resources																					
Natural Resources	Dairy Farms		X	X	X	X	X		X												
	Apple Orchard		X	X	X				X						X				X		
	PYO Farms		X	X	X				X		X				X				X		
	Sunrise Lake														X						
	Lake Champlain														X						
	East Creek														X						
Historic Resources	Mount Independence Historic Site											X									
	Orwell Historical Museum											X									
Cultural Resources																					
Activities that have Value to the Community	Sunrise Lake recreation							X													
	Baseball field recreation		X					X													
	Lake Champlain/Marina recreation				X			X													

2.2. Community Maps

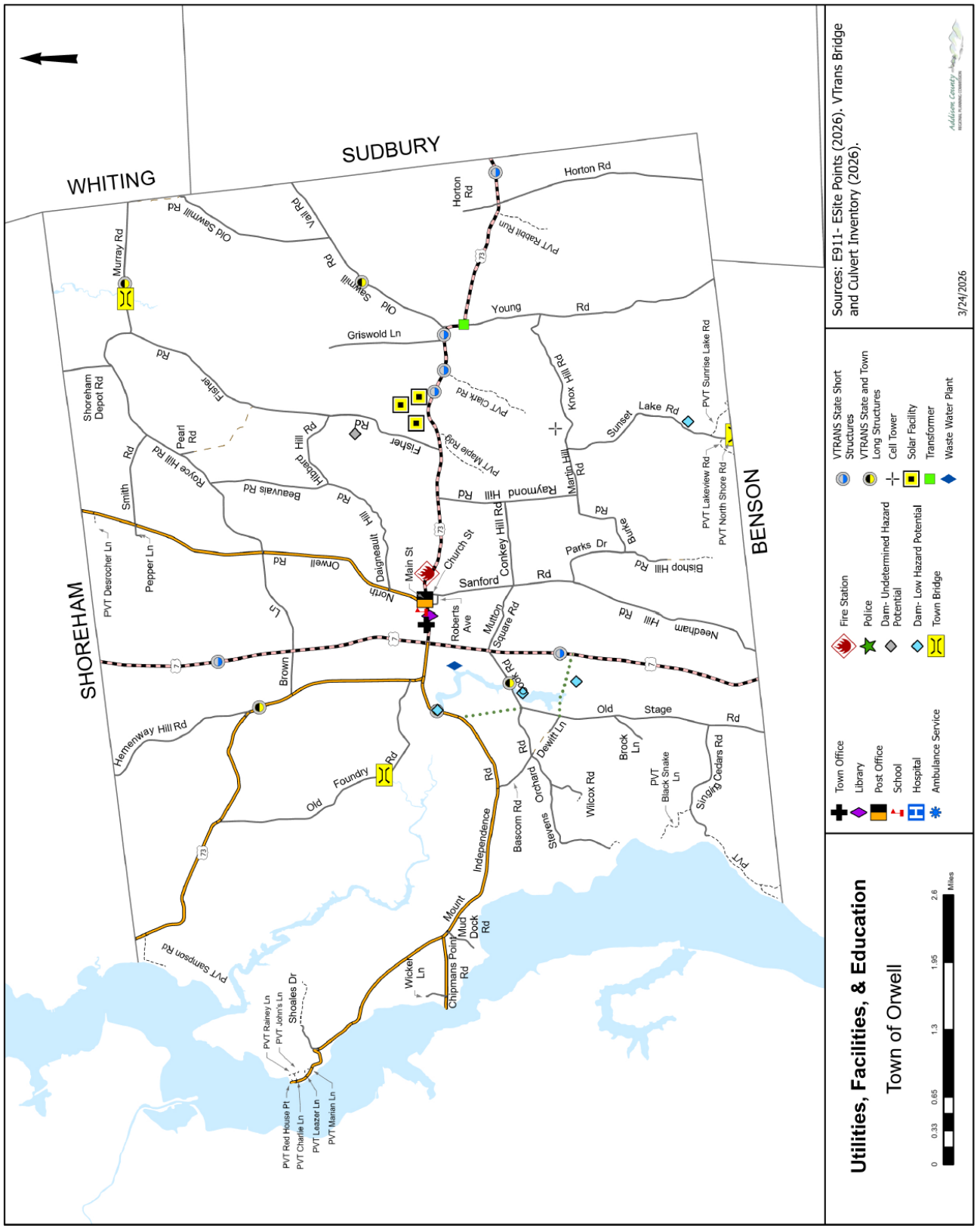
2.2.1. Municipal Road Names Map



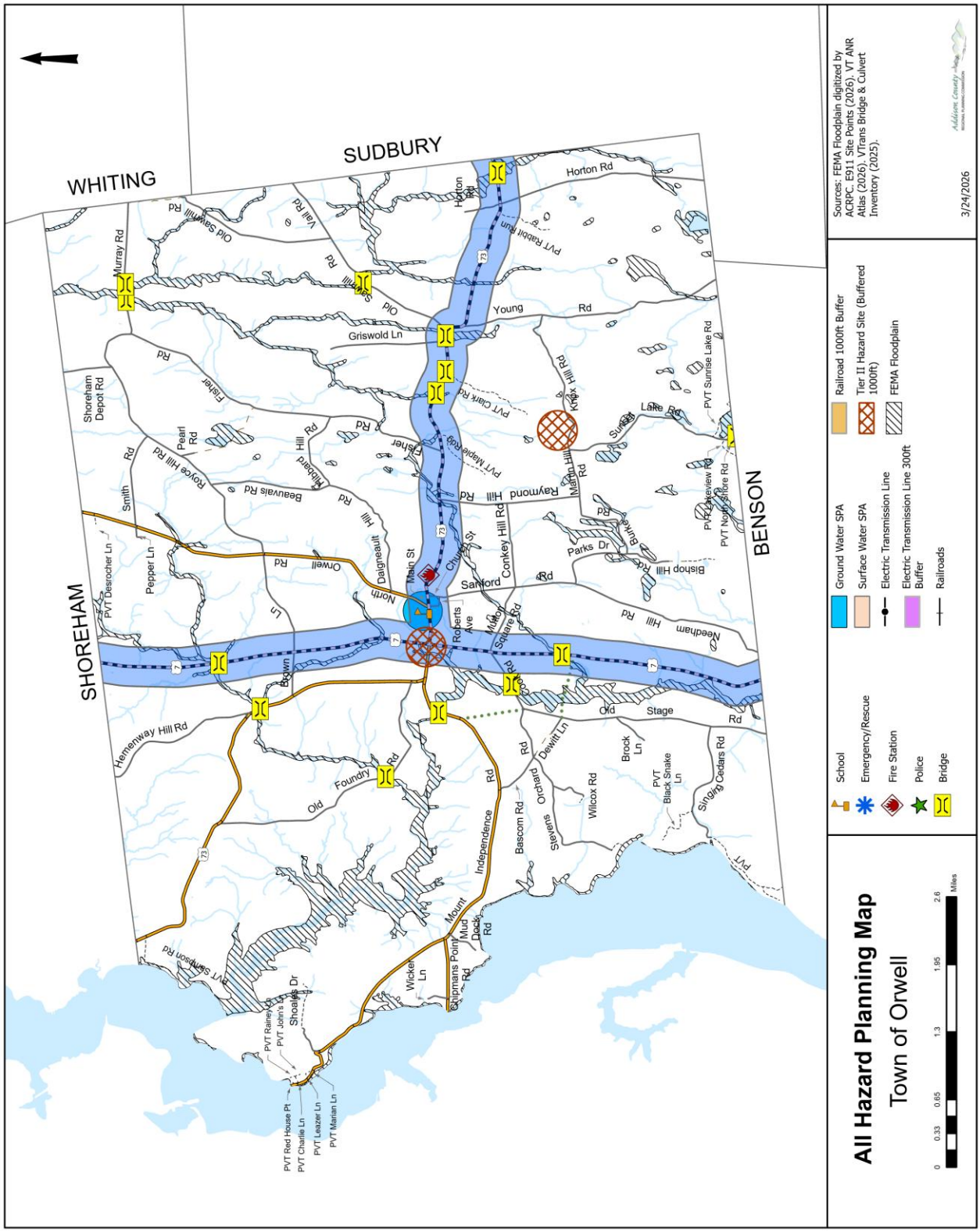
2.2.2. Population Density Map



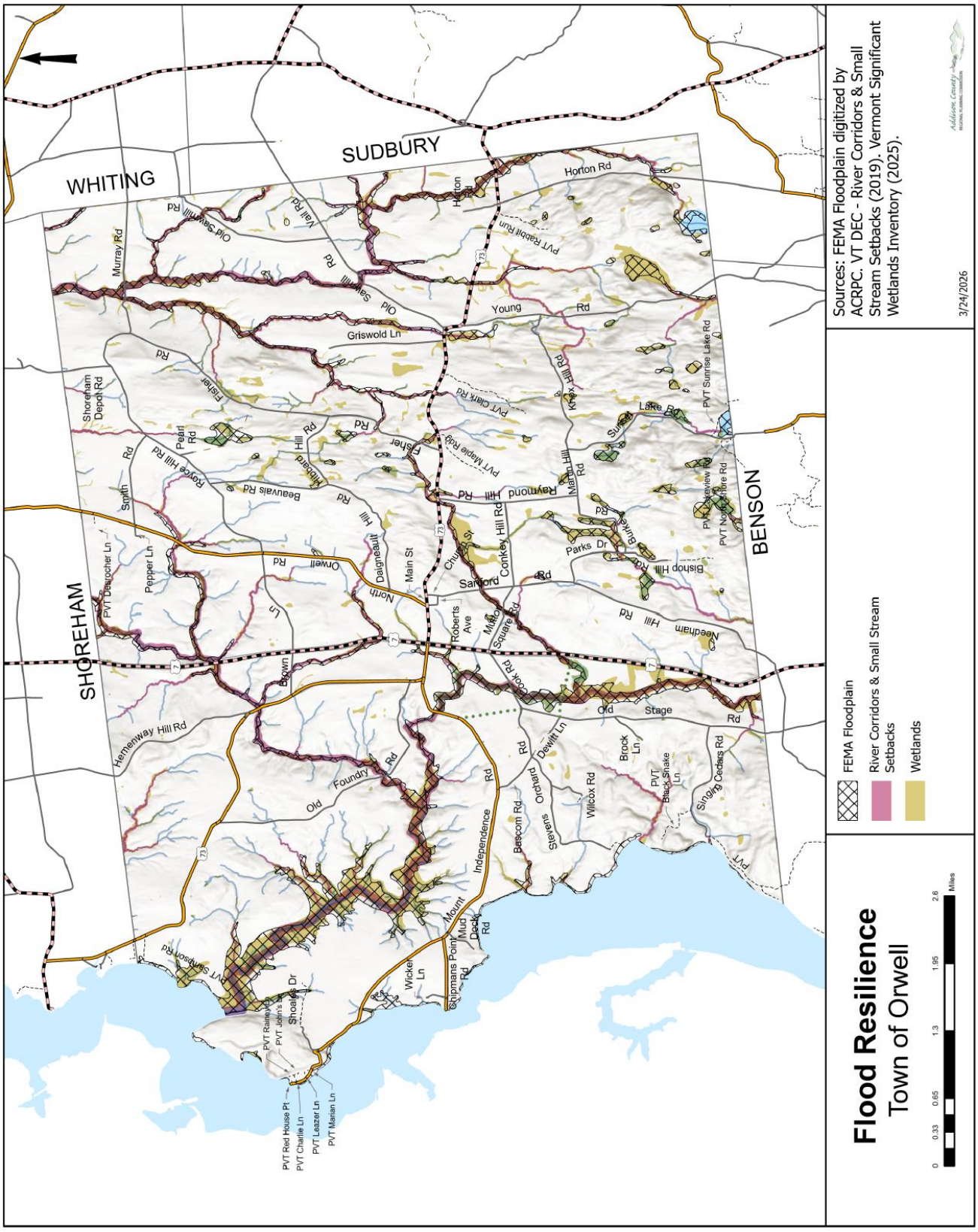
2.2.3 Community Facilities Map



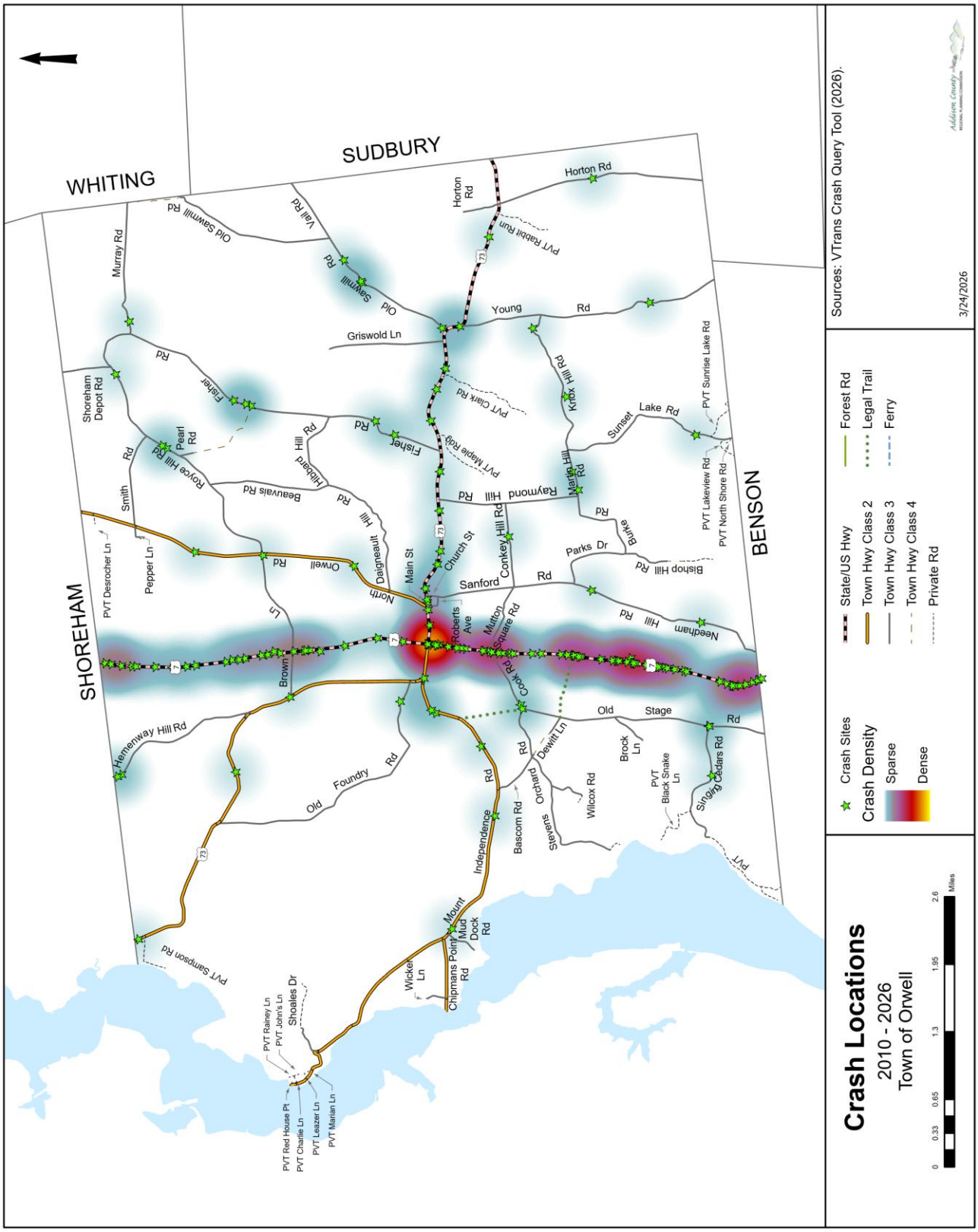
2.2.4. All-Hazards Planning Map



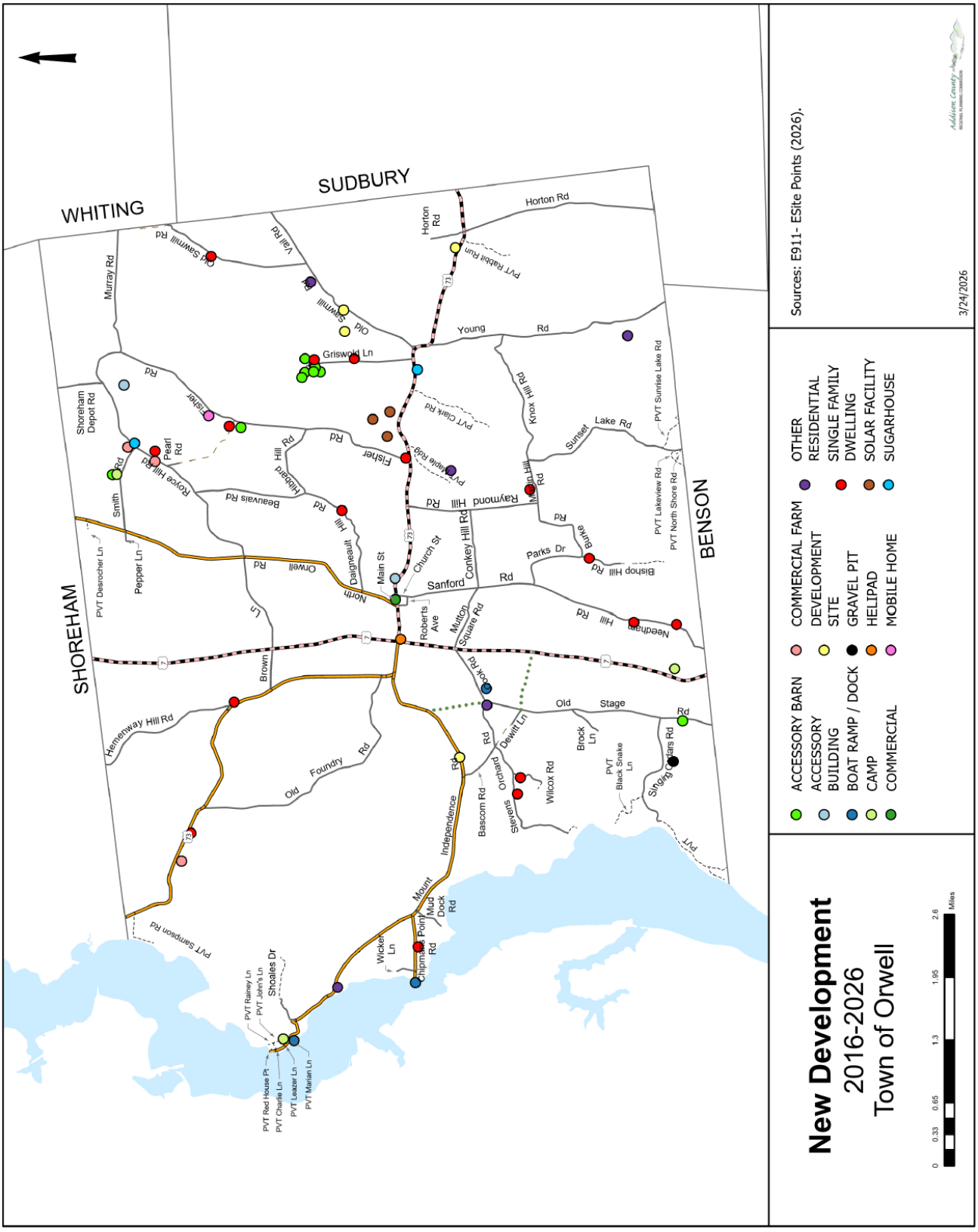
2.2.5 Flood Resiliency Map



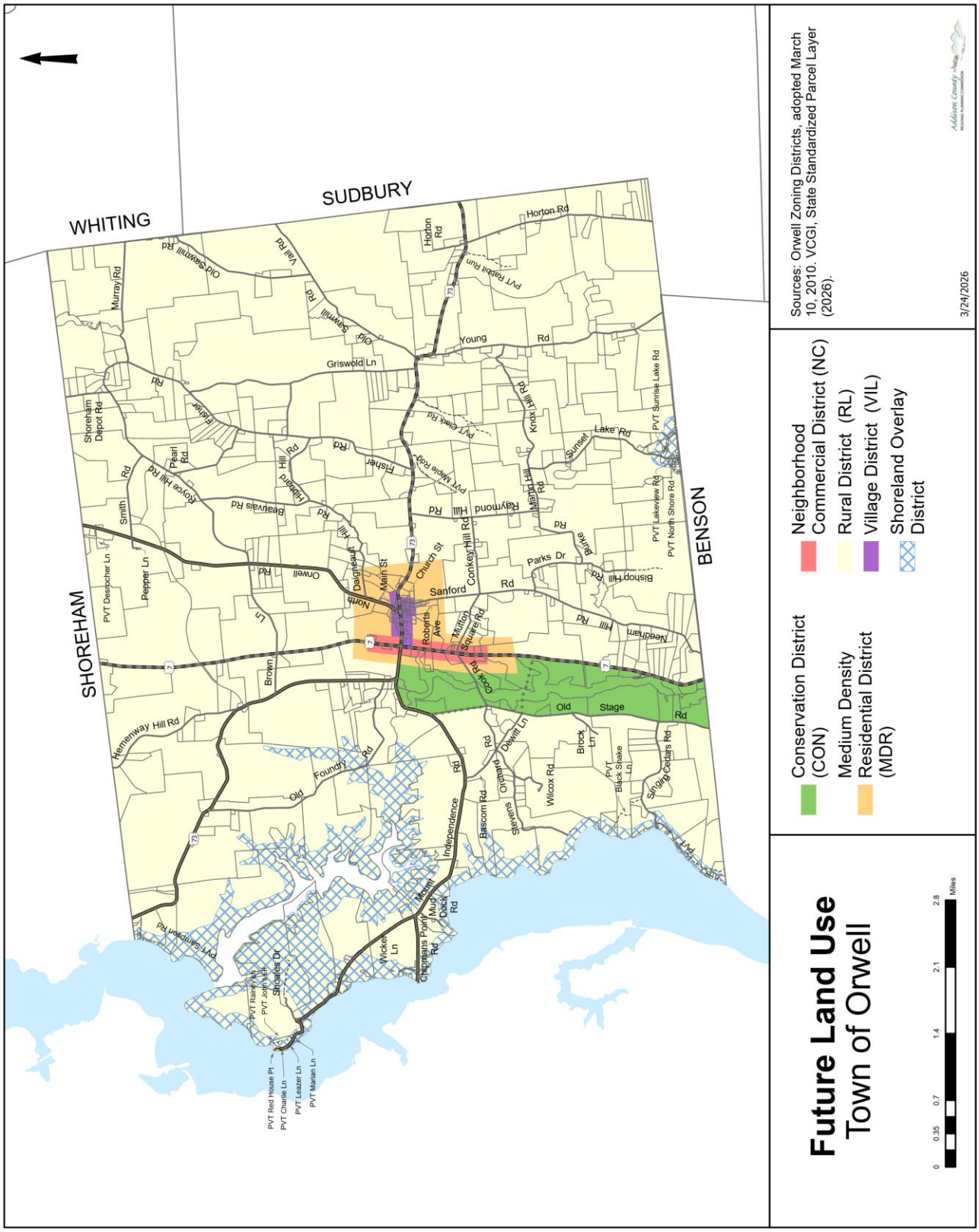
2.2.6. Vehicle Crash Location Map



2.2.7. New Development (2016-2026) Map



2.2.8. Future Land Use Map



3. Existing Adopted Plans Which Support Hazard Mitigation

3.1. 2026 Orwell Local Emergency Management Plan

Adopted annually and before May 1st each year and includes all required elements:

- Emergency Management (EM) Planners
- Municipal Emergency Operations Center (EOC)
- Municipal Resources
- Public Information and Warning
- Vulnerable Populations
- Shelters
- Local and Regional Contacts

Also includes several additional voluntary annexes:

- Emergency Services Personnel Guide for Pandemics
- Community Sheltering in Place
- Hot Weather Emergency Response Planning
- Maps of All-Hazards Planning, Road Names, and Fire Hydrant locations

3.2. 2024 Orwell Municipal Plan and Land Use Plan Goals

- Support efforts to protect wetlands by ensuring that adjacent land uses do not impair the important habitat, filtration and flood control functions of the town's wetlands.
- Protect existing high-quality riparian habitat within the town by establishing or maintaining undisturbed, naturally vegetated riparian buffers along the town's streams to protect water quality, prevent erosion, reduce the amount of pollutants entering surface waters, and provide habitat and corridors that connect habitats.
- Protect lakes, ponds, rivers and streams from encroaching development, including roads and driveways, by incorporating development setbacks and standards into the town's land use regulations that require the maintenance or establishment of naturally vegetated riparian buffers.
- Pay special attention to aquifers and groundwater protection and explore the development of regulations that would provide additional review of land uses within designated Source Protection Areas and restrict development that could contaminate public water supplies.
- Protect the natural function of the town's flood hazard areas by regulating development activity in floodplains.
- Participate in the National Flood Insurance Program and regulate development within mapped floodplains in accordance with federal standards to ensure that property owners are able to purchase flood insurance.
- Limit further construction within floodplains in order to prevent increased risk of property damage, injury or loss of life during flood events.
- Minimize the number of accesses connected to state and local highways to maintain traffic safety.
- Enact regulations to keep development set back an adequate distance from Route 22A to prevent reductions in sight distance and to increase safety.
- Support projects that would calm traffic on Main Street and Route 22A near the village center to create a safe, pleasant environment…

- Require that all roads, whether public or private, be built to basic standards…to protect public safety…
- Construct all new drives serving residential or commercial subdivisions to B-71 state highway standards.
- Adopt and utilize Codes and Standards for road repair that adequately size culverts and other infrastructure to minimize repetitive damage.
- Review most development along the shoreline as a conditional use.
- Establish setbacks for all new structures or additions to existing structures along the shoreline.

3.3. 2018 Addison County Regional Plan

Goals that support hazard mitigation:

- Work to restore and maintain stream equilibrium by developing and implementing river corridor plans.
- Reduce flooding and related damages through appropriate mitigation techniques.
- Encourage watershed-based cooperation and educate towns and the general public about water quality and stream dynamics
- Provide communities the support they need to be proactive in reducing flood and erosion hazards by adopting appropriate zoning regulations to limit development in hazardous areas.
- Encourage proper maintenance and sizing of bridges, culverts and other structures to accommodate flow from storm events and to mitigate flood hazards.
- Reduce the loss of life and injury resulting from all hazards.
- Mitigate financial losses incurred by municipal, residential, industrial, agricultural and commercial establishments due to disasters.
- Reduce the damage to public infrastructure resulting from all hazards.
- Recognize the connections between land use, storm-water, road design/ maintenance and the effects from disasters.
- Ensure that mitigation measures are sympathetic to the natural features of the region's rivers, streams and other surface waters; historic resources; character of neighborhoods; and the capacity of the community to implement them.
- Encourage hazard mitigation planning as a part of the Municipal Planning Process.
- Encourage municipalities and landowners to consider VT Agency of Natural Resources riparian guidelines for habitat and flood protection.

3.4. 2018 State of Vermont Hazard Mitigation Plan

Goals:

Protect, restore and enhance Vermont's natural resources to promote healthy, resilient ecosystems.
Enhance the resilience of our built environment – our communities, infrastructure, buildings, and cultural assets.
Develop and implement plans and policies that create resilient natural systems, built environments, and communities.
Create a common understanding of – and coordinated approach to – mitigation planning and action.

Priority Plan Actions:

Utilizing existing FEMA mapping updates and the Functioning Floodplain Initiative, develop an inventory of critical headwater and floodplain storage areas that would result in a measurable abatement of flooding.
Develop a drought plan for Vermont to include analyzing water level/monitoring data to use as predictor of drought and rates of recovery.
Develop a wildfire mitigation plan, to include research on the long-term future risk of wildfire due to climate change, determine existing infrastructure for wildfire suppression, and develop wildfire mitigation options.
Support municipalities in developing a prioritized list of transportation infrastructure improvements that increase resilience using PROTECT and/or other funding sources.
Increase Public Service Department capacity to maximize utilization of available federal dollars (including IIJA, IRA, ARPA, and EDA) towards utility resilience implementation work.
Assess all state/federal funding/technical assistance programs, as well as State permitting programs, to determine areas for better alignment around state hazard mitigation priorities.
Identify sustainable, long-term funding to support hazard mitigation and local match, to include: purchase of hazard-prone properties and easements to conserve river corridors, floodplains, and wetlands identified as key flood attenuation areas.
Complete an assessment of heat risks in urban areas of Vermont and expected impacts on historically disadvantaged populations, identify strategies for mitigating impacts (e.g., urban forestry, green roofs, green infrastructure, and/or other vegetative strategies; increased use of highly reflective and/or high emittance materials for pavement, roofs, and building).
Develop a methodology and protocol for quantifying climate mitigation, resilience, and adaptation impacts (Climate Action Office measuring and assessing progress tool).
Develop an analysis of existing Resilience Hub locations, including identification of new locations, and identification of key components that should be co-located within a Resilience Hub.

4. Community Risk Assessment

Requirement 44 CFR § 201.6(c)(2)(i)
(Description of all natural hazards)

4.1. Risk Prioritization Process

The Town of Orwell's Hazard Mitigation Planning Committee reviewed the following hazards in its Hazard Inventory/Risk Assessment, examining each of the 2023 State Hazard Mitigation Plan assessed hazards:

- Inundation Flooding,
- Fluvial Erosion
- Severe Snow Storm
- Ice Storm
- Tornado or High Winds
- Severe Cold
- Invasive Species
- Landslides
- Wildfire
- Drought
- Hail
- Infectious Disease outbreak
- Severe Heat
- Earthquake
- Dam Failure

While completely human-caused hazards were removed in the most recent State of Vermont's state hazard mitigation plan, the Orwell committee felt that additional hazards should be included in the assessment due to community concerns and potential impacts:

- Hazardous Materials Spill
- Structure Fire
- Highway Accident
- Widespread Power Outage

The Orwell Hazard Mitigation Planning Committee then assessed the town's vulnerability to each hazard for each of the following factors:

- **Probability,** or likely frequency of occurrence from historical trends and future projections
- **Warning**, or the projected time available to give notice to the majority of the population
- **Geographic impacts**, or how much of the population is expected to be impacted
- **Potential impacts**, or the potential severity of damages and disruption to lives and property.

Overall Vulnerability was then calculated by taking the total score of Warning, Geographic Impact, and Property Damage and multiplied by Probability. This score was divided by 4 to increase the scoring legibility and rank hazards on a 12-point scale.

In an effort to validate the risk assessment completed by the Steering Committee, community input was solicited through both an online survey and interactive display at Town Meeting Day to solicit input. The priority scores indicated by community members were very similar to those determined by the steering committee and comments supported including the additional hazards (See **Appendix 1**).

4.1.1 Hazard Inventory/Risk Assessment Parameters

Probability: Frequency of Occurrence

1= Unlikely	<1% in a given year
2= Occasionally	1%-10% probability in a given year
3= Likely	>10% but <100% in any given year
4= Highly Likely	100% probability in a given year

Warning: Time available to give notice to the majority of the population

1= More than 12 hours
2= 6-12 Hours
3= 3-6 hours
4= <3 hours (minimal)

Geographic Impacts: How much of the population is expected to be impacted

1= Isolated Locations/neighborhood	<20% of population impacted
2= Moderate impact	>20% and <75% of population impacted
3= Community-wide	>75% of population impacted within community
4= Region-wide	Level 2 & 3 impacts in surrounding communities

Potential Impact: Severity of damages and disruption to lives and property

1= Negligible	Isolated property damage, minimal disruption to infrastructure
2= Minor	Isolated moderate to severe property damage, brief disruption to infrastructure
3= Moderate	Severe damages at neighborhood level, temporary closure of infrastructure
4= Major	Severe damages town-wide, temporary to long-term closure of infrastructure

Vulnerability: Total score of Warning, Geographic Impact, and Property Damage, multiplied by Probability (and divided by 4 to increase legibility of scale)

Community Priority:

Highest Priority	Vulnerability score > 6
High Priority	Vulnerability score > 4 and ≤ 6
Moderate Priority	Vulnerability score > 3 and < 4
Low Priority	Vulnerability score ≤ 3

4.1.2 Town of Orwell Risk Assessment Results 2025

Reg evaluation	Hazard	Hazard Impact	Potential Occurrence Location	Probability	Warning Time	Geographic Extent	Potential Impact	Total Vulnerability Score	Community Priority
				1(Unl)-4(High)	1(Long)-4(Short)	1(Little)-4(Wide)	1(Neg)-4(Maj)	Prob. x Other Factors (/4)	
*	**Severe Ice Storm**	Property Damage and Power Outage	Whole town	4	2	3	2	**7.00**	**Highest**
*	**Severe Snow Storm**	Closed Roads and Drifting, Property Damage and Power Outage	Whole town	4	2	3	2	**7.00**	**Highest**
*	**High Winds**	Property Damage and Power Outage	Southwest Exposures	3	2	3	3	**6.00**	**Highest**
	Highway Accident	Human injury, property damage	Along roads	4	4	1	1	**6.00**	**Highest**
	Structure Fire	Property damage, Injury	Individual Structures	3	4	1	2	**5.25**	**High**
*	**Severe Heat**	Human Health Risk	Whole town	3	1	3	2	**4.50**	**High**
	Hazardous Materials Spill	Human Health risk/contamination	Along major roads and Tier II sites	2	4	3	1	**4.00**	**High**
*	**Drought**	Loss of Drinking Water, Crop damage	Farms and Residences served by private wells	2	2	3	3	**4.00**	**High**
*	**Invasive Species**	Property Damage, Health Risks	Whole town	4	1	2	1	**4.00**	**High**
*	**Infectious Disease Outbreak (Pandemic)**	Human Health Risk	Whole town	3	1	3	1	**3.75**	**High**
*	**Hail Storm**	Property and Crop Damage	Whole town	2	4	2	1	**3.50**	**High**
*	**Wildfire**	Structure Fires and Property Damage, Air throughout town	Residential areas with forest and grassland, human health	2	4	1	2	**3.50**	**High**

Reg evaluation	Hazard	Hazard Impact	Potential Occurrence Location	Probability	Warning Time	Geographic Extent	Potential Impact	Total Vulnerability Score	Community Priority
				1(Unl)-4(High)	1(Long)-4(Short)	1(Little)-4(Wide)	1(Neg)-4(Maj)	Prob. x Other Factors (/4)	
*	**Severe Cold**	Human Health Risk	Whole town	2	1	3	2	**3.00**	**Medium**
*	**Landslides/Rockslides/ Shoreline Slides**	Health Risk, property damage	Steep slopes along streams, shore	2	4	1	1	**3.00**	**Medium**
*	**Insect-borne Illness**	Human Health Risk	Singing Cedars access and Camps,	2	1	3	1	**2.50**	**Medium**
*	**Tornado**	Property Damage and Power Outage	Whole Town	1	4	2	3	**2.25**	**Medium**
*	**Flash Flooding & Fluvial Erosion**	Property damage and road closure	Areas immediately adjacent to rivers and streams	2	1	1	2	**2.00**	**Medium**
*	**Lightning Storm**	Fire Damage	High structures and ridges	1	4	1	1	1.50	**Low**
*	**Earthquake**	Structure and Property Damage	Whole town	1	4	1	1	**1.50**	**Low**
	Ice Jam	Road damage	Ditches, small streams	1	2	1	1	**1.00**	**Low**
*	**Inundation Flooding**	Water Damage	Low-lying Areas adjacent to Lake Champlain	1	1	1	2	**1.00**	**Low**
*	**Dam Failure**	Property damage, road closure	Downstream of 5 earthen dams, all low or undetermined hazard class	1	1	1	1	**0.75**	**Low**

4.2. Risk Prioritization Results

The committee calculated the following hazards as the highest in terms of overall vulnerability

- Severe Ice Storm
- Severe Snow Storm
- High Winds
- Highway Accidents

additional hazards received a high vulnerability score:

- Structure Fires
- Severe Heat
- Hazardous Materials Spill
- Drought
- Invasive Species
- Infectious Disease Outbreak/Pandemic
- Hail Storm
- Wildfire

4.3 Hazards: Location, Extent, Previous Occurrences, Future Probability and Vulnerability

Addison County has experienced just over a dozen federally-declared disasters over the past decades (see Figure 1 and Table 1). Most of these have been due to severe storms and associated flooding.

The Town of Orwell has avoided most of the physical effects and financial damage of these disaster events. The costliest storm events were flooding in spring 2011 (months prior to Tropical Storm Irene), and a snowstorm in March 2001. The town received some public assistance following these events, but the individual assistance damage threshold was not met.

The vulnerability scores for earthquakes have changed since the last plan based on USGS data and local knowledge.

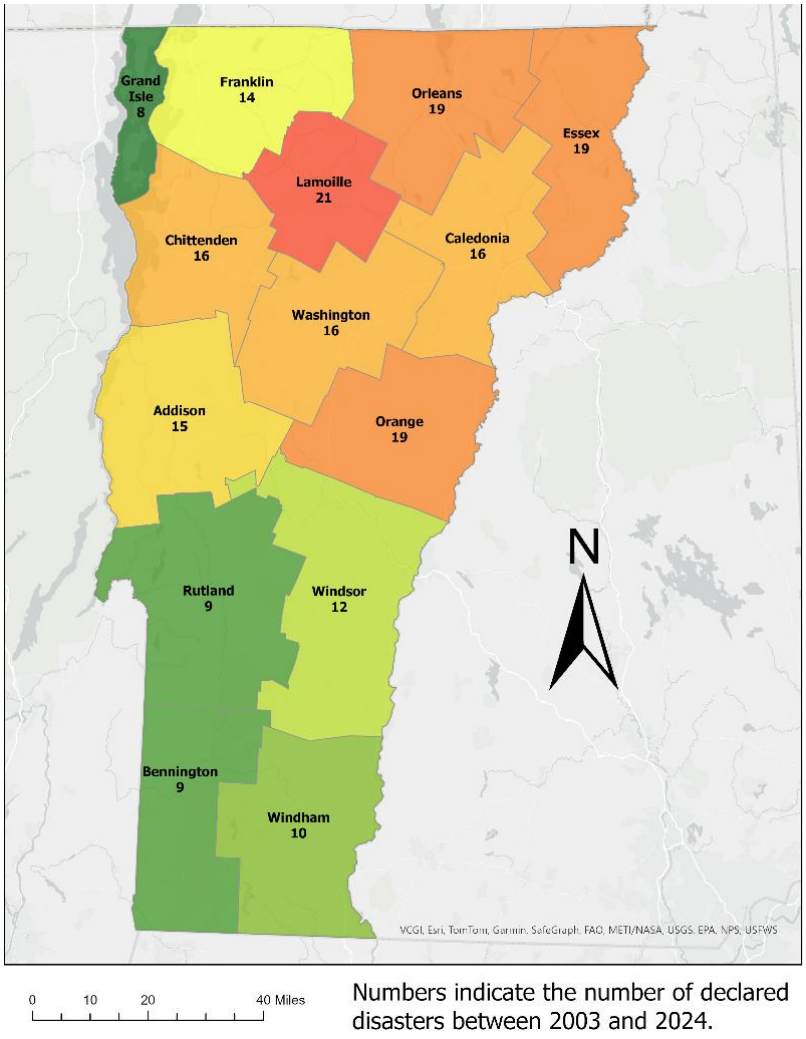


Figure 1. Federally Declared Disasters in Vermont by County, 2003-2024

Table 1. Federally declared disasters and costs affecting Addison County

Year	Incident Date	Description	Declaration #	County Cost
2024	July 29- 31, 2024	Severe Storms, Flooding, Landslides, and Mudslides	DR4826	Unavailable
2024	July 9 - 11, 2024	Severe Storm, Flooding, Landslides, and Mudslides	DR4810	Unavailable
2023	Aug 3-5, 2023	Severe Storms and Flooding	DR4744	Unavailable
2023	Jul 7- 21, 2023	Severe Storms, Flooding, Landslides, and Mudslides	DR4720	Unavailable
2022	Dec 22- 24, 2022	Severe Storms and Flooding	DR4695	Unavailable
2021	July 29 - July 30, 2021	Severe Storms and Flooding	DR4621	Unavailable
2020	Jan 20, 2020 - May 11, 2023	Vermont COVID -19 Pandemic	DR4532	Unavailable
2019	April 15, 2019	Severe Storms and Flooding	DR4445	Unavailable
2019	October 31- November 1, 2019	Severe Storms and Flooding	DR4474	Unavailable
2017	Oct 29 - Oct 30, 2017	Severe Storms and Flooding	DR4356	Unavailable
2017	June 29 - Jul 1, 2017	Severe Storms and Flooding	DR4330	Unavailable
2015	June 9, 2015	Severe Storms and Flooding	DR4232	$893,310.63
2015	December 9 - 12, 2014	Severe Winter Storms	DR4207	$184,715.05
2012	May 29, 2012	Severe Storm, Tornado and Flooding	DR4066	$172,847.70
2011	August 26-September 2, 2011	Hurricane Irene	EM3338	Unavailable
2011	August 27-9/2/2011	Tropical Storm Irene	DR4022	$1,175,911.20
2011	April 23- May 9, 2011	Severe Storms and Flooding	DR1995	Unavailable
2008	June 14-17, 2008	Severe Storms and Flooding	DR1778	$1,114,515.70
2008	July 21-August 12, 2008	Severe Storms and Flooding	DR1790	$2,273,481.42
2004	August 12- September 12, 2004	Severe Storms and Flooding	DR1559	$430,551.00
2001	March 5-7, 2001	Snowstorm	EM3167	$138,333.08
2000	July 14-18, 2000	Severe Storms and Flooding	DR1336	$738,127.27
1998	January 6-16, 1998	Ice Storms	DR1201	$662,388
1998	July 17-August 17, 1998	Severe Storms and Flooding	DR1228	$2,146,484
1996	January 19- February 2, 1996	Storms, Flooding	DR1101	$130,529
1993	April 24- May 26, 1993	Flooding, Heavy Rain, Snowfall	DR990	$17,639
1989	August 4-5, 1989	Severe Storms, Flooding	DR840	$31,033
1977	September 6, 1977	Drought	EM3053	$ Unavailable
1976	August 5, 1976	Severe Storms, High Winds, Flooding	DR518	$ Unavailable
1973	July 6, 1973	Severe Storms, Flooding, Landslides	DR397	$ Unavailable

On the following pages, each hazard type is described, evaluated and listed in order of priority as identified by the Orwell Hazard Mitigation Committee as shown in their risk assessment.

Requirement 44 CFR § 201.6(c)(2)(i) (Hazard information- Location, Extent, Previous Occurrences)
Requirement 44 CFR § 201.6(c)(2)(ii) (Hazard Impacts, Vulnerability)
Requirement 44 CFR § 201.6(c)(d)(3) (Development in hazard-prone areas)

Other hazards identified in Vermont's state hazard mitigation plan did not rise to the same level of concern by the local planning committee. These included:

- Lightning Storm
- Earthquake
- Ice Jam
- Dam Failure

Hazard types are listed in their order of priority with highest perceived vulnerability described first.

4.3.1 Severe Ice Storm (Vulnerability Score 7.00)

Location:

Severe ice storms are common throughout Vermont and can occur geographically in any part of Orwell, and often across the entire town and region in a short period of time. Generally, ice storms strike within a particular elevation band depending on temperatures with higher elevations experiencing snow and lower elevations experiencing a mix of ice and rain. Located at a consistent elevation along Lake Champlain, Orwell can be at high risk for more widespread ice accumulation.

Extent:

Because winter storms are extremely temperature and elevation dependent, they are notoriously difficult to predict. When conditions conducive to ice build-up are predicted, the National Weather Service issues a Winter Storm Warning with emphasis on ice accumulation.

The Winter Storm Severity Index (WSSI) (Appendix 5) is a categorization of overall severity based on six components:

- Snow Amount: to depict severity due to total amount of snow or rate of snowfall accumulation. (Adjustments are made based on climatology and urban areas)
- Snow Load: to depict severity due to total weight of snow on trees and power lines.
- Blowing Snow: to depict severity mainly to transportation due to blowing and drifting snow.
- Ice Accumulation: to depict severity of transportation and downed trees/powerlines due to the accumulated ice in combination with wind.
- Ground Blizzard: to depict severity to mainly transportation of ground blizzards that develop due to a pre-existing snowpack and strong winds.
- Flash Freeze: to depict severity primarily to transportation of situations where temperatures rapidly fall below freezing during precipitation.

Previous Occurrences:

The National Climatic Data Center reports that the Addison Region has experienced two major Ice Storm events over the past 25 years. During that period an estimated $850,000 in total property damages were recorded in the region. The highest recorded damages were incurred during the January 1998 Ice Storm which impacted most of the northeastern US and resulted in ice accumulations of up to ¾ inch, a loss of power for up to 2.5 weeks, and $750,000 in damages to Addison County. The Orwell hazard mitigation committee identified the 1998 ice storm as the worst that had occurred in the region. Fortunately, the residents of Orwell were largely spared the effects of this storm. On December 22-23, 2022, Addison County received high winds, downing power lines and closing roads, followed by cascading temperatures falling into the single digits, with wind chills of zero to the minus 0's, but again Orwell was largely spared the effects.

Since 1970, NOAA has documented a number of winter storms across Addison County, spanning the period from November to April:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Ice Storm	1	0	0	0	0	0	0	0	0	0	0	1
Winter Storm	28	38	42	10	0	0	0	0	0	1	14	42
Winter Weather	54	32	27	12	0	0	0	0	0	7	11	44

*NOAA Storm event database (https://www.ncdc.noaa.gov/stormevents/)

The impacts within the Town of Orwell are generally limited to residents impacted by loss of power and the occasional downed tree or branches in the road. Loss of power to the town hall and garage are of concern due to the frequency of losses at these locations. In March 2001 a string of storms hit Orwell and the rest of Vermont, beginning with 15-30" of snow on March 5-6, followed by 10-30" on March 22, and 10-20" on March 30.

Future Probability:

Warmer temperatures such as might be anticipated with climate change would result in less snow and a higher likelihood of ice in winter. Other predictions indicate that climate change will bring more atmospheric moisture and snowfall, or jet stream alternations producing "Bomb Cyclones" that might increase sudden deep freezes or ice storms in early spring and late fall. In all cases, winter storms are predicted to increase in severity. Changes in land use and development are not expected to increase the impacts of ice storms or power outages on community assets or the population.

Vulnerability Summary:

The Town of Orwell is a rural community with one major highway and dispersed population. Utility company priorities following storms are to repair the simplest fixes which impact the highest total populations as the highest priority. As a result, there is a high risk of extended power failures due to ice storm throughout the Town of Orwell.

Severe Ice Storms are considered the **HIGHEST PRIORITY** for the Town of Orwell, with an overall vulnerability score of 7.00 determined.

4.3.2 Severe Snow Storms (Vulnerability Score 7.00)

Location:

Severe winter snow storms are common throughout Vermont and can occur geographically in any part of Orwell. Generally, ice storms strike within a particular elevation band depending on temperatures with higher elevations experiencing snow and lower elevations experiencing rain. Located at a consistent elevation along Lake Champlain, Orwell is at moderate risk for more widespread snow accumulation, with additional risk of drifting due to relatively flat topography.

Extent:

Because winter storms are extremely temperature and elevation dependent, they are notoriously difficult to predict. When conditions conducive to ice build-up are predicted, the National Weather Service issues a Winter Storm Warning with emphasis on ice accumulation.

The Winter Storm Severity Index (WSSI) (Appendix 5) is a categorization of overall severity based on six components:

- **Snow Amount:** to depict severity due to total amount of snow or rate of snowfall accumulation. (Adjustments are made based on climatology and urban areas, e.g. 4" of snow in Atlanta is more severe than 4" in Minneapolis.)
- **Snow Load:** to depict severity due to total weight of snow on trees and power lines.
- **Blowing Snow:** to depict severity mainly to transportation due to blowing and drifting snow.
- **Ice Accumulation:** to depict severity of transportation and downed trees/powerlines due to the accumulated ice in combination with wind.
- **Ground Blizzard:** to depict severity to mainly transportation of ground blizzards that develop due to a pre-existing snowpack and strong winds.
- **Flash Freeze:** to depict severity primarily to transportation of situations where temperatures rapidly fall below freezing during precipitation.

Previous Occurrences:

Since 1970, NOAA has documented winter storms across Addison County in a number of events, spanning the period from late October to April:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nove	Dec
Blizzard	0	0	1	0	0	0	0	0	0	0	0	0
Heavy Snow	0	7	1	0	0	0	0	0	0	0	0	1
Winter Storm	28	38	42	10	0	0	0	0	0	1	14	42
Winter Weather	54	32	27	12	0	0	0	0	0	7	11	44

*NOAA Storm event database (https://www.ncdc.noaa.gov/stormevents/)

The major impacts within the Town of Orwell are generally limited to residents impacted by loss of power and the occasional downed tree or branches in the road. Loss of power to the town hall and garage are of concern due to the frequency of losses at these locations. In March 2001 a string of storms hit Orwell and the rest of Vermont, beginning with 15-30" of snow on March 5-6, followed by 10-30" on March 22, and 10-20" on March 30.

Future Probability:

Warmer temperatures such as might be anticipated with climate change would result in less snow and a higher likelihood of ice in winter. Other predictions indicate that climate change will bring more atmospheric moisture and snowfall, or jet stream alternations producing "Bomb Cyclones" that might increase sudden deep freezes or ice storms in early spring and late fall. In all cases, winter storms are predicted to increase in severity. Changes in land use and development are not expected to increase the impacts of ice storms or power outages on community assets or the population.

Vulnerability Summary:

Severe snowstorms in rural Vermont pose significant threats to vulnerable populations and both current and future infrastructure. These storms can lead to power outages, road closures, and restricted access to essential services, disproportionately affecting older adults, individuals with health conditions, and those with limited mobility or financial resources. The accumulation of heavy snow can damage roads, bridges, and utility lines, while also impeding emergency response efforts. As climate change contributes to more frequent and intense winter storms, the strain on aging infrastructure and the challenges faced by vulnerable communities are expected to increase, underscoring the need for proactive adaptation and resilience planning.

The Town of Orwell is a rural community with one major highway and dispersed population. Utility company priorities following storms are to repair the simplest fixes which impact the highest total populations as the highest priority. As a result, there is a moderate risk of extended power failures due to snow storm throughout the Town of Orwell. Changes in land use and development are not expected to increase the impacts of snow storms or power outages on community assets or the population.

Severe Snow Storms are considered the HIGHEST PRIORITY for the Town of Orwell, with an overall vulnerability score of 7.00 determined.

4.3.3 High Winds (Vulnerability Score 6.00)

High wind events can be the result of any of the following:

- **Wind Storm:** events without precipitation with gusts sustained at more than 31 mph for at least an hour or any gusts greater than 46 mph.
- **Hurricanes/Tropical Storms**: often result in high winds greater than 39 mph, along with inundation flooding, and fluvial erosion impacts.
- **Thunderstorm**: storms with precipitation, lightning, and/or hail, that can be compounded by downburst high winds potentially in excess of 80 mph.

(See Beaufort Wind and Saffir-Simpson wind scales in Appendix 4).

Location:

High winds can affect the entire planning area. In Vermont, high winds are most often seen accompanying severe thunderstorms. In Addison County, these storms usually originate from the west, southwest, or south.

Because Orwell is distant from the base of the Green Mountains, it is less vulnerable to downslope windstorms and related hazards. Large-scale hurricanes affecting the entire region are infrequent because hurricanes typically lose wind speed as they move inland and downgraded to tropical storms by the time they reach inland Vermont.

Extent:

Wind-producing storms can range significantly in size and type. Wind storms and hurricanes can affect the entire state in a single event. Squall line thunderstorms move in a line or front that can exceed 100 miles in length, with the strongest rains and winds at the front of the storm. Thunderstorms can produce downburst winds that affect the land immediately beneath a storm. These downburst winds are called microbursts, which move outward from the base of a thunderstorm.

Previous Occurrences:

In Vermont, high winds most often seen accompany severe thunderstorms. In fact, straight-line winds are often responsible for most of the wind damage associated with a thunderstorm. These winds are frequently confused with tornadoes because they exhibit similar wind speeds and cause similar damage but the winds do not rotate as they do in a tornado.
While thunderstorms and associated hazards can occur anywhere and at any time of the year in Vermont; spring and summer are the most common times for severe thunderstorms. Tornadoes typically occur in Vermont between March and August.

Since 1970 NOAA has documented wind-damage from over 150 thunderstorms across Addison County, primarily during the spring and summer:

	Jan.	Feb.	Mar.	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Thunderstorm & Wind	0	1	2	0	21	32	72	35	9	3	3	1

*NOAA Storm event database (https://www.ncdc.noaa.gov/stormevents/)

Large-scale windstorms have affected wide portions of the state three times in the last decade: October 30, 2017, November 1, 2019, December 23, 2022. In each of these storms, strong winds affected all of Vermont's 14 counties, resulting in downed tree limbs, power outages, and uprooted trees which affected transportation routes.

Future Probability:

Wind events are considered **Highly Likely** in Vermont. The risk due to wind events is moderate for the built environment and minor for natural environment, people, and economy. Tornadoes are not common in Vermont. However, it is likely that as climate change accelerates, the area will see exacerbation of wind events such as hurricanes, tropical storms, and thunderstorms. Projected land use and population changes are not expected to significantly affect their impact on community assets or vulnerable populations, but may make such events more visible.

Green Mountain Power has been working to make their electrical systems more resilient and are working towards a 0-outages goal. Their projects to implement a resilient energy system include:

- Undergrounding lines (doing undergrounding work on the 20 most unreliable circuits, burying power conduit/cable/telephone lines at depth of 51 inches). GMP tries to stay in existing right of ways off-road to avoid roads, but in some areas the only flat place that they can bury lines is the road and they work with towns to minimize disturbance.
- Storm hardening above ground lines (spacer-cables in diamond shape), and
- Creating additional energy storage, including home battery storage

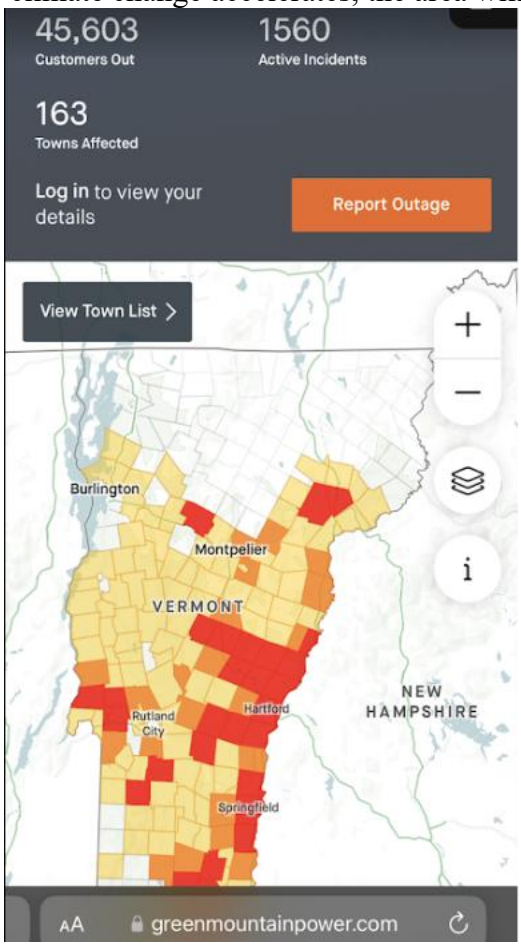


Figure. Screenshot from Green Mountain Power's online Outage Map on December 22, 2023

Vulnerability Summary:

People who live in rural, isolated communities like Orwell are particularly vulnerable to windstorms. High winds can take down trees and power lines, resulting in blocked transportation routes, cut off electricity and telecommunication networks, and property destruction. Lack of electricity is life-threatening for those relying on electric life supports systems and electrical heating and cooling systems. In addition, isolated populations may have limited access to information and communication resources that could prevent injury or death. Future assets are not

expected to experience increases in vulnerability due to land use changes or change in population demographics. Due to the risk to life and property represented by this hazard the Town expends considerable resources attempting to make its roads as safe as possible within a restricted budget. Future assets are not expected to experience increases in vulnerability to wind storms due changes in population demographics but they may increase with land use changes or increased residential development.

High Winds are considered the HIGHEST PRIORITY for the Town of Orwell, with an overall vulnerability score of 6.00 determined.

4.3.4 Highway Accidents (Vulnerability Score 6.00)

Location:

Since 2010, there have been more than 170 vehicle accidents documented by the state transportation agency within the town of Orwell. Almost two-thirds of these have been on the primary state routes through town, on Route 22A (64%) and Route 73 (12%).

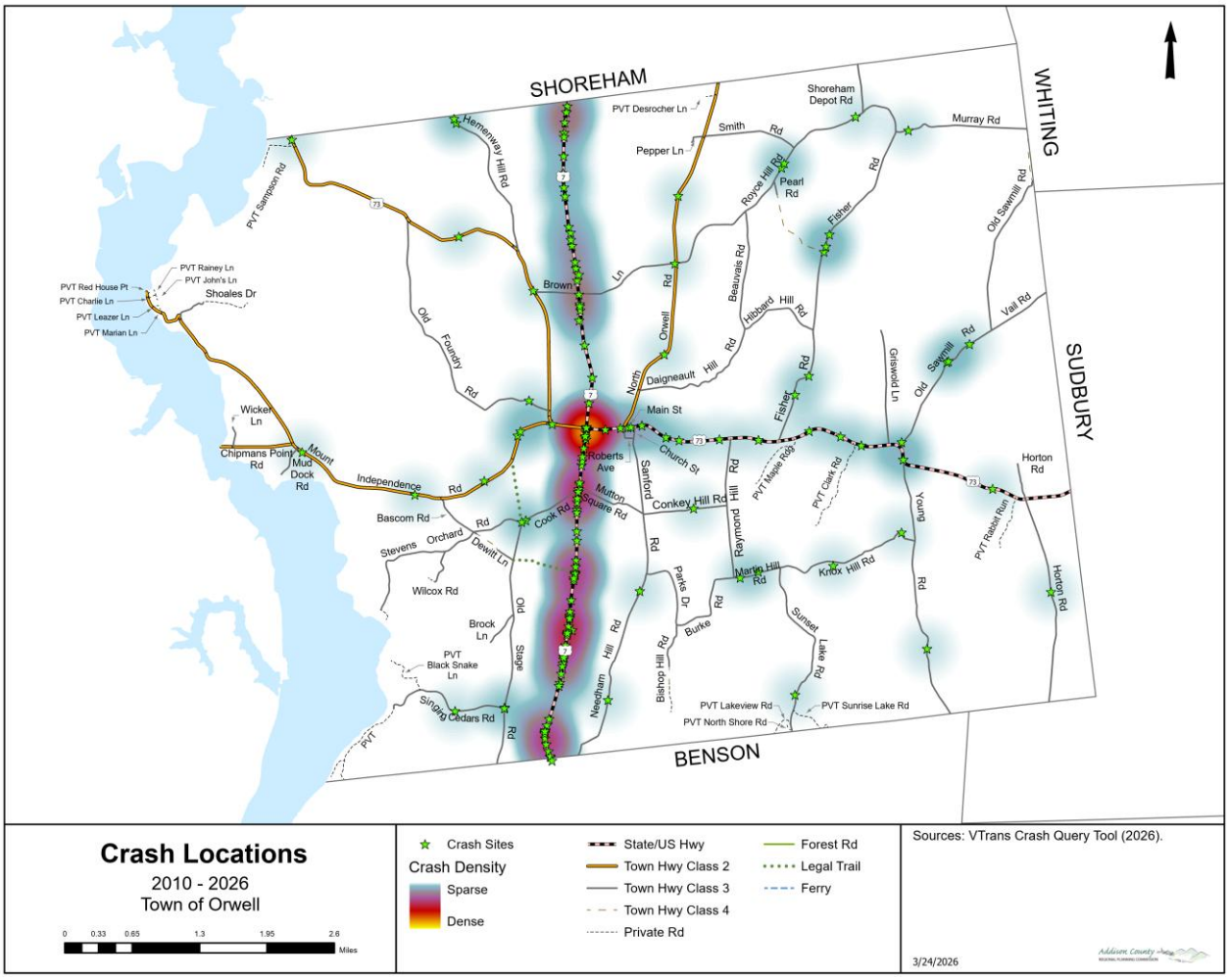


Figure. VTrans Recorded Orwell Accident locations, 2015-2026

The intersections of Route 73 and Route 22 had a large number of cases, followed by the intersection of Brown Road and Route 22A.

Extent:

Most accidents occurred during daylight hours (65%) and in clear weather, though freezing precipitation was the weather condition in 12% of crashes. The majority of crashes were single vehicle accidents with most resulting only in property damage, with no fatalities, though more than 61 (43%) resulted in injuries. At least 28 (19%) involved Heavy Trucks, and most occurred on Route 22A, often near the Route 73 intersection.

Previous Occurrences:
Car accidents in Orwell have averaged 1 or 2 per month since 2010, staying relatively constant over recent years, but with increasing number of accidents involving Heavy Trucks.

Figure. Car crashes by Year

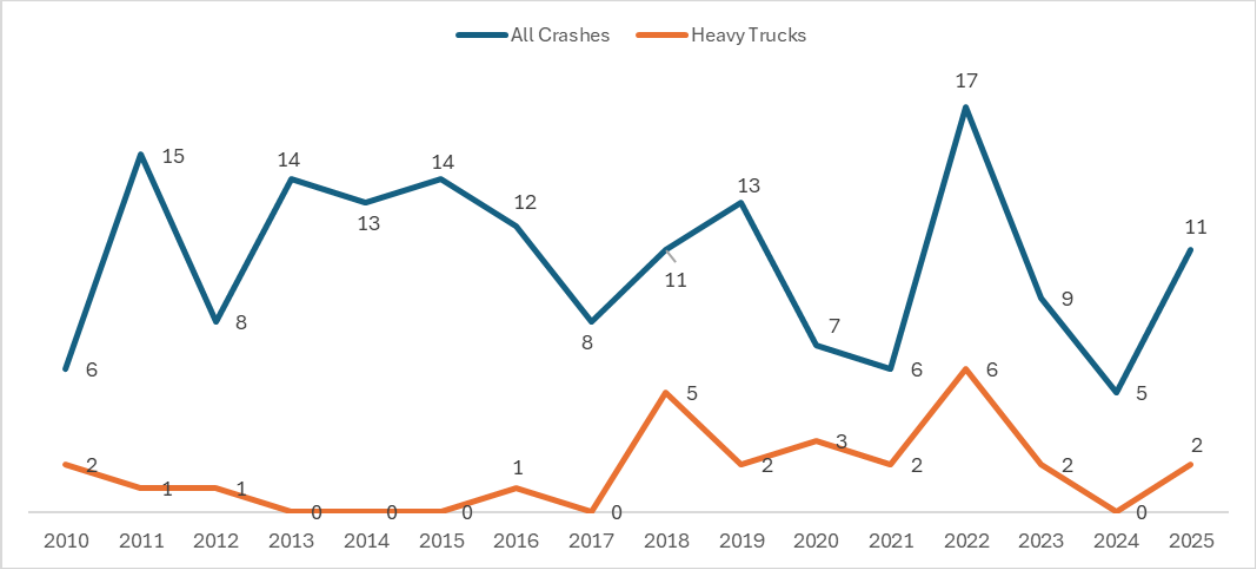
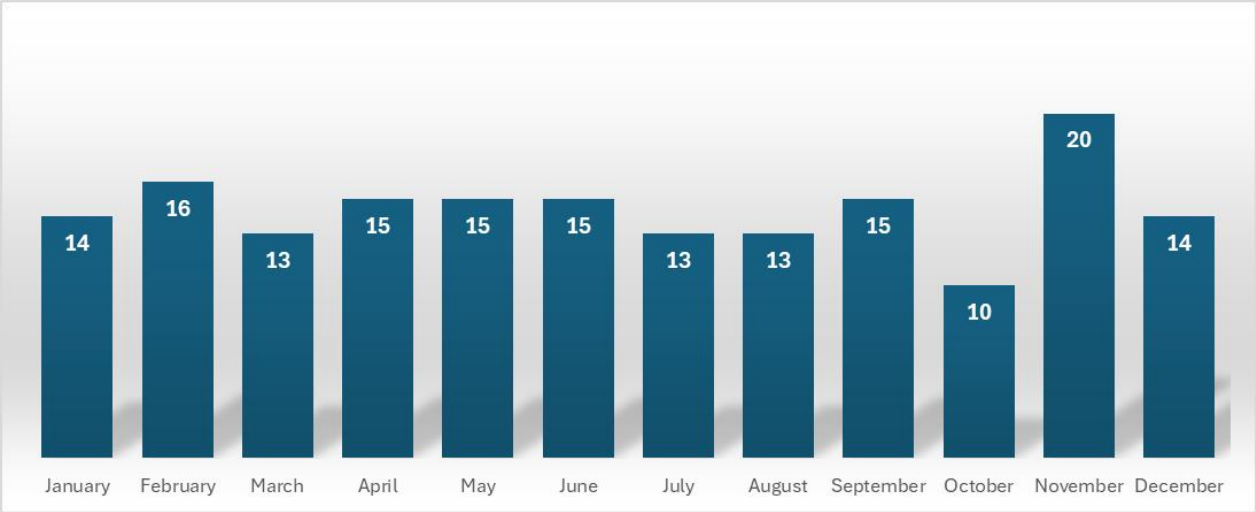


Figure. Car crashes by Month



Future Probability:
While documented car accidents over time have declined in recent years, through-traffic may have increased, potentially due to commuters and travelers. Traffic calming measures, such as road widening and other safety engineering, should help reduce speeding and accidents.

Vulnerability:
Changes in climate are not expected to increase the probability of Highway Accidents or affect their impact on community assets or the population. Most hazard mitigation actions needed would have to be implemented by the State of Vermont along state routes 22A and 73.

Highway Accidents are considered the HIGHEST PRIORITY for the Town of Orwell, with an overall vulnerability score of 6.00 determined

4.3.5 Structure Fire (Vulnerability Score 5.25)

Location:

Nationwide, civilian fatalities are correlated with populations living in rural areas and in older homes. As with much of Vermont, Orwell's housing stock is dominated by older, owner-occupied residential homes, which account for most structure fires. While multi-building fires are unlikely, given the dispersed geography of the town's structures, response time is extended. Access issues on narrow driveways could also cause challenges, especially with multiple departments and the need to coordinate a continuous stream of water tankers to deliver the needed volume for fire suppression in areas without a municipal water system.

Orwell's supports its own volunteer fire department for fire-response coverage, as well as motor vehicle accidents and a number of other types of emergency calls.

Extent:

The primary causes of structure fires are cooking fires and heating appliances, especially wood stoves and uncleaned creosote from solid-fueled heating equipment chimneys. Aging houses and cold Vermont winters put added stress on heating systems. Furthermore, the high cost of heating fuel can force people to use alternative heating sources that may not be safe. An improperly installed and maintained heating appliance can result in added fire risk and carbon monoxide poisoning. While fatalities from fires are rare, older adults have a greater risk of fire death than the overall population.

A fire within the town's central historic district could potentially spread to the multiple public buildings located there. With a church, the Town Hall, and the Village School all in relatively close proximity to each other, a wind-driven fire could result in the compromise of these structures for municipal use and would severely disrupt the operations of the school. Elsewhere in the district, homes built on small village lots are potentially subject to the same issue.

Previous Occurrences:

Responses by the fire department for structure fires have ranged from 0-3 per year over the past few years. In 2024 there was one structure fire assisted through mutual aid, in 2025 there was one structure fire in town and three others assisted through mutual aid.

Future Probability:

The risk of individual structure fire events is likely to continue. Education about safe practices and maintenance activities will prevent some incidents, but accidents and unforeseen occurrences will occur. Changes in climate, land use, and population are not expected to increase the probability of Structure Fires or affect their impact on community assets or the population.

Vulnerability Summary:

Older adults have a greater risk of fire death than the overall population. In the past decade, more than a third of Vermont's fire deaths have been seniors over the age of 65. About 21% of Orwell's population is older than 65, about the same as the rest of Addison County and

Vermont. Future assets are not expected to experience increases in vulnerability to structure fires due to land use changes or change in population demographics.

Structure Fires are considered a HIGH PRIORITY for the Town of Orwell, with an overall vulnerability score of 5.25 determined.

4.3.6 Severe Heat (Vulnerability Score 4.50)

The frequency and intensity of hot weather is increasing in Vermont, resulting in greater numbers of heat-related emergency department visits and total deaths.

Location:

Heat waves occur across the entire state, but may be a slightly higher risk in areas like New Haven that aren't higher elevation mountain locations but also aren't close to Lake Champlain with cooling on-shore and off-shore breezes.

Extent:

A number of metrics demonstrate the extent of recent increase across the state:

- Days with a maximum temperature above 95 degrees Fahrenheit have increased from less than 1 per year (1950-2009) to at least 2 per year (2010-2022)
- Days with a maximum temperature above 90 degrees Fahrenheit have increased from about 4 per year (1950-2009) to more than 9 per year (2010-2022)
- Days with a minimum temperature above 70 degrees Fahrenheit have increased from about 2 per year (1950-2009) to more than 7 per year (2010-2022)

Previous Occurrences:

Since 1970 across western Addison County, NOAA has seven documented heat events, primarily during July and August and all since the year 2006:

	January	February	March	April	May	June	July	August	September	October	November	December
Heat Event	0	0	1	0	0	1	3	2	0	0	0	0

*NOAA Storm event database (https://www.ncdc.noaa.gov/stormevents/)

The March 2012 event saw record heat across all of Vermont with maximum temperatures 30° to 40° above normal. Some daily records that stood for more than 100 years were broken and several daily records were broken by 10° or more. The Winter of 2011-12 was atypical with temperatures that averaged 4°-5° above normal and snowfall that was 40-60 percent lower than normal. This combination caused snowpacks across the region to be well below normal or even non-existent by mid-March. The ski industry suffered significant revenue loss due to lack of snow, including early spring closures and the Vermont maple sugaring industry lost approximately $10M statewide.

From June 18-23, 2020 the second longest heatwave in modern history (1900-onward) occurred across portions of New York and Vermont. Temperatures exceeded 90° F for up to six consecutive days in portions of the Champlain Valley.

Future Probability:

Average temperatures in Vermont are projected to increase by an additional 3° to 12° F by 2100, suggesting that New Haven can expect more frequent and harmful hot weather in the future. A number of NOAA projections demonstrate the probability of future temperature increases in the Champlain Valley:

- Days with a maximum temperature **above 95 degrees** Fahrenheit will increase from 2 per year (2010-2022) to **between 3 and 6 per year** (2035-2064)
- Days with a maximum temperature **above 90 degrees** Fahrenheit will increase from 9 per year (2010-2022) to **between 13 and 19 per year** (2035-2064)

Vulnerability:

Changes in climate are expected to increase the probability of Severe Heat incidents and changes in land use and population may increase their impact on community assets or the population.

Despite Vermont's northern location, data indicates that Vermont residents experience heat-related illnesses at lower temperatures than residents of other regions. This is likely related to the infrequency of hot weather in Vermont, which has several impacts:

• Vermonters do not experience enough hot weather for their bodies to adapt to hotter conditions;

• Many Vermont homes are not adequately weatherized and do not have air conditioning;

• The State and local communities have not developed plans and policies needed to be prepared for hot weather;

• Adapting behaviors to stay safe during hot weather can be challenging for individuals;

• Vermont has a large population of older adults, who are at higher risk for heat-related illnesses.

The Vermont Department of Health has identified Orwell as having a higher population vulnerability than the state average, due primarily to the percentage of "Adults 65 and Older Living Alone" in Orwell. Other populations disproportionately impacted by heat can include outdoor workers and hobbyists with more exposure to hot conditions, populations that are particularly sensitive to heat exposure (older adults, young children, pregnant women, people that are overweight or have chronic medical conditions, people using drugs, alcohol, or some prescription medicines), and people with limited adaptation resources (living alone, unable to access community cooling sites, or unable to keep their home cool).

Between 2009 and 2019, there were an average of 104 heat-related emergency department visits per year and 12 heat-related deaths across the state. The primary shelter for Orwell, the town office, currently has no way to provide cooling.

Severe Heat events are considered a HIGH PRIORITY for the Town of Orwell, with an overall vulnerability score of 4.50 determined.

4.3.7 Hazardous Materials Spill (Vulnerability Score 4.00)

Location:
Route 22A Is one of Vermont's most traveled north/south highway on the western part of the State. It is also the highway most used to transport gasoline and heating fuels from the Port of Albany to the Burlington area in northeastern Vermont. As a major truck route that avoids the more heavily traveled Route #7 it is popular for truckers wanting to avoid speed traps and villages. The rolling nature of Rte. 22A as it passes through Orwell leads to an increased risk of highway accidents as cars often cannot see as far ahead as it seems.

Four sites in Orwell have sufficient types and/or quantities of hazardous materials to require reporting via Tier II. These reporting sites are:

- Verizon Wireless Cell tower (Batteries) 44 Knox Hill Rd.
- Buoy 39 Marina (Gasoline) 7668 Mount Independence Rd.
- Chipman Point Marina (Gasoline) 68 Chipman Point Rd.
- Town of Orwell (Propane, Diesel Fuel) 606 Main St.

The nearest hazardous materials response capacity for the Town of Orwell is the State HazMat response team and decontamination trailer located in Brandon, 13 miles away.

Extent:
Due to the truck traffic on Rte. 22A carrying fuels, an accident along the stretch running through Orwell is of great concern to first responders. An accident involving these trucks has a high possibility of spilling a large quantity of petroleum into the environment. Because water in Orwell is directly delivered to Lake Champlain via streams and ditches, the impacts could be huge. The EPA has developed a response plan for this area of the lake specifically for this hazard. If combined with a source of flame any environmental hazard could quickly become a life safety issue as well and, in the right location, could burn structures along the highway. This is equally true with the Tier II reporting facilities storing larger quantities of petroleum fuels.

Based on the recommended Public Safety evacuation distance from the 2016 Emergency Response Guidebook, a 1000-foot circle has been drawn around the Tier II sites. Structures inside the circle are those that may need to be evacuated if an incident occurred. Of the 683 buildings (E911 locations) in Orwell, there are 48 (residences, public facilities and commercial facilities) or 7% of the structures in town that might be impacted. Along Route 73 and 22A, there are an additional 133 structures that could be impacted should an incident with a vehicle carrying Hazardous Materials occur. Essential facilities included in these zones are the fire station, sewage treatment plant and school.

Previous Occurrences:
The intersection of Rtes. 22A and Rte. 73 just west of the village is considered a high accident location due to the large number of accidents occurring at this location. Because of the high percentage of flammable materials transported on Rte. 22A, this location particularly concerns local firefighters. A few miles to the north in Bridport, saw an accident involving an overturned

fuel oil truck in the early 2000's. The truck overturned and spilled approximately ¼ of its load into a farm field across the road from one of the area's largest farm operations.

Photo Courtesy of Bob Hall

Intersection of Rtes. 22A and 73 west of Orwell (High Crash Location)

Accidents involving passenger cars and trucks are a common occurrence along Rte. 22A in Orwell. The committee specifically recounted an accident in September of 2017 involving a vehicle involved with fire. A different combination of vehicles could have resulted in a near-disaster.

Future Probability:

Increased need for energy sources in Vermont is expected to continue well into this century. A recent natural gas pipeline extension has reduced some need in the short term and should result in fewer fuel-bearing trucks on Orwell's main highway. In spite of the State of Vermont's policy of reducing non-renewable energy use to 10% of all energy use by 2050, Gasoline and heating fuel use is expected to rise temporarily before reaching the final goal. Since the majority of these fuels is trucked on Vermont's roads, Rte. 22A will likely remain a highly hazardous route.

Vulnerability Summary:

The Addison County Hazardous Materials Commodity Flow Study was updated during the summer of 2010. At sampling sites on Route 22A in Vergennes, 11.8% of trucks were recorded as carrying a hazardous material. Of these trucks, 2/3 were carrying petroleum products destined for Chittenden County to the north. It is probably safe to assume that most of these same trucks had passed through Orwell on their way. Additional numbers of trucks and hazardous materials may have been routed through Middlebury and consequently would have not been seen at the Vergennes sampling location. Results of this sampling would indicate that Orwell's risk for a transportation associated HazMat spill would be quite high.

The community vulnerability to a HazMat and/or Highway Accident event was scored by the Orwell Hazard Mitigation Committee with 13 points. This would translate into one of the highest concerns for the community and would be considered of regional and/or Statewide importance. Orwell routinely addresses hazards associated with Rte. 22A when in conversations with VTrans officials.

Hazardous Materials Spills are considered a HIGH PRIORITY for the Town of Orwell, with an overall vulnerability score of 4.00determined.

4.3.8 Drought (Vulnerability Score 4.00)

Location:

Drought is an inherent, cyclical component of natural climatic variability and can occur at any place at any time. Drought events are often spread over a larger geographic area than other natural hazards, with gradation of impacts that are not as obvious as other hazards. Significant droughts would affect the entirety of the municipality of Orwell, as well as adjoining municipalities and likely extending to other counties and states during the same event.

Extent:

The severity of a drought depends on the duration, intensity, and geographic extent of the water shortage, as well as the demands on the area's water supply. Droughts are rated in classifications from D0–D4, depending on the severity of the drought, the amount of time it will take for vegetation to return to normal levels, and the possible effects of the drought on vegetation and water supply. High winds, low humidity, and extreme temperatures can all amplify the severity of drought.

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures Coming out of drought: some lingering water deficits pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures Streams, reservoirs, or wells low, some water shortages developing or imminent Voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely Water shortages common Water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses Widespread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses Shortages of water in reservoirs, streams, and wells creating water emergencies

Source: http://droughtmonitor.unl.edu/AboutUSDM/DroughtClassification.aspx

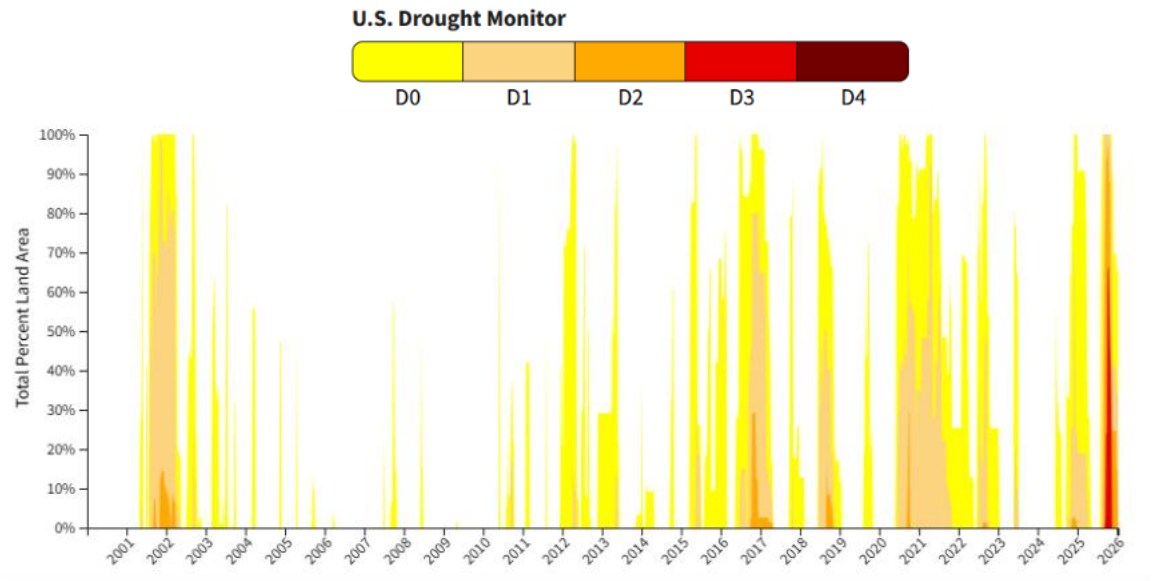
The impacts of drought are typically felt by agricultural enterprises and rural residents in areas like Orwell first. Drought can cause extensive damage to gardens, agricultural crops and livestock. Drought can also lead to dry or low water levels in wells needed for drinking water. and can also concentrate water contamination levels and lead to resulting in potential health concerns.

Soil moisture, streams, and groundwater are all depleted due to drought. Drought depletes water availability for both cultivated and wild plants and animals. Lack of rain combined with high temperatures can lead to significant crop loss. As a result, the economic effects of a drought can be just as devastating as any other natural hazards.

Previous Occurrences:

Droughts, while low frequency hazards, are of serious concern to the population of Vermont. It is often difficult to recognize the onset of a drought during its preliminary stages.

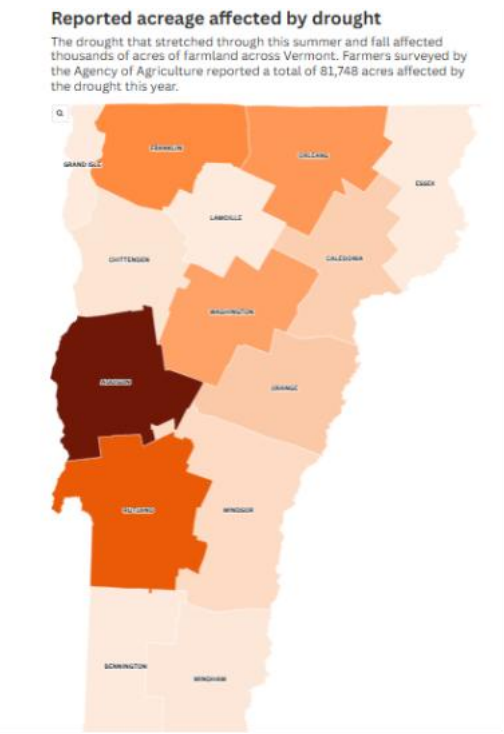
Orwell relies entirely on private wells and is not part of the Tri-Town Water District in adjoining municipalities. Following a severe drought that had affected the area in the early 1960's, the Tri-Town Water District was established in 1965 to serve Addison, Bridport, and Shoreham, Vermont. The idea was championed by Rev. Benjamin Wysolmerski, parish priest for Bridport and Shoreham, who was involved in town water efforts.



Source: https://www.drought.gov/states/vermont#historical-conditions

Since 2000, drought conditions measured by intensity indices have periodically surged in Vermont. Beginning in 2001, New England experienced historic drought conditions not seen since the 1960s. In 2001-2002, large parts of Vermont were affected by a Severe Drought (D2), but Orwell and the Champlain Valley were judged to have only reached Abnormally Dry (D0) conditions.

A series of drought conditions have affected portions of Vermont nearly annually over the past decade. Parts of central Vermont were in Severe Drought (D2) from October 2016 through April 2017, peaking in October and November 2016. At least 80% of the State was in at least Moderate Drought (D1), including all of Orwell and Addison County reaching Severe Drought (D2) (Figure). Moderate Drought conditions returned in October of 2017 and again in June 2018.



Since 2018 there have been four Severe Droughts, more than the previous two decades combined. From September to November of 2018 the State experienced another Severe Drought. Then from June 2020 to October 2021 much of the State was under Moderate Drought to Abnormally Dry conditions. From September to October of 2020 29.4% of the State was under Severe Drought conditions. A severe drought occurred from June through September, 2025. According to a state survey, Addison County saw the most acres affected by far. Thirty farmers across the county reported a little more than $1.4 million in damages across about 25,000 acres.

Figure. Reported acreage affected by 2025 summer drought

(Source: VT Agency of Agriculture, Food and Markets 2025 Agricultural Drought Impact Survey)

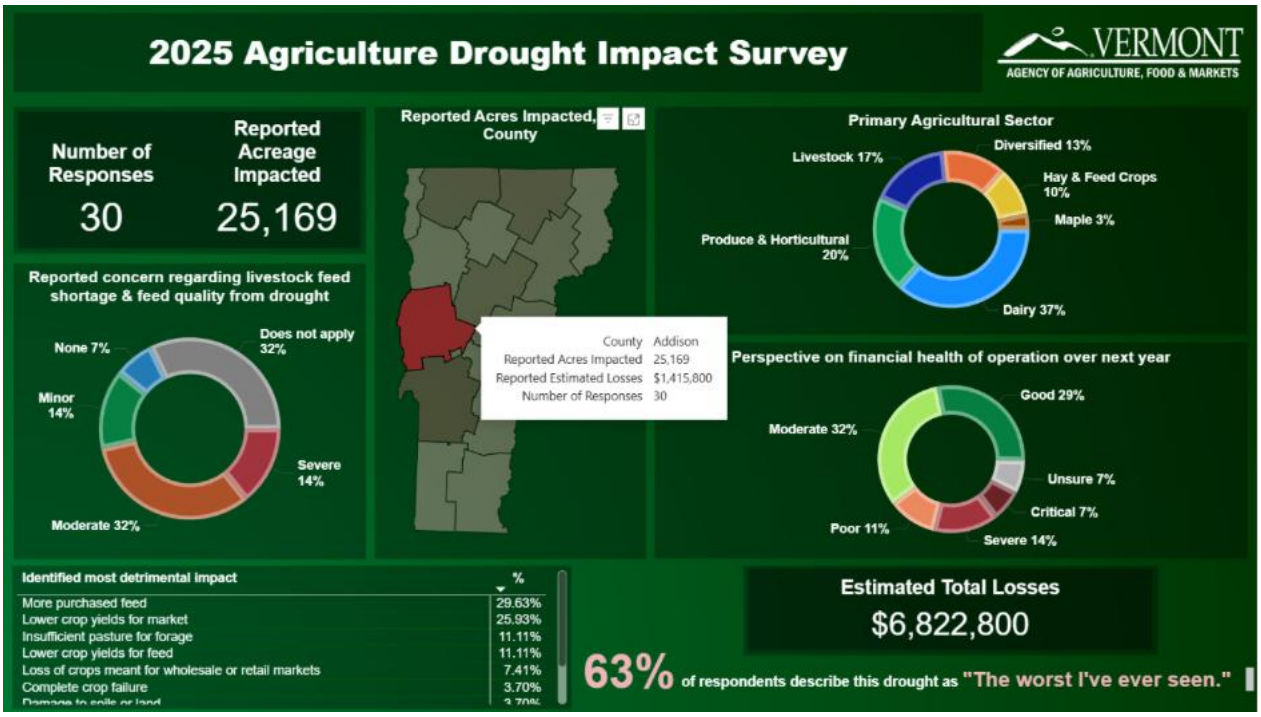


Figure. Addison County 2025 Agriculture Drought Impact Survey Results

(Source: VT Agency of Agriculture, Food and Markets 2025)

Future Probability:

Relative to other regions of the country, severe droughts are not frequent occurrences in Vermont. However, changes in climate are expected to significantly increase the probability Drought events. Both wet and dry extremes are expected to increase over time across the state: Vermont's precipitation trend is an on upward trajectory, having seen increases in average annual precipitation of 7.5 inches since 1900. At the same time Vermont is seeing an increase in average annual maximum and minimum temperature, which is contributing to an increased likelihood of drought. Higher temperatures lead to increased rates of evaporation, combined with dry periods between intense precipitation events will lead to increased dry conditions.

Land use changes are not expected to significantly affect the impact of droughts on community assets, but changing demographics, especially isolated or aging populations, may increase vulnerability. For instance, isolated residents may be unable to obtain drinking water.

Vulnerability Summary:

Changes in climate may increase the probability of droughts. Drought frequency and severity is unlikely to be affected by land use or demographic changes, or cause additional impact on community assets.

Droughts are considered a HIGH PRIORITY for the Town of Orwell, with an overall vulnerability score of 4.00 determined.

4.3.9 Invasive Species (Vulnerability Score 4.00)

Invasive species are non-native introductions to an ecosystem whose presence causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can overwhelm native species and their habitats, forcing the native species out due to their ability to outcompete native species in their natural environments without the threat of a predator that can keep their populations in check. Invasive species are considered the second greatest threat to global biodiversity.

The State of Vermont has a long history of invasive species infestation in several categories, including:

Aquatic Species

- Zebra Mussel
- Eurasian and Variable-Leaf Watermilfoil
- Water Chestnut

Forest Pests

- Emerald Ash Borer
- Hemlock Woolly Adelgid*
- Asian Long-horned Beetle*

Arbovirus-Transmitting Arthropods

- Asian Tiger Mosquito (*Aedes albopictus*)*
- Asian Longhorned tick*

Disruptive Terrestrial Plants

- Japanese Knotweed
- Common Reed (Phragmites)
- Purple Loosestrife
- Garlic Mustard
- Buckthorn

Phototoxic Terrestrial Plants

- Giant Hogweed
- Wild Parsnip
- Wild Chervil

Tick Increasing Plants

- Japanese Honeysuckle
- Japanese Barberry

*Not yet present in Addison County

Aquatic Invasive Species pose a serious threat to lakes, ponds, and rivers by choking out swimming holes and crowding out beneficial native species, drastically impacting aquatic foodwebs and limiting fishing, or covering lake bottoms with a layer of sharp shells.

Forest Pests are insects that cause irreversible impacts on tree health and biodiversity.

Arbovirus-Transmitting Arthropods are a group of insects that transmit viral infections through their bites.

Disruptive Terrestrial Plants are invasive plants can change soil composition, change water tables, and disrupt insect cycles, negatively affecting native plant regeneration, agricultural crops, ecosystem function, recreation and wildlife habitat, and human health.

Phototoxic Terrestrial Plants are invasive plants whose sap can cause a chemical reaction that makes skin hypersensitive to ultraviolet sunlight if it makes direct contact with human skin and potentially cause serious skin burns.

Tick Increasing Plants are plants have proven to increase the incidence of Lyme disease by providing sheltered habitat that increases the abundance of small rodents, which act as hosts to the ticks that carry Lyme disease pathogens.

Location:

Invasive species are commonly introduced via travel routes, unintentionally brought into Vermont with the transportation of people and goods. As a result, many are found along roadsides and in waterways across the entire state. Aquatic Species have become established in Otter Creek (Water Chestnut).

Orwell contains relatively little forest cover susceptible to Forest Pest insects, in comparison to neighboring municipalities. Orwell's largest forest blocks are located south of VT Route 73 and areas along tributaries to Lake Champlain. Large trees in the village area and other trees along other roads and driveways in town could be impacted. Orwell is within the five mile "confirmed infested areas" of confirmed Emerald Ash Borer locations in Middlebury and Bristol.

Phototoxic Terrestrial Plants like Wild Parsnip are especially common in abandoned yards, farmland, and along roadsides and other disturbed environments. They spread by seed via waterways, wind, mowers, and wildlife.

Extent:

Invasive species have a variety of effects on humans and the environment so characterizing the extent of their spread is a challenge.

Forest Pest insects threaten more than 14 different species of trees in Vermont, including: maple, elm, horse chestnut, willow, ash, poplar, European mountain ash, hackberry, and hemlock.

Wild Parsnip secretes a toxic sap that contains furanocoumarins, chemicals that make the skin extremely sensitive to ultraviolet (UV) rays. The toxic sap, in combination with sun exposure, can cause a severe skin reaction called phytophotodermatitis, which usually starts within 24 to 48 hours of exposure. The reaction can turn into a severe rash or blistering burn and lead to discoloration of the skin or photosensitivity that can last for years.

Phragmites (*Phragmites australis*), or Common Reed, is a highly aggressive, non-native wetland grass found across Vermont that creates dense monocultures, choking out native plants and

ruining wildlife habitat. These tall (up to 15-20 ft) plants spread via seeds and rhizomes, disrupting ecosystems and altering wetland hydrology. Control requires a multi-year effort combining cutting below the water line or using herbicide applications. The plant creates a thick accumulation of dead biomass that can produce high-intensity fires, threatening structures near wetlands and roadsides, particularly in late winter and early spring, due to its dense, tall, and dry stands.

Previous Occurrences:

Because invasive species often spread over a long period of time and have dispersed effects, identification of hazard events concerning invasive species is difficult.

- The zebra mussel was discovered in Lake Champlain in the summer of 1993.
- The emerald ash borer was first discovered in Vermont in February 2018, and was detected in nearby Bristol (2019) and Middlebury (in 2021).
- Wild Parsnip was likely brought by early European settlers, but has escaped cultivation and populations have increased dramatically across the state in the last decade. In recent years it has been documented to cause 2nd degree burns to several individuals in parts of Vermont.

Future Probability:

Changes in climate are expected to increase the probability of invasive species introduction and spread, but projected land use and population changes are not expected to affect their impact on community assets or vulnerable populations. Existing and new invasive species are expected to continue moving into Orwell through human transport and by natural reproductive spread.

Phototoxic terrestrial plants like Wild Parsnip can form dense stands which outcompete native species and become self-sustaining populations that continue to expand if not eradicated.

Some mobile species like ticks and Woolly Adelgid are moving north from southern Vermont and are expected to continue moving as milder winter temperatures allow them to overwinter. The *Aedes albopictus* (Asian tiger) mosquito, which can carry and transmit Zika, dengue, and other arboviruses including West Nile Virus, has an estimated geographic range that includes southern Vermont and is anticipated to move into Addison County.

In addition to concerns over Vermont's ash tree population, northern hardwood species like maple, yellow birch and American beech are predicted to largely vanish in the State, replaced by tree species such as oak and pine that thrive in warmer, drier conditions. The changing climate is expected to lead to less available water, resulting in additional stress to existing trees, which will increase their vulnerability to pest invasion and disease.

Vulnerability Summary:

Warming temperatures and milder winters makes Vermont more vulnerable to insect borne diseases and increases the chance these diseases can overwinter. While not strictly invasive, this shift in species distribution and range could threaten human health in the state. As the global climate continues to shift rapidly rate, species better adapted for warmer climates will continue to proliferate, causing changes in ecosystem composition that could destabilize basic ecosystem functions. Monetary and health costs associated with the disturbances invasives cause will continue to increase. However, future assets are not expected to experience increases in vulnerability to invasive species due to land use changes or changes in population demographics

Invasive Species are considered a HIGH PRIORITY for the Town of Orwell, with an overall vulnerability score of 4.00 determined.

4.3.10 Infectious Disease Outbreak/Pandemic (Vulnerability Score 3.75)

An infectious disease is caused by micro-organisms, such as bacteria, viruses or parasites. A vector-borne disease is an infectious disease that is transmitted to humans by blood-feeding arthropods, including ticks, mosquitoes, and fleas, or in some cases by mammals (e.g. rabies). This section covers Zoonotic Diseases, spread by animals (including Rabies, Avian Influenza or Bird Flu, Hantavirus, Tularemia) and respiratory viruses (including Coronavirus 19 (COVID-19), influenza, Respiratory syncytial virus (RSV), etc.).

For the purposes of this plan, Orwell has separated tick and insect-borne diseases, primarily through mosquitoes, into a separately evaluated hazard (Section 4.3.15).

An epidemic emerges when an infectious disease occurs suddenly in numbers above normal expectancy. Infectious disease outbreaks put a strain on the healthcare system, can cause continuity of operations challenges for local businesses, impact the economy, and interrupt daily life for everyone within a community. These outbreak incidents are a danger to emergency responders, healthcare providers, schools, and the public.

Extent:

Infectious diseases come in a wide variety of types and have a broad range of effects. In most cases, only a few individuals are affected. However, more virulent infectious disease outbreaks have the potential to affect the entire community over a long period of time.

Municipal staff, volunteers, and road crews in Vermont face heightened vulnerability to **respiratory illnesses** like COVID-19 and RSV, especially during peak seasons. Respiratory illnesses like COVID, flu, and RSV spread mainly through infectious droplets and aerosols released when an infected person breathes, talks, coughs, or sneezes, and by touching contaminated surfaces and then the face. As essential workers who often operate in close-knit teams and prioritize public-facing duties these personnel are likely to see increased sick leave, reduced staffing capacity, and potential disruptions to municipal services during intense respiratory illness waves.

Several infectious zoonotic diseases that may be present in the state or may spread to Vermont in the future may not be directly influenced by climate change, but will continue to be a serious concern. **Rabies** poses risks of fatal viral transmission to humans and unvaccinated animals via bites. **Hantavirus**, though relatively rare with only two confirmed Vermont cases since 1993, causes severe respiratory illness after exposure to virus-laden rodent droppings — notably those of deer and white-footed mice. **Leptospirosis**, spread through contaminated water and soil via mammalian urine (e.g., rodents, raccoons, livestock), can lead to serious kidney and liver issues and is emerging as a threat to both humans and pets in Vermont. **Plague** remains predominantly a western U.S. disease, but travel or wildlife movement could introduce it; typically bubonic and contracted from rural rodent reservoirs, it averages around seven U.S. cases annually. **Valley Fever**, caused by the soil-based Coccidioides fungus, isn't endemic to Vermont but climate shifts raise concerns for possible eastward spread of spores and risk of respiratory infection. **Anthrax** persists in soil and livestock, particularly cattle, sheep, and goats; humans may contract it through contact with infected animals or products, with spores capable of persisting in the environment for decades. **Q Fever**, transmitted via inhalation of contaminated materials from sheep, goats, or cattle, can cause flu-like illness and chronic conditions like endocarditis, notably impacting agricultural workers.

Waterborne Illnesses

When large runoff delivers excess nutrients like phosphorus and nitrogen into lakes, the warmer, calmer waters become prime habitat for blooms, which can release harmful toxins that cause skin rashes, throat irritation, gastrointestinal distress, and serious illness in humans and pets. Flooding events elevate the risk of waterborne parasites such as **Cryptosporidium**: heavy rains wash animal feces into surface waters, and the parasite's hardy oocysts can survive traditional chlorination, leading to outbreaks of diarrhea and dehydration—especially affecting children, the elderly, and immunocompromised individuals.

Location:

Infectious disease cases have been dispersed throughout Vermont and likely in Orwell. Low population density in town may reduce the spread of respiratory disease within town, but the small number of business and town offices may congregate residents and increase local exposure. Workers travelling to more distant locations like Burlington, Middlebury and Rutland may also increase the chances of exposure to and spread of respiratory illnesses.

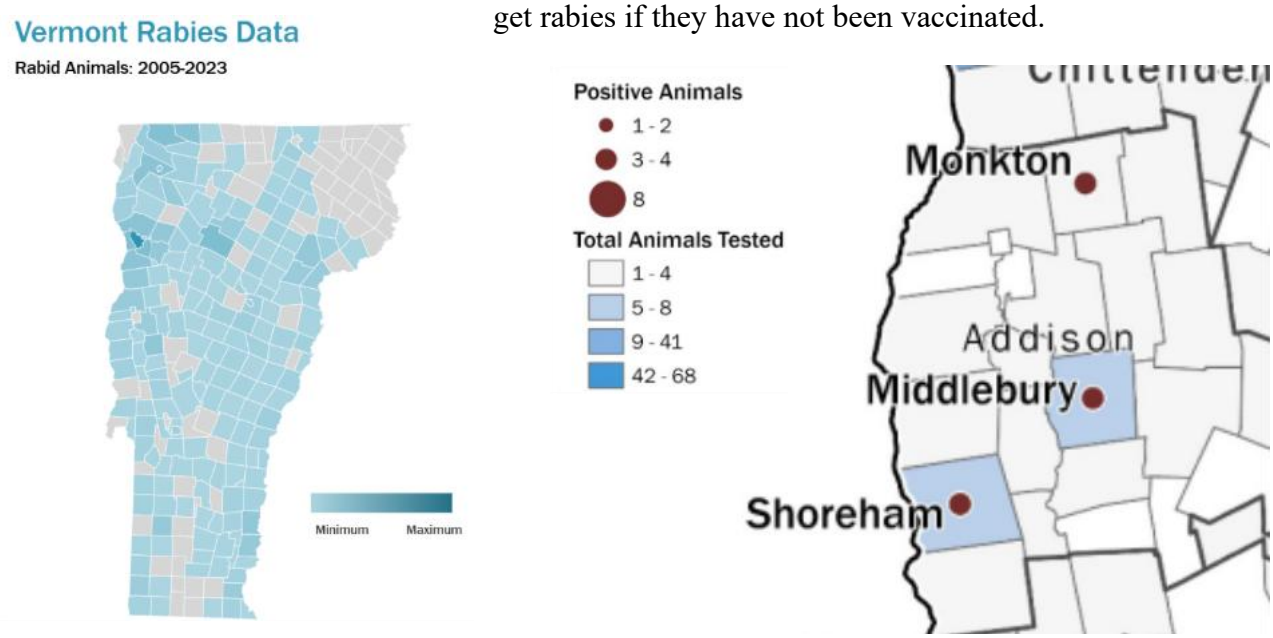
Proximity to livestock from farms and wild animals in rural areas throughout the rural areas of town increases potential exposure to zoonotic disease. Waterborne illness are most likely along the edge of Lake Champlain where residents recreate and may be exposed to algal blooms or waterborne parasites from runoff events.

Previous Occurrences:

Respiratory diseases have had the greatest impact and most widespread previous occurrences. Pandemic influenza, considered to be a global outbreak, spread quickly around the world and was observed in 1918, 1957, 1968 and in 2009 with the novel H1N1 strain. The great influenza epidemic of 1918 killed millions worldwide and would likely cause hundreds to thousands of deaths in Vermont should a similar outbreak occur today. The 2009 H1N1 outbreak, though not considered a serious threat to the state, still affected some Vermonters.

The COVID-19 pandemic led to a complete disruption of daily life in Vermont. A state of emergency was issued by Governor Phil Scott on March 13, 2020 to help ensure Vermont had the resources necessary to respond to the COVID-19 public health emergency. In the following weeks, a series of executive orders were issued restricting activities likely to result in transmission or use up valuable medical resources. Some of these included restricting visitor access to long term care facilities, suspending in person PreK-12 education, closing bars and restaurants, suspension of elective and non-essential medical surgeries, interstate travel restrictions, and limits on non-essential gatherings. COVID-19 restrictions stayed in effect until June 14, 2021 when 80% of Vermont's eligible population (those 12 and older) had received at least one dose of COVID-19 vaccine, in accordance with the State's Vermont Forward Plan. To date, Vermont has documented more than 150,000 cases and 900 deaths due to COVID-19. A more serious strain of the flu is anticipated in the future and vaccines might not be available in time to combat rapid spread.

Vector-borne diseases, even beyond Mosquito and Tick-borne illnesses, continue to pose a significant and growing threat. Rabies remains a serious concern in Vermont, with 66 rabid animals identified in 2024 — primarily raccoons, skunks, foxes, bats, and woodchucks. Rabies cases have been noted recently near Orwell. Between 2005 and 2023 Orwell has not had any rabies cases identified, but neighboring municipalities have had a dozen cases primarily in raccoons, as well as a skunk, cat, and a cow. In Vermont, rabies is most commonly found in wild animals such as raccoons, skunks, foxes, bats and woodchucks. Cats, dogs and livestock can also get rabies if they have not been vaccinated.



Source: 2023 State Rabies Surveillance Report

The presence of highly pathogenic avian influenza (HPAI), also known as H5N1 bird flu, has been circulating in Vermont since 2022. A bobcat and two red-tailed hawks found dead in Cornwall tested positive for HPAI in early 2024. HPAI is uncommon in mammals, and the bobcat that tested positive was the first detection of HPAI virus in a mammal in all of Vermont HPAI was also confirmed in a backyard chicken flock in Franklin County in December 2024. This was the fourth instance of HPAI in a domestic flock in Vermont since spring of 2022 and emphasizes the ongoing need for vigilance as the disease continues to be an ongoing risk to domestic birds.

Future Probability:

Changes in climate are expected to increase the probability of Infectious Disease introduction and spread. According to the Centers for Disease Control (CDC), the number of reported cases of vector-borne infectious disease more than tripled between 2004 and 2016 and can be expected to continue rising. Warmer temperatures allow more diseases and their vectors to expand and establish populations farther north, where harsh winters temperatures previously inhibited expansion. Projected land use changes are not expected to affect the impact of infectious disease on community assets, but changing demographics may result in faster spread and impacts on vulnerable populations. With increasing trends for global travel and short-term visitors, diseases

not previously observed in Vermont may be introduced by infected travelers and spread to the local population.

Vulnerability Summary:

People who are immunocompromised, elderly and young, and healthcare workers are most vulnerable to infectious disease. These populations are at heightened risk of infection and death due to weakened immune systems or compounding factors of other illnesses or stressors. Future assets are not expected to experience increases in vulnerability to infectious diseases due to land use changes but may increase with changes in population demographics.

Infectious disease outbreaks are considered a HIGH PRIORITY for the Town of Orwell, with an overall vulnerability score of 3.75 determined.

4.3.11 Hail Storm (Vulnerability Score 3.50)

Location:
Hail can occur anywhere in Vermont, but storms tend to be highly localized and limited to a relatively small area.

Extent:

Hail is considered a relatively infrequent occurrence in Vermont. Storms can be significant to local farmers, who can lose entire fields of crops in a single hailstorm. Large hail is also capable of property damage, including both structures and vehicles. Hailstone size can range from the size of a pea to the size of a melon.

Previous Occurrences:

There have been at least 2 significant hailstorms documented in Orwell since 1970. There have been documented occurrences in neighboring Shoreham (8), all between 2008 and 2014 and all with magnitudes of quarter and half-dollar equivalent in hail size. No property or crop damage was recorded as a result. Hailstorms usually occur in Vermont during the summer months and generally accompany passing thunderstorms.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Orwell	-	-	-	-		2	-	-	-	-	-	-
Shoreham	0	0	0	0	3	2	2	1	0	0	0	0
Neighboring Towns	0	0	0	0	1	5	2	1	0	0	0	0

Source: https://www.ncdc.noaa.gov/stormevents/

Future Probability:

Significant hailstorms are likely to occur relatively infrequently, and have not shown significant change in frequency over time. According to the 2018 National Climate Assessment, changes in the frequency or severity of hail events are still uncertain. Changes in climate may slightly increase the probability of Hail Storms, but projected land use and population changes are not expected to affect their impact on community assets or vulnerable populations.

Vulnerability Summary:

The impact from hail is considered to be negligible to infrastructure, life, the economy and the environment. However, hail can damage property, young and tender plants, and cause bodily harm to those individuals unfortunate enough to be caught outside. As a result, farmers and outdoor recreationists are more vulnerable to hailstorms than other groups of people.

Hail Storms are considered a HIGH PRIORITY for the Town of Orwell, with an overall vulnerability score of 3.50 determined.

4.3.12 Wildfire (Vulnerability Score 3.50)

Location:

Severe wildfires are uncommon throughout Vermont, but minor fires are regular occurrences and could conceivably occur in any part of Orwell. Un-mowed field edges and grass or shrub vegetation are the most likely locations for fires to start.

Extent:

Wildfire conditions in the Champlain Valley are typically at their worst either in spring when dead grass and fallen leaves from the previous year are dry and new leaves and grass have not come out yet. The majority of fires in Vermont are caused by burning debris, though they can be a result of naturally occurring influences such as lightning, and exacerbated by drought and extreme heat. Open burning of natural and untreated wood, brush, weeds, or grass requires a 'Permit to Kindle Fire' from the Town Forest Fire Warden. When there is significant fire danger, open burns are banned entirely.

Wildfire risk may be increased by the presence of invasive *Phragmites* (*Phragmites australis*), or Common Reed, a highly aggressive, non-native wetland grass. The plant creates a thick accumulation of dead biomass that can produce high-intensity fires, threatening structures near wetlands and roadsides, particularly in late winter and early spring, due to its dense, tall, and dry stands.

Previous Occurrences:

There has not been a major wildfire in Orwell or any of Vermont in the last 50 years, but small fires do occur relatively frequently. In the last decade, the average size of wildfires in the state has been 1.72 acres and there were only 11 brush fires in all of Addison County in 2024. The Orwell Fire Department recorded 3 wildland-brush fires in 2024, 6 in 2025 plus one assisted through mutual aid, and one so far in 2026 with another assisted through mutual aid. In July 2025 a wildfire in the town of Fair Haven, in neighboring Rutland County burned approximately 11 acres over 6 days before being contained by state and local firefighters. The cause of that fire remains unknown, but it occurred during a period of hot, dry, and windy conditions. A March 2026 fire in nearby Ferrisburgh burned about 120 acres of field, woods and swamp, as well as an outbuilding, and required assistance from 10 fire department crews to contain. On April 28-29, 2026, a 54-acre wildfire burned in the Green Mountain National Forest of Middlebury-Ripton, requiring multiple municipal, state, and federal agencies to control.

Most wildland fires occurring in vegetation or natural fuels in the area are caused by debris burning or campfires and are quickly reported and contained. A campfire that got out of control in Starksboro damaged just over 4 acres in an inaccessible area off Big Hollow, and a small campfire in Bristol burned about 2 acres. The Town Forest Fire Warden issues permits and

local fire departments respond for wildland fire control with mutual aid assistance from other towns and the State, when necessary.

March 2026 Wildfire in Ferrisburgh, VT

The greatest impacts to communities from wildfires are smoke from wildfires in Canada and the western United States. This vulnerability is described in the Air Quality section of this plan.

Future Probability:
Although wildfires are currently uncommon in Vermont, the hazard committee acknowledged that extended periods of warming due to climate change have the potential to increase the occurrence of wildfire events. Unhealthy wildfire smoke from out-of-state wildfires is also expected to affect Vermont more frequently and severely in the future, as climate change is already increasing wildfire risks in the western United States and Canada. Changes in climate are expected to significantly increase the probability of wildfire events, if not in Orwell, then in distant forested areas that still affect local atmospheric conditions.

Local land use changes are not expected to significantly affect their impact on community assets, but changing population demographics, especially aging populations, may create more vulnerability and compounding factors. For instance, older residents may have more breathing issues, or experience more social isolation. Limited numbers of volunteer fire fighters are available, especially for daytime and early evening hours when wildfires are most likely to be initiated, make response efforts challenging and reliant on mutual aid from neighboring communities.

Vulnerability Summary:

Populations that are more vulnerable to wildfire include firefighters, isolated residents, and immune-compromised individuals. Future assets are not expected to experience increases in vulnerability to wildfires due to land use changes or change in population demographics.

Wildfires are considered a HIGH PRIORITY for the Town of Orwell, with an overall vulnerability score of 3.50 determined.

4.3.13 Severe Cold (Vulnerability Score 3.00)

Location:
Severe cold events occur across the entire state, and are generally more severe at higher elevations. Temperatures in the lower, populated areas of Orwell are somewhat moderated, but can still experience significant low temperatures.

Extent:
Vermont often experiences cold conditions during winters, however very cold temperatures remain a threat despite their regularity. The NOAA Wind Chill Chart identifies those temperatures and associated wind speeds that may cause frostbite if skin is exposed to the air over a certain period of time. In anticipation of extreme cold temperatures, the National Weather Service may issue the following watches, warnings or advisories, which are aimed at informing the general public as well as the agricultural industry:

- **Wind Chill Warning:** Dangerously cold wind chill values are expected or occurring
- **Wind Chill Watch:** Dangerously cold wind chill values are possible
- **Wind Chill Advisory:** Seasonably cold wind chill values but not extremely cold values are expected or occurring
- **Hard Freeze Warning:** Temperatures are expected to drop below 28°F for an extended period of time, killing most types of commercial crops and residential plants
- **Freeze Warning:** Temperatures are forecasted to go below 32°F for a long period of time, killing some types of commercial crops and residential plants
- **Freeze Watch:** Potential for significant, widespread freezing temperatures within the next 24-36 hours
- **Frost Advisory:** Areas of frost are expected or occurring, posing a threat to sensitive vegetation

Previous Occurrences:
Since 1970, NOAA has documented severe cold and wind chill events across Addison County in a number of events, exclusively in the period from December to February:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nove	Dec
Cold/ Wind Chill	19	6	0	0	0	0	0	0	0	0	0	3

*NOAA Storm event database (https://www.ncdc.noaa.gov/stormevents/)

In January and March of 2007, several arctic cold fronts moved across Vermont on the 24th and delivered very cold temperatures as low as 15 degrees below zero along with blustery winds.

On January 14, 2009 an arctic cold front moved across Vermont during the early morning hours which delivered some of the coldest temperatures across the region in several years. As the arctic

front passed across northern Vermont, temperatures dropped over 20 degrees within several hours. Temperatures averaged 20 to 25 degrees below normal values, which were already at climatological winter minimums. In parts of Addison County, minimum temperatures reached 20 degrees below zero. These extremely cold temperatures led to numerous cold weather-related problems including numerous dead vehicle batteries and broken home/business water pipes.

On January 7, 2015, early evening temperatures were zero to 10 above zero with winds of 15 to 30 mph that created wind chills colder than 20 to 30 below zero through the overnight into the morning hours of January 8th. Actual morning low temperatures on January 8th were 10 below to 20 below zero in Addison County, with temperatures dipping to 12 below zero in some locations.

On December 22-23, 2022, Addison County received high winds, downing power lines and closing roads, followed by cascading temperatures falling into the single digits, with wind chills of zero to the minus 0's. The greatest effect to Orwell was the extended power outage.

Future Probability:

Warmer temperatures associated with climate change may result in milder winters but the possibility of jet stream alterations producing "bomb cyclones" that might increase sudden deep freezes or ice storms in early spring and late fall. As a result, some winter storms and severe cold events are predicted to increase in severity. Changes in land use and population are not expected to increase the impact of severe cold events on community assets or the population.

Vulnerability Summary:

Severe cold can drain vehicle batteries and freeze water pipes, leading to transportation challenges that prevent people from reaching work, school, childcare, grocery stores, and hospitals. Frozen or burst pipes can cut off water supply and cause extensive damage, leaving homeowners and business owners with costly repairs, cleanup, and potential loss of income or operations—compounding the hardship caused by the cold.

Future assets are not expected to experience increases in vulnerability to severe cold events due to land use changes or change in population demographics.

Severe Cold events are considered a MEDIUM PRIORITY for the Town of Orwell, with an overall vulnerability score of 3.00 determined.

4.3.14 Landslide/Rockslide/Shoreline Slide (Vulnerability Score 3.00)

Landslides are a variety of processes that result in the downward and outward movement of slope-forming materials including rock, soil, organic matter, or artificial fill. The materials may move by falling, toppling, sliding, spreading, or flowing and generally move in either a planar fashion, classified as translational, or curved, classified as rotational or slump. They can be as large as several cubic miles or as small as a few cubic meters and are able to move as quickly as a free fall or as slowly as a multi-century creep.

Landslides that move a significant amount of material quickly and over a large area have the capacity to cause substantial damage to infrastructure, buildings and the natural environment, as well as cause injuries and fatalities. Landslides can be the result of the following:

- Slope saturation from intense Rainfall/Snowmelt
- Oversteepening of slopes due to stream erosion or undercutting
- Invasive Species
- Reduction of material strength due to weathering.
- Addition of excess load onto slopes, often due to human activity.

Earthquake or artificial vibration

Location:

Landslides in Vermont often involve unconsolidated materials and are most common along rivers where fluvial erosion occurs. In Orwell the areas of greatest risk are along the edge of Lake Champlain and north-south stream ravines south of Route 73.

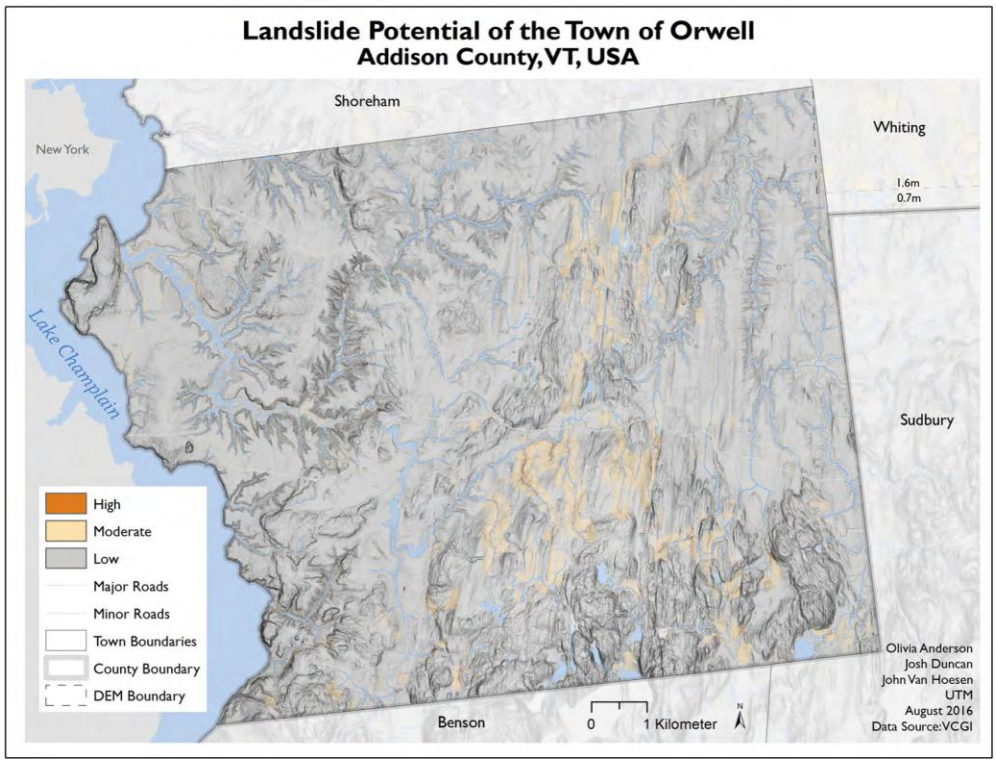


Figure. Landslide Potential in Orwell (from Addison County Landslide Susceptibility, 2016)

Extent:

The impact that landslides can have is concentrated in limited areas, but can have significant impacts on the built and natural environment. Landslide events can quickly and significantly alter topography with massive amounts of debris moving downslope. Roads that sit along steep slopes near rivers are especially vulnerable to damage or complete failure from a landslide event. Bridges and culverts placed near waterways similarly can be damaged or swept away by the debris of a landslide. Buildings and other structures can be damaged as well, especially if they are in historical landslide sites, steep slopes, slopes altered by construction, channels along streams or rivers, and areas where humans have directed surface runoff. Slope instability is further exacerbated by human activity, often in the form of infrastructure construction that either mishandles surface runoff, overloads the tops of slopes, or undercuts the bases of slopes. The destruction of roadways can limit the transportation corridors in distant areas, making it difficult to respond to emergencies caused by landslides as well as other emergencies.

Landslides can also significantly impact the natural environment. Landslide debris can impact the character and quality of rivers and groundwater flow when large amounts of earth and organic materials enter streams as sediment resulting from landslides and erosion activity, thus reducing the potability of the water and quality of habitat for fish and wildlife. Sedimentation can lead to many waterway issues by clogging fish gills, reducing resistance to disease, lowering growth rates, and affecting fish egg and larvae development. Increased turbidity of the water can prevent the growth of vegetation disrupting the Biochemical Oxygen Demand (BOD) of the water, making it more difficult for marine species to breathe. The habitat destruction and disruption caused by landslides is not confined to waterways, as forested ecosystems in the path of a landslide can be swept away, stripping forest cover away, impacting wildlife habitat. The changes in the natural environment experienced by this hazard are fast acting and severe, requiring time for ecosystems to recover and topography to stabilize.

Previous Occurrences:

Vermont has recorded over 3,000 landslides, with many occurring in the northern and central parts of the State along the spine of the Green Mountains. These regions are often sparsely populated, but storms in July 2023 dropped several inches of rain over 3-days, and continued rain over the following days and weeks that added to already saturated soils, flooding rivers, and at-capacity dams. The storm caused numerous landslides, road closures, and home damages. State scientists evaluated more than 70 fallen slopes and potential landslides after the summer floods — unprecedented in recent history. There were no landslides documented in Orwell from that storm event. In Orwell the only documented landslide is along the Lake Champlain shoreline next to Mount Independence Road.

Figure. Screenshot of all documented landslides in Orwell (https://gis-vtanr.hub.arcgis.com/datasets/landslides/)

Future Probability:

Widespread landslides are harder to predict and prevent than flooding. Unlike floods, there isn't necessarily a straight-line connection between the amount of rainfall and landslides. Vermont-specific work indicates that 3 to 5 inches of precipitation can trigger failures that lead to landslides, particularly in areas of steep slopes when the ground is already saturated. Extreme weather events and an expected increase in precipitation caused by climate change could make landslides more common in Vermont. While landslides in Orwell are unlikely, they are potentially a concern along steep stream gulleys.

Vulnerability:

Extreme weather events and the expected increase in precipitation caused by climate change could make landslides more common in Orwell.

Landslides are considered a MEDIUM PRIORITY for the Town of Orwell, with an overall vulnerability score of 3.00 determined.

4.3.15 Insect-Borne Illness (Vulnerability Score 2.50)

An infectious disease is caused by micro-organisms, such as bacteria, viruses or parasites. A vector-borne disease is an infectious disease that is transmitted to humans by blood-feeding arthropods, including ticks, mosquitoes, and fleas, or in some cases by mammals (e.g. rabies). For the purposes of this plan, Orwell has separated tick-borne and insect-borne diseases, transmitted primarily through mosquitoes, into a separately evaluated hazard.

Orwell is not a member of Insect Control District (ICD). There are only two insect control districts in the state of Vermont (the Lemon Fair ICD in Cornwall-Bridport-Weybridge, and the other is located in the towns on the east side of Otter Creek). The LFICD has identified about 800-900 treatable acres along the Lemon Fair River, and up to 400 acres in the Cornwall Swamp.

The Vermont Department of Health has separated vector-borne and other infectious diseases into five threat categories. Diseases spread by ticks and mosquitoes include:

Threat Classification	Disease	Vector
Diseases already present in Vermont that may be exacerbated by climate change	West Nile Virus	Mosquitoes
	Eastern Equine Encephalitis	Mosquitoes
	Lyme Disease	Ticks
	Anaplasmosis	Ticks
	Babesiosis	Ticks
	Hard Tick Relapsing Fever	Ticks
	Jamestown Canyon Virus	Mosquitoes
	Tularemia	Ticks, Flies
	Powassan Virus	Ticks
Diseases that may spread to Vermont even without contribution of climate change, whose spread to and transmission of Vermont could be exacerbated by climate change	St. Louis Encephalitis	Mosquitoes
	Western Equine Encephalitis	Mosquitoes
	La Crosse Encephalitis*	Mosquitoes
	Ehrlichiosis	Ticks
	Alpha-gal Syndrome	Ticks
	Rocky Mountain Spotted Fever	Ticks
Diseases with vectors that may spread to Vermont by the end of the century under a higher emission scenario	Dengue	Mosquitoes
	Zika Virus	Mosquitoes
	Chikungunya Virus	Mosquitoes
Diseases that have or may in the future have competent vectors in Vermont, but are unlikely to become established in Vermont despite a vector presence	Yellow Fever	Mosquitoes
	Malaria	Mosquitoes
	Chagas Disease (insects)	Insects
	Rift Valley Fever	Mosquitoes
Diseases that may be present in Vermont or may spread to Vermont in the future but whose link with climate changes expected in Vermont is tenuous.	Bartonellosis (fleas/lice)	Fleas/Lice
	Plague	Fleas (rodents and cats)

(from 2016 Vermont Climate Health Report see full chart in infectious disease section).

Location:

In Orwell, mosquito-borne illness poses a seasonal health threat, particularly during the warmer months when mosquito populations flourish. The Lemon Fair River, with its slow-moving waters and adjacent floodplains, creates ideal breeding grounds for mosquitoes, is the primary habitat for a floodplain mosquito known as *Aedes vexans* (a nuisance mosquito).

Wetland areas provide a large, undisturbed wetland habitat where *Culiseta melanura* black mosquito larvae, a species known to carry Eastern Equine Encephalitis (EEE), thrive. Additionally, numerous wet areas on private properties—such as poorly drained lawns, clogged gutters, and standing water in containers—serve as smaller, but widespread breeding sites that help sustain local populations of Common or Northern House Mosquitoes (*Culex pipiens)* known to carry diseases such as West Nile virus.

The risk to surrounding populations varies based on proximity to these breeding areas and individual property conditions. Residents living near wetlands may face elevated exposure, particularly if preventative measures are not taken to control standing water or limit outdoor activity during peak mosquito hours. However, even those farther from large wetlands may be affected due to mosquitoes traveling short distances and breeding in overlooked backyard environments. Public health agencies urge continued surveillance and mosquito control efforts, along with public education campaigns, to reduce the risk of transmission and protect community health throughout the region.

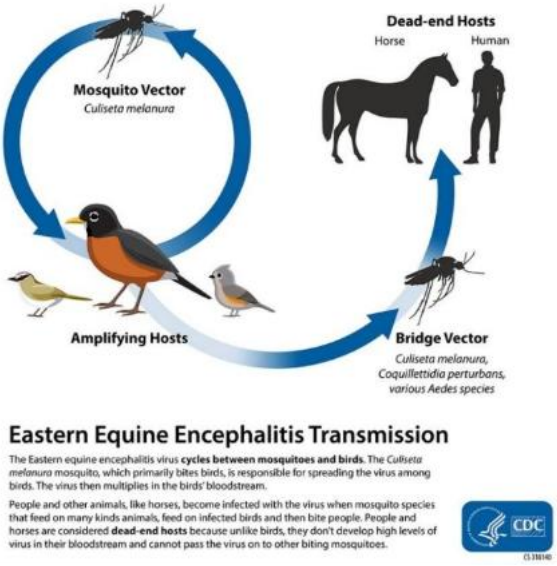
Extent:

West Nile virus (WNV) is a Flavivirus from the family Flaviviridae that can infect a wide range of vertebrates. Birds are the natural reservoir for WNV. WNV is maintained in nature in a mosquito–bird transmission cycle primarily involving Culex mosquitoes. Many species of birds survive their infections and develop permanent immunity; the virus can even become amplified in some bird species, contributing to the transmission cycle between birds and mosquitos. However, several species become ill and die, particularly corvids such as crows, blue jays, and ravens.

Approximately 80% of humans infected with WNV do not develop symptoms, and 20% experience a febrile illness. Less than 1% develop severe neurologic illness, such as encephalitis or meningitis, which can be fatal in a small percentage of cases. People over 50 years of age and individuals with weakened immune systems are at greatest risk for severe illness.

The virus was first detected in Vermont in 2000 and has spread to all 14 counties. WNV is considered enzootic and widespread in Vermont, and the risk is considered uniform throughout the state. Active mosquito-based WNV surveillance is conducted June through October every year throughout Vermont, and passive veterinary and human surveillance is conducted year-round.

Eastern Equine Encephalitis virus (EEV) is maintained in nature through avian hosts and *Culiseta melanura* mosquitoes located primarily in freshwater, hardwood swamps. Mosquito species from the genera *Aedes, Ochlerotatus, Coquillettidia*, and *Culex* that bite both birds and mammals are considered "bridge" vectors and allow transmission of EEEV to mammals



The virus is well established in North America, but human cases are relatively uncommon, with an annual average of 11 cases reported nationally during 2010–2019. Most EEEV activity has occurred in the Atlantic, Gulf Coast, and Great Lakes states. The first evidence of EEEV in Vermont was identified through a 2010 deer and moose serosurvey.

In humans, an infection with EEEV can vary from asymptomatic to severe illness. People who become ill with an EEEV infection either have systemic or encephalitic disease. Symptoms of a systemic illness include the abrupt onset of fever, chills, fatigue, arthralgia, and myalgia, which lasts 1–2 weeks. Those with encephalitic disease may have fever, headache, irritability, vomiting, diarrhea, convulsions, and other symptoms; approximately one third of people with encephalitis from EEEV infection die and about half of those who survive have some degree of permanent neurologic damage.

Jamestown Canyon Virus (JCV) is a bunyavirus belonging to the California serogroup and circulates in nature in a cycle including deer and various mosquito vectors. The transmission cycle of JCV is still not fully understood, but it is thought that early season mosquitoes, such as Ochlerotatus species, play a significant role in the early amplification of the virus within deer populations. These species overwinter as eggs and may be infected when they are laid in the fall by an infected female mosquito. When the eggs hatch after the snow melts in the spring, they are able to transmit the virus when they take their first bloodmeal. Late season amplification as well as transmission to humans is also thought to be connected to certain Anopheles mosquitoes, which readily bite mammals, including humans.

Many people infected with JCV do not develop any illness, but the proportion of asymptomatic infections among all infections is unknown. In people who develop illness, JCV will cause a mild, febrile illness. Some patients also report respiratory symptoms, such as cough, rhinitis, or pharyngitis. The incubation period for JCV disease is unknown. Neuroinvasive disease (meningitis or encephalitis) has been reported. No human infections with JCV have been reported in Vermont to date. In recent years the number of annual JCV cases reported to the CDC by other states has been increasing, although this is thought to be due to increased awareness and testing efforts.

Lyme Disease

In 2019, Vermont ranked highest in the United States for Lyme disease incidence, and is often at or near the top of incident rankings. The Vermont Department of Health has tracked Lyme disease cases in the state since for several decades, though not at the town-level. Shifting habitats and climate changes continue to create favorable conditions for pathogen-carrying ticks to proliferate.

<u>Previous Occurrences</u>:

The state has an Arbovirus Surveillance and Response Plan[1], updated in 2024, that it implements with sampling and testing. Several insect-borne diseases are frequently present in and around Orwell; West Nile Virus was confirmed in mosquito populations in Vergennes and New Haven in August and September of 2023. There had not been any cases of Jamestown Canyon Virus in Vermont until the first human case of the virus was confirmed in Windsor County in 2025.

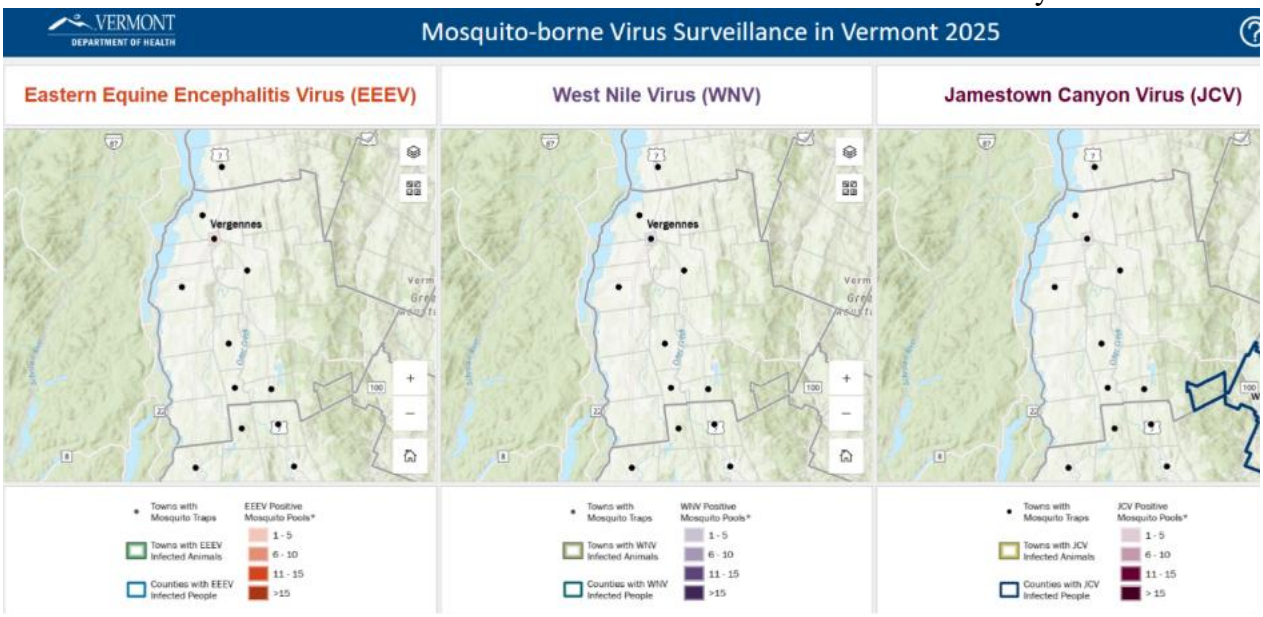


Figure. 2025 Surveillance Map [2]

<u>Future Probability</u>:

Climate change is intensifying the risk of mosquito-borne illnesses in Orwell, Vermont, as warmer temperatures and increased precipitation create more favorable conditions for mosquito proliferation. The expansion of mosquito habitats, coupled with longer breeding seasons, heightens the potential for diseases such as Eastern Equine Encephalitis (EEE) and West Nile virus to affect the region. This trend is evident in the broader Northeast, where EEE cases have emerged in states including Vermont, New Hampshire, and Massachusetts, prompting public health advisories and preventive measures. In Vermont, the combination of milder winters and wetter summers has been linked to a surge in mosquito populations, thereby increasing the likelihood of disease transmission.

The increase in Lyme disease is the most significant trend in infectious disease cases from ticks in Vermont. The Vermont Department of Health reports a dramatic increase in reported cases of Lyme disease around the state and milder, shorter winters increases the potential for infection

through tick bites. Additionally, early successional habitat on road edges and retired farmland could provide a more suitable habitat for ticks and their hosts, which may lead to further spread of Lyme disease.

Vulnerability Summary:

People who are most vulnerable to insect-borne diseases include immunocompromised individuals, elderly and young populations, and those frequently outdoors. Due to weakened immune systems or compounding factors of other illnesses or stressors these populations are at heightened risk of infection and death. Outdoor laborers and recreationalists are especially vulnerable to mosquito-vector transmission and tick bites that may cause Lyme disease. Future assets are not expected to experience increases in vulnerability due to land use changes or change in population demographics.

Insect-borne illness are considered a MEDIUM PRIORITY for the Town of Orwell, with an overall vulnerability score of 2.50 determined.

4.3.16 Tornado (Vulnerability Score 2.25)

Tornadoes are violently rotating columns of air extending from a thunderstorm with wind speeds capable of reaching in excess of 250 mph.

Location:

High winds can affect the entire planning area. In Vermont, high winds are most often seen accompanying severe thunderstorms. In Addison County, these storms usually originate from the west, southwest, or south.

Extent:

Tornado damage paths can be more than mile wide and 50 miles long. Straight-line winds from thunderstorms are more common, but usually more limited in scale. (See Beaufort Wind and Saffir-Simpson wind scales in Appendix 4).

Previous Occurrences:

Since 1970 across Addison County, NOAA has documented damage from only 3 tornadoes, primarily during the spring and summer:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Tornado	0	0	1	0	0	0	2	0	0	0	0	0

*NOAA Storm event database (https://www.ncdc.noaa.gov/stormevents/)

Tornadoes can occur in Addison County, but are rare. In July 2022 a storm system produced two tornado touchdowns north of Orwell: one in Addison (EF1) and one in Waltham (EF0). (See Enhanced Fujita Scale in Appendix 4). The tornadoes caused property damage, and uprooted and snapped several trees. The path length of the Addison tornado was 1 mile long and as much as 50 yards wide, while the second tornado path was 0.7 miles long and 25 yards wide.

Future Probability:

Tornadoes are not common in Vermont. However, it is likely that as climate change accelerates, the area will see exacerbation of wind events which could include tornadoes. Projected land use and population changes are not expected to significantly affect their impact on community assets or vulnerable populations, but may make such events more visible.

Vulnerability Summary:

People who live in rural, isolated communities like Orwell are particularly vulnerable to windstorms. High winds can take down trees and power lines, resulting in blocked transportation routes, cut off electricity and telecommunication networks, and property destruction. Lack of electricity is life-threatening for those relying on electric life supports systems and electrical heating and cooling systems. In addition, isolated populations may have limited access to

information and communication resources that could prevent injury or death. Future assets are not expected to experience increases in vulnerability to tornadoes due to land use changes or change in population demographics.

Tornados are considered a MEDIUM PRIORITY for the Town of Orwell, with an overall vulnerability score of 2.25 determined.

4.3.17 Flash Flooding & Fluvial Erosion (Vulnerability Score 2.00)

Location:
Fluvial erosion is the wearing-away of streambed and streambank associated with physical adjustment of stream channel dimensions (both width and depth). It occurs naturally in stable, meandering rivers and small streams.

Fluvial erosion typically occurs as a result of one of the following:

Rainfall: Significant precipitation from rainstorm or hurricane/tropical storm, causing flash flooding when a large amount of precipitation occurs over a short period of time.
Snowmelt: Melted runoff due to rapidly warming temperatures, often exacerbated by heavy rainfall. The quantity of water in the snowpack is based on snow depth and density.
Ice Jams: A riverine back-up when flow is blocked by ice accumulation, often due to warming temperatures and heavy rain which causes snow to melt rapidly.

Location:
The generally gentle topography of Orwell does not lend itself to widespread high velocity flood events common to fluvial erosion events. Previous plans have identified several vulnerable areas where roadways cross streams and the statewide Transportation Resilience Planning Tool (TRPT) identifies portions of VT Route 22A as highly vulnerable and critical. Portions of Lake Street and Townline Road and Rattlin Bridge Road, serving several residences, are at higher risk.

Extent:
Summer downpours and remnants of tropical storms can have the effect of concentrating flood waters into rivers and small and narrow stream areas, particularly in steeper geographic regions. In Orwell there are approximately 986 acres of state-identified river corridor areas along rivers and small streams (See yellow corridor areas on 2.2.5. Flood Resiliency Map). River Corridors encompass the area of land surrounding a river that provides for the meandering, floodplain, and the riparian functions necessary to restore and maintain the naturally stable or least erosive form of a river thereby minimizing erosion hazards over time. Lands within and immediately abutting a river corridor are at higher risk to fluvial erosion. They are mapped by the Vermont Agency of Natural Resources using calculations that rely on in-field and map-based measurements. Recent erosion of these in Orwell is undocumented and thought to be minimal, but these areas are the most likely extent of flash flooding and fluvial erosion occurrence.

According to NCDC statistics, the Addison Region has experienced 31 flash flood events over the past 25 years. The highest record of damage in Addison County was $1,000,000 during a period in July of 1998. During the period an estimated $32,310,000 in property damages and $1,500,000 in crop damages were incurred. None of this damage was experienced in Orwell due to the limited infrastructure located in susceptible terrain. Orwell may also be affected indirectly by flash flooding in nearby areas, as the closing of other North-South state routes (VT Route 7 or VT Route 30) might result in an inordinate amount of traffic being directed onto VT Route 22A and other parts of Orwell's road system.

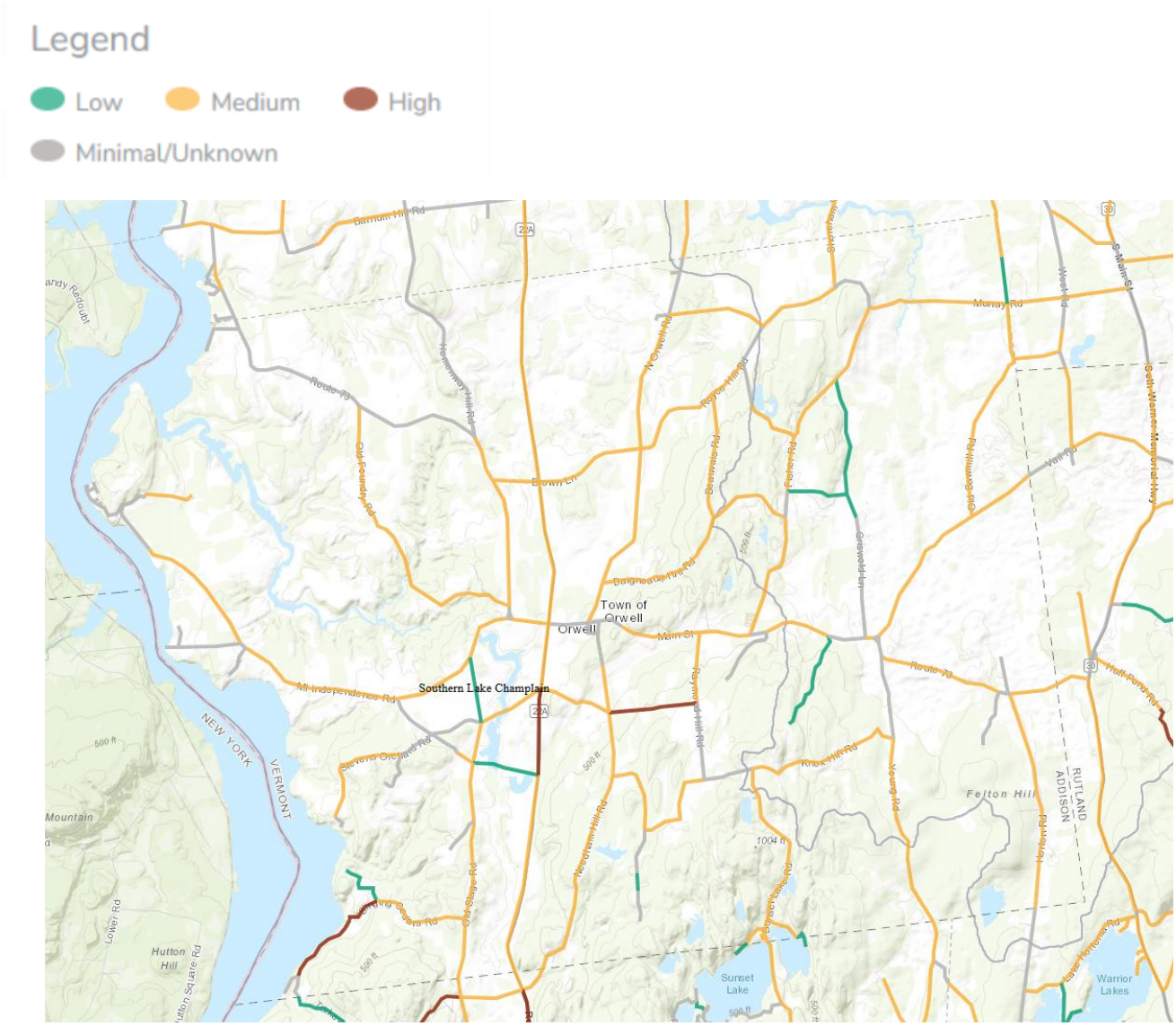


Figure. Orwell Road Infrastructure Asset Risk from the Vermont Transportation Resilience Planning Tool (TRPT) (https://roadfloodresilience.vermont.gov/#/map)

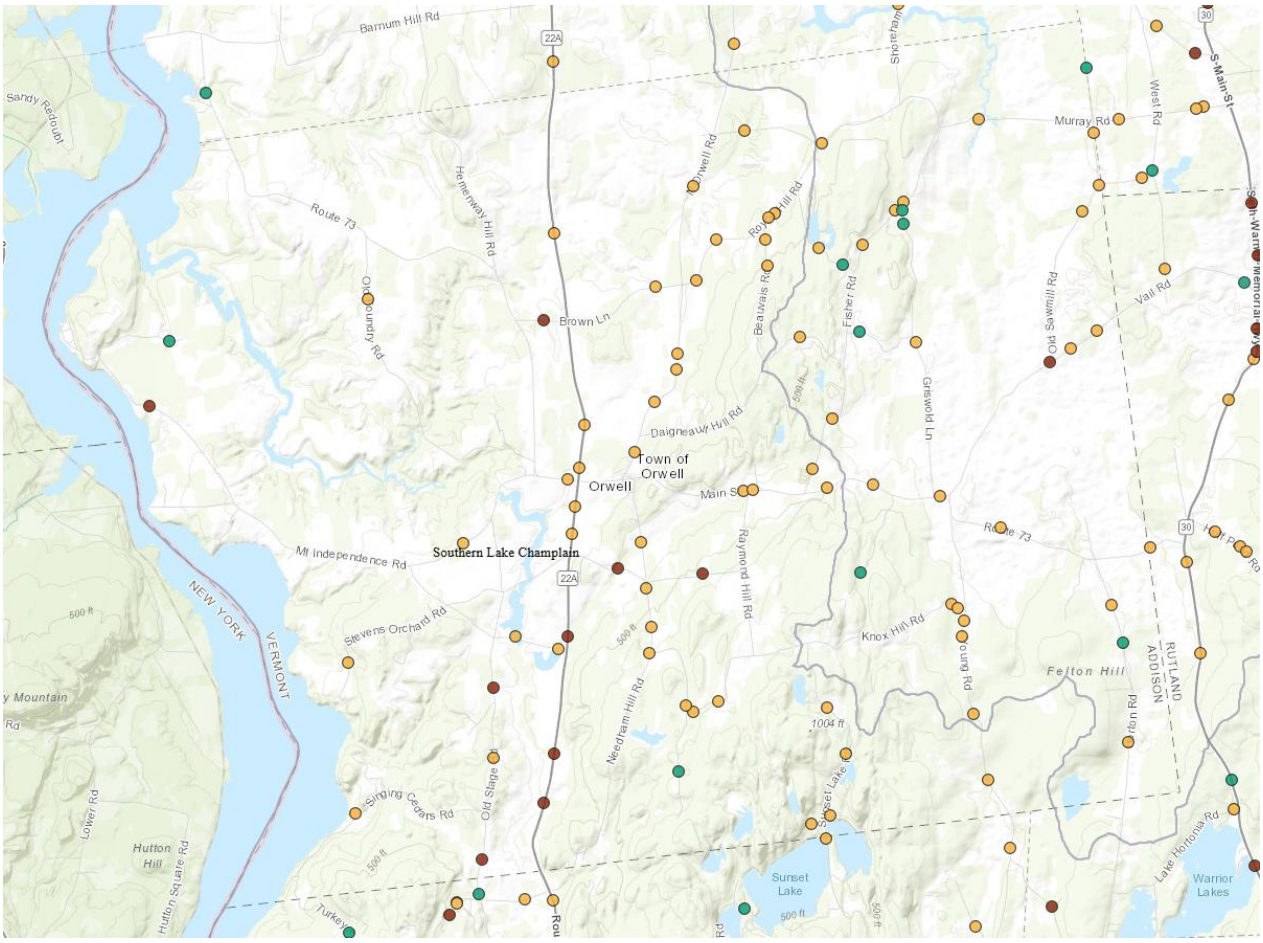


Figure. Orwell Culvert Infrastructure Asset Risk from the Vermont Transportation Resilience Planning Tool (TRPT) (https://roadfloodresilience.vermont.gov/#/map)

Previous Occurrences:

According to NOAA statistics, the Addison Region has experienced more than 45 flash flood events over the past 25 years. These generally occur in the summer months due to intense rainstorms, but they can occur in other seasons as well.

Table. NOAA recorded flash flood events by month of occurrence

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nove	Dec
Flash Flood	2	1	1	2	7	10	13	7	0	2	1	1

The Halloween storm of October 31-November 1, 2019 brought more than 3 inches of rain and gusting southwest winds that caused flooding and power outages across the region.

Future Probability:

Changes in climate are expected to increase the probability of large rainfall events and rapid snow melt that may have increasing impacts on community assets. In Vermont, average annual precipitation has increased by almost 7 inches over the past 50 years. The northeastern United States is projected to experience above average precipitation in the winter and spring, with even wetter conditions expected under a high greenhouse gas emissions scenario, and is also projected to experience more frequent, heavier rainfall events. These anticipated increases in both frequency and magnitude of precipitation in Vermont are expected to lead to alterations of hydrology and increased flash flooding events and fluvial erosion. Additional development in Orwell could potentially affect the impact of flash flood events on vulnerable populations.

Vulnerability Summary:

Flash flooding is an increasing concern for residents of the Town of Orwell. Although few areas are susceptible to flooding, the expense of infrastructure repairs make the community relatively vulnerable to large scale damages caused by flash flooding. Future assets are not expected to experience increases in vulnerability to flash flooding due to change in population demographics but may be increase with land use changes.

Flash Flooding & Fluvial Erosion are considered a MEDIUM PRIORITY for the Town of Orwell, with an overall vulnerability score of 2.00 determined.

4.3.17 Inundation Flooding (Vulnerability Score 1.00)

Location:
Minor inundation flooding is a regular occurrence in Much of the mapped Special Flood Hazard Area 1% chance floodplain (aka 100-year floodplain) lies along the Lake Champlain shoreline and its associated marshes. These areas flood on a regular basis and therefore have been unattractive to development. A few of the existing residences in the floodplain lie within the shoreline area. (see 2.2.5. Flood Resiliency Map, page 20 and Appendix 2 FEMA Flood Insurance Rate Map).

Extent:
Based on the results of overlaying the FIRM flood maps with the location of the E911 points, there are 27 residential and commercial units in the town that are vulnerable to potential flooding. The estimated loss for damage to these properties ranges from a low of $1,500,000 a high of $2,000,000. This is 5% of the grand list.

Local interviews indicate other areas of potential loss to the infrastructure due to erosion and road flooding. Of greatest immediate concern is the Sewage Treatment Plant for the village which lies within the mapped floodplain. Floodproofing measures have been taken to protect this critical infrastructure but failure of these would result in no sewage treatment for those served by the community system.

There is regular flooding in the low-lying area along Route 74. Minor shoreline flooding may occur in Orwell when the Lake Champlain water level exceeds 101' above sea level. Water levels can also rise due to backflow along small tributaries that flow directly into Lake Champlain.

Previous Occurrences:
Much of Orwell is relatively flat and its main waterways— East Creek and headwaters of the Lemon Fair River—rises every spring through agricultural fields, so there has been no development in those areas. As a result, inundation flooding has not historically affected Orwell and there have been no recent incidents.

Future Probability:
Flood hazard areas for Orwell and all of Addison County are currently being updated by USGS for FEMA and are expected to be finalized by 2027. The Zoning Administrator implements the substantial improvement/substantial damage provisions of the town's floodplain management regulations by prohibiting substantial improvement and post-event repairs that will result in any increase in flood levels. All new construction and substantial improvements require the granting of a conditional use permit. Changes in climate and high rainfall events may increase the probability of inundation flooding events, but land use and development changes are not expected to affect their impact on community assets or vulnerable populations.

Vulnerability:

The Town of Orwell, with its historic development patterns and large wetland areas, is relatively inundation flood-safe. Future assets are not expected to experience increases in vulnerability due to land use changes or change in population demographics.

Inundation Flooding is considered a LOW PRIORITY for the Town of Orwell, with an overall vulnerability score of 1.00 determined.

4.3.9 Downgraded Hazards from previous Hazard Mitigation Plan

Lightning Storm
Severe storms which include lightning are a common occurrence in Orwell during summer months. Lightning strikes can potentially cause fires to trees along ridge tops and less commonly start fires in structures. Fires associated with lightning strikes to inhabited buildings occur very rarely. More common is loss of power and damage to electronic equipment in homes where there has been a proximity strike. Anecdotally, there are multiple reports each year of electronic equipment unprotected by surge suppressors which are damaged by lightning strikes. Generally, these homeowners file insurance claims for damages and total annual damages in the entire community likely do not exceed $10,000. Community vulnerability to lightning strike is considered LOW due to the limited and scattered effects of strikes combined with the very common occurrence.

Earthquake
All of Vermont and New England is classified as an area with “moderate" seismic activity. Several seismic centers and events have been projected to have a <2% chance of affecting Addison County in the next 50 years, including:

- The Middlebury Once-in-500-year earthquake (5.7 magnitude)
- The Goodnow, NY Once-in-500-year earthquake (6.6 magnitude)
- The Montreal, Quebec (6.8 magnitude) Once-in-500-year earthquake
- Tamworth, NH (6.2 magnitude) Once-in-500-year earthquake

These are all predicted to have low to moderate damage to buildings, transportation and utility systems, but minimal casualties and economic loss. The Orwell Hazard Mitigation Committee and residents of the community do not generally consider earthquake to be a high enough risk to require preparing for one beyond providing information to local residents.

Ice Jam
Severe ice jams causing flooding do not occur in the Town of Orwell. Ice formation in culverts can cause spring runoff to flood over the tops of low lying and wooded stretches of town highways. These may be closed for a few days until warm weather melts the plugged culverts. The current program of upgrading culverts and bridges as they are replaced will mitigate any minor Ice Jam issues in town.

Dam Failure
The Town is home to three dams identified in the latest State DEC Dam survey. These dams are primarily used in moderating heavy flows through the East Creek wetlands. All of these are relatively small structures whose failure would result in extremely limited flooding should they fail at any time. As such they are considered “low risk” dams.

- East Creek #1 across the South Fork of East Creek
- East Creek #2 across the South Fork of East Creek
- East Creek #5 across Sanford Brook

The Town of Orwell in recent years has had minor impacts from dam failures due to failed beaver dams north of Sunrise Lake. In 2010, a severe summer storm caused a series of beaver dams to break causing road damage and a culvert failure from the downstream flooding. These dams are not listed on the State database because they are not man-made and their location fluctuates depending on beaver populations. This vulnerability is addressed in fluvial and flash flooding section.

5. Community Mitigation Strategies

Requirement 44 CFR § 201.6(c)(3)(i)
(Goals to reduce vulnerability to Hazards)

5.1 Hazard Mitigation Goals by Hazard Type

The Town of Orwell has identified that its goals for hazard mitigation are to reduce vulnerabilities to the hazards identified in section 4.3 and mitigate their potential harmful effects. In doing so, it also recognizes that political will and lack of funding stand in the way of many mitigation projects. The Town particularly supports local residents' efforts to mitigate their personal risks. The Town also supports projects that lead to a positive benefit vs. cost evaluation and which the voters can afford.

Goal 1: Increase Community Awareness of Orwell's Vulnerability to Natural and Human-influenced Hazards

Objective: Inform and educate the community about the types of hazards the Town of Orwell is exposed to, where they occur, and recommended responses

Goal 2: Reduce Vulnerability of People, Property, and the Environment to Natural and Human-influenced Hazards

Objective: Provide mechanisms to enhance life safety

Objective: Reduce impacts to critical facilities and services

Objective: Reduce impacts to existing buildings and infrastructure to the extent possible

Objective: Reduce impacts to future development and infrastructure to the extent possible

Objective: Reduce impacts to the town's natural and historic resources

Objective: Reduce impacts to public health

Goal 3: Increase Interagency Capabilities and Coordination to Reduce the Impacts of Natural and Human-influenced Hazards

Objective: Continue to collaborate and coordinate with other agencies on planning, projects, hazard response, and funding opportunities

5.2 Authorities, Policies, Programs, Resources

Requirement 44 CFR § 201.6(c)(3)
(Existing capabilities and ability to expand)

5.2.1. Authorities of Town Officials:

Selectboard: The Selectboard is responsible for the basic administration of the town. They take care of roads, make appointments to other boards and commissions, and authorize expenditures of voted budgets. The selectboard may enact ordinances and rules in many areas including traffic regulation, regulating nuisances, managing solid waste, dogs and recreation, and establishing bike paths.

Planning Commission: The Planning Commission is responsible for long range planning in a town particularly as it relates to future land uses and resilience. They prepare a municipal plan and zoning bylaws which are adopted by the Selectboard. Planning Commission members are appointed by the Selectboard.

Zoning Administrator: The Zoning Administrator (ZA) is appointed by the town's Selectboard with consideration given to the recommendation of the planning commission. Their responsibilities include administration and enforcement of a town's zoning bylaws, The ZA and usually also serve as the administrator of town floodplain regulations.

Tree Warden: The Town Tree Warden is responsible for the shade and ornamental trees within the town rights-of-way. They oversee tree health and removal when necessary. The tree warden is appointed by the Selectboard.

Fire Warden: The Town Forest Fire Warden has the responsibility for suppression of wildland fires, regulating open burning in the town by issuing burn permits, and wildfire education/prevention. The Town Fire Warden is appointed by the state Commissioner of Forests, Parks and Recreation with approval by the town's Selectboard.

Health Officer: The Town Health Officer is the executive officer of the local Board of Health.
A local board of health may make and enforce rules and regulations…relating to the prevention, removal, or destruction of public health hazards and the mitigation of public health risks. The Town Health Officer is appointed by the Commissioner of Health with approval by the local Selectboard. They take direction from the state Department of Health in investigation and enforcement of public health issues.

Town Service Officer: The Town Service Officer's responsibilities are to coordinate aid for residents needing assistance during hours when State offices are closed. In many towns, this office has become redundant as State agencies have developed 24/7 emergency assistance programs.

Emergency Management Director: Orwell has appointed a emergency management director (EMD) unless one is appointed. The emergency manager is responsible for the organization, administration and operation of the local emergency management organization. Emergency managers prepare local emergency operations plans, coordinate a local emergency management group and perform emergency management functions at the local level. Orwell has an active four-person Emergency Management Team organized by the Emergency Management Director (EMD).

5.2.2. Current policies, programs, resources

The 2024 Orwell town plan integrated information from the previous hazard mitigation plan into the Flood Resilience section, where it noted vulnerable locations and supported the adoption of river corridor protections and the adoption of updated FEMA special flood hazard areas. Emergency-preparedness improvements were noted in the Community Facilities and Services section, Housing section, and the Transportation section, as well as in the Goals for each topic. The following programs and resources are currently in place to mitigate the following hazards:

Widespread Power Failure

Many essential Town facilities like the Town Office, Fire Department and Town Garage have power generators for maintaining electric power. Many private residences have back-up power sources and batteries.

As population growth and housing expands along remote road corridors, increasing reliance on dependable power by the new homeowners requires changes in line maintenance. Green Mountain Power (GMP), the utility servicing the Town of Orwell has an ongoing program of line clearing and relocation to ensure outages are kept to a minimum. In addition, recent improvements to the transmission system in northwest Vermont have provided redundant systems to bring electric power to the region.

Flash Flooding

The Town of Orwell adopted the 2013 version of road and bridge standards as recommended by VT AOT on June 26, 2019. These standards address road and bridge construction, are designed to mitigate local traffic issues and are particularly designed to mitigate potential damages due to flooding and flash flooding. The standards address culvert sizing, ditch treatments and driveway access to reduce flood-caused erosion. The town supports the Vermont Culvert Database by updating records whenever they replace or upgrade culverts. The town requires stormwater permits and for commercial and industrial development, stormwater management and erosion control plans are required. Current Unified Development Regulations require that changes in grading are done so that drainage does not cause ponding, flooding, or siltation of other properties. Changes to natural drainage patterns are not allowed to alter wetlands or stream flow.

Winter Snow Storm & Ice Storm

Mitigation activities by power companies have re-routed many of the remote lines along town highways since the 1998 ice storm and an increased pruning effort has reduced the impact of a similar event would it happen today. The Town of Orwell generally mitigates its winter storm risk through preparedness activities in the form of appropriately sized equipment and training. All improvements to the road system take into account ease of snow removal in design

High Winds

In order to mitigate power outages and residential structures, the town road crew removes or prunes damaged trees in town road rights of way to reduce their vulnerability to high wind events. All modular, or mobile/manufactured dwellings must be installed on a proper foundation sufficient to ensure their stability and security and Newly constructed buildings may have tie

downs between roof and side walls but no building codes exist within the community that require construction to any particular standard.

Structure Fire

All new structures require Fire Marshall Safety permits and adequate water storage or distribution facilities for fire protection are required within new subdivision. Installation of dry hydrants at water supply locations increases the availability of and speed in which water can be accessed for firefighting purposes. The Town of Orwell maintains and tests these hydrants and would support additional installations as funding permits and suitable locations can be identified.

Insect-Borne lllness

Orwell has a high percentage of its land mass in frequently flooded soils and abandoned farmlands. These lands are home to insects, some of which also carry arboviruses. The town is not a member of the nearby Lemon Fair Insect Control District which requires an annual monetary contribution toward the district's efforts to keep insect populations in check. The Town supports efforts by the Vermont Department of Health in educating the population.

Wildfire

Orwell has an active fire department and a fire warden who requires permits prior to any outdoor burning in the town. This process includes site visits to a proposed burn site and a subsequent issuance of a permit. Enforcement is usually limited to a warning if the fire seems lit out of ignorance and can result in fines if the fire department is called out.

The town has no guidelines for home construction in place that would limit the risk of wildfire in Orwell. Actions taken as described above should limit the setting of uncontrolled outdoor fires and should result in an overall limited risk. Fire ponds may be required in larger developments, which should mitigate future fire risk in those developments.

Large-Scale Hazardous Materials Incident

The Orwell Fire Department conducts annual and has mutual aid agreements with neighboring Fire Departments through the Addison County Fire Association. The departments each maintain HazMat Decontamination supplies and members undergo annual HazMat Awareness certification. The State HazMat team responds to larger incidents.

Inundation Flooding

The Town has been a member in good standing of the National Flood Insurance Program (NFIP) for over 30 years. There are no identified "Repetitive Loss" properties located in Orwell. One flood insurance policy is in effect for a residence in the town located in the identified flood hazard zone, but no critical or public structures are located in the 1% or 0.2% flood hazard areas. The Town supports continued compliance with the NFIP.

5.2.3. Current resources

The Town of Orwell's annual budget is slightly more than $2,000,000 annually including an annual highway budget for equipment and payroll of just over $370,000. Collected income is primarily from property taxes, with less than 1% from grants, fines fees and licenses, zoning permits, and other sources of income.

The town's budget is structured to address various operational and community needs. Key allocations include:

- General Fund: Covers administrative expenses, including salaries for town officials, office supplies, and other operational costs.
- Public Safety: Funds allocated for fire protection services, emergency medical services and law enforcement (Addison County Sheriff) support.
- Public Works: Includes road maintenance, snow removal, and infrastructure repairs.
- Health and Welfare: Supports health officers, animal control, and contributions to health-related organizations.
- Recreation and Culture: Funds for community events, library services, and historical preservation.
- Debt Service: Payments on any outstanding municipal debts.

The budget also outlines anticipated revenues from property taxes, state aid, and other local sources to balance expenditures.

Grants and Funding Sources

Orwell actively seeks external funding to supplement its budget. Notable grants and funding sources include:

- State and Federal Grants: Applications submitted for infrastructure improvements and community development projects.
- Donations and Contributions: Received from local organizations and residents to support specific initiatives.
- Intergovernmental Transfers: Funds from county or state agencies for designated programs.

To enhance Orwell's resilience against natural hazards, the town may consider applying for the following grants:

- Hazard Mitigation Grant Program (HMGP): Provides funding for projects that reduce disaster risk, such as infrastructure upgrades and property buyouts.
- Building Resilient Infrastructure and Communities (BRIC): Supports proactive mitigation projects, including planning and code enforcement activities.
- Flood Mitigation Assistance (FMA): Offers grants for flood risk reduction projects, particularly for properties insured under the National Flood Insurance Program.
- Community Development Block Grant - Disaster Recovery (CDBG-DR): Funds long-term recovery efforts in areas affected by significant disasters, focusing on infrastructure and housing restoration.

To be eligible for these grants, Orwell must maintain an updated Local Hazard Mitigation Plan, be in good standing with the National Flood Insurance Program, and have an adopted Local Emergency Operations Plan.

By leveraging these funding opportunities, Orwell can proactively address potential hazards and enhance the community's safety and resilience.

5.2.4. Authority and Capabilities to Expand Funding

As a small town governed by a Selectboard and annual Town Meeting, the Town of Orwell has limited authority and capacity to expand its funding capabilities independently. However, it does have some tools and options within its municipal authority:

- **Property Tax Adjustments**: The town can propose and approve increases to property tax rates through the Town Meeting process, allowing for additional revenue—though this depends on voter support and is often constrained by affordability concerns in a small population.
- **Grant Applications**: Orwell has the authority to pursue state and federal grants, and its annual report indicates it does so. Successful grant-seeking depends on administrative capacity, competitive proposals, and alignment with state and federal priorities.
- **Special Assessments and Fees**: The town can levy fees or create special assessment districts for specific projects (e.g., road improvements), though this is rare in small rural towns.
- **Intergovernmental Partnerships**: Orwell can collaborate with neighboring towns or regional planning commissions (e.g., Addison County Regional Planning Commission) to access shared services, technical assistance, and larger funding pools.

Limitations:

- **Administrative Capacity**: Small towns like Orwell often lack full-time staff, grant writers, or dedicated financial planners, limiting their ability to aggressively pursue or manage complex funding streams.
- **Revenue Base**: With a small population and limited commercial activity, Orwell's tax base is modest, restricting local revenue potential.
- **Regulatory Constraints**: State laws cap certain forms of taxation or borrowing, and voter approval is typically required for new spending or debt.

In summary, Orwell has some municipal authority to improve its funding, especially through voter-approved measures and grants, but its small size and limited resources pose real constraints on expanding its financial capabilities. Collaborating regionally and leveraging state/federal programs are the town's most viable paths to increased funding.

5.3 Project Prioritization Process

Requirement 44 CFR § 201.6(c)(3)(ii)
(Prioritization, Implementation, Administration)

Projects and actions included in Section 5.2 are conducted by the Town of Orwell, GMP or regional and State agencies where noted. The Town encourages its residents to adopt mitigation actions which could protect their personal property by making educational materials available to residents. Mitigation actions identified in Section 5.4, are considered the jurisdiction's priority mitigation actions.

The Town has established the following priorities for choosing mitigation projects: Life safety and the safety of its residents, keeping local roads and bridges open to ensure access for emergency vehicles, and protecting critical infrastructure facilities in the town. These actions/projects are constantly evaluated for benefit to the community, estimated project cost and political will to implement and will be implemented as those factors indicate. Several mitigation projects have been completed in the past five years, and additional work is underway. The Town has established that costs considered are primarily financial, however there are political and social costs considered depending on the action.

The actions identified in Section 5.4 under each hazard have passed a preliminary evaluation utilizing those general concepts by the hazard mitigation committee, and are listed in their order of priority. Before undertaking these projects, they will additionally be prioritized based on their feasibility and a benefit vs. cost review. A minimum C/B result of 1.0 will be required prior to any request for federal mitigation funds. All projects in section 5.4 will be reviewed for progress following any local disaster declaration and will be considered annually as part of overall town budgeting.

5.4 Proposed Mitigation Actions by Hazard Type

Requirement 44 CFR § 201.6(c)(d)(3)
(Revisions due to priorities changes)
Requirement 44 CFR § 201.6(c)(3)(ii)
(Range of actions and projects considered

The following list of proposed mitigation actions and projects was revised from the previous plan due to changes in community priorities. The Hazards Committee identified a comprehensive range of specific mitigation actions from the previous Hazard Mitigation Plan, the State Hazard Mitigation Plan, and the goals and actions of neighboring municipalities, and analyzed each. Projects were considered to reduce the effects of each priority hazard, with emphasis on human life and safety as well as consideration of the new and existing buildings and infrastructure.

The final list includes only those projects which could be considered reasonable and feasible based on cost and political willingness. The town will maximize 406 mitigation opportunities whenever possible when making repairs to Public Assistance eligible damages during a declared disaster.

Each project in this action plan includes an estimated cost, possible funding sources, potential benefits, the lead person or agency responsible for completion of the project and an estimated start and end timeframe for project completion. Timeframes are an estimate only and are dependent upon funding and the political will to complete.

Requirement 44 CFR § 201.6(d)(3)
(Update on previous mitigation actions)

Requirement 44 CFR § 201.6(c)(3)(ii)
(Actions for each identified hazard)
Requirement 44 CFR § 201.6(c)(3)(iii)
(Responsible position, potential funding, expected time frame)

Requirement 44 CFR § 201.6(c)(3)(ii)
(Actions for each identified hazard)
Requirement 44 CFR § 201.6(c)(3)(iii)
(Responsible position, potential funding, expected time frame)

5.4.1 Mitigation Actions by Hazard Type Table

Hazard	Suggested mitigation action(s) for this hazard?	Estimated Cost	Source of Funds	Responsible Entity	Time-frame	Priority
All Hazards	Support dedicated EMD personnel and communication accounts	None to Town	Volunteer Time	Em. Management Director	2026-2031	**High**
	Encourage residents to sign up for VT-Alert and Care Registry	None to Town	Volunteer Time	Em. Management Director	2026-2031	**High**
Severe Ice storm	support efforts by Green Mountain Power to mitigate power outages due to ice storms via pruning and tree removal activities.	None	N/A	Select Board	2026-2031, Ongoing	**Medium**
	Manage vegetation in the ROW to minimize/allow space for powerlines	~$5000/yr	Town highway budget	Town Road Crew	2026-2031, annually	**High**
	Install solar panels and energy storage system (battery), and electrical service to town office to improve the ability of the town offices to remain open during an extended power outage		State grants	EMD, Town	by 2030	**Medium**
	Improve the wiring connection to the Orwell school to allow full use of the building during power outages.	Unknown	State grants	EMD, Slate Valley Unified Union School District	by 2030	**Medium**
Severe Snow Storm	Identify appropriate shelters for people who may need to evacuate due to loss of electricity, isolation, cold temperatures	None to Town	N/A	Emergency Management Coordinator	2026-2031	**Medium**
	Maintain snow removal equipment and qualified personnel	~$50,000/ year	Town highway budget	Town road crew, with assistance from the tree warden	2026-2031, Ongoing	**High**
	support efforts by Green Mountain Power to mitigate power outages due to ice storms via pruning and tree removal activities.	None	N/A	Select Board	2026-2031, Ongoing	**Medium**

Hazard	Suggested mitigation action(s) for this hazard?	Estimated Cost	Source of Funds	Responsible Entity	Time-frame	Priority
High Winds	Remove dead and dying trees from town rights of way as part of normal maintenance	$5,000	Town highway budget	Town road crew, with assistance from the tree warden	2026-2031, Ongoing	**High**
	support efforts by Green Mountain Power to mitigate power outages due to ice storms via pruning and tree removal activities.	None	N/A	Select Board	2026-2031, Ongoing	**Medium**
Highway Accident	Support future reconstruction activities to reduce risk at the intersection of Rte. 22A and Rte. #73 west of the village.	Unknown	State of Vermont VTrans	VTrans	by 2031	**High**
	Maintain Sheriff Patrols to reduce speeding along Route 22A					**Medium**
Structure Fire	Maintain dry hydrants and ponds throughout town.	$1000-$5000	Rural Fire Protection Grant Program	Orwell FD	2026-2031, Ongoing	**Medium**
	Provide Fire Safety education program in the elementary school	None to town	Volunteer Time	Orwell FD	2026-2031, Ongoing	**Low**
	Upgrade driveway standards in the next zoning bylaw rewrite to support basic accessibility for emergency vehicles to all structures in town.	None to town	Zoning Administrator time	Planning commission	2028	**Medium**
	Support Orwell Volunteer Fire Department	~$70,000/annually	Town operating budget	Select Board	2026-2031, Ongoing	**High**
Severe Heat	Maintain Orwell Library as emergency cooling shelter with generator and air-conditioning	$10,000	State grants	Select Board	2026-2031	**High**
	Encourage residents to sign up for the CARE registry and set up a process to check on vulnerable populations during heat events	None to Town	Volunteer Time	Em. Management Director	2026-2028	**High**
	Update and implement a Hot Weather-Cooling Shelter plan	None to Town	Volunteer Time	Em. Management Director	2026-2028	**Medium**

Hazard	Suggested mitigation action(s) for this hazard?	Estimated Cost	Source of Funds	Responsible Entity	Time-frame	Priority
Large-scale Hazardous Materials Spill	Support ongoing HazMat training efforts of the Orwell Volunteer Fire Department	None to Town	Volunteer Time	Orwell FD	2026-2031, Ongoing	**High**
	Support inventory of hazardous material flow on trucks	None to town	State grants	Regional Emergency Management Committee	by 2030	**Medium**
Drought	Encourage reporting by residents with dry wells	None to Town	Volunteer Time	Em. Management Director	2026-2031, Ongoing	**Medium**
	Provide education to residents about water conservation measures	None to Town	Volunteer Time	Em. Management Director	2026-2031, Ongoing	**Medium**
	support groundwater protection efforts around both public and private water supplies.	None to Town	Volunteer Time	Em. Management Director	2026-2031, Ongoing	**Medium**
Invasive Species	Follow state recommendations for roadside mowing to prevent seed production of Poison Parsnip	None	N/A	Town Road crew	2026-2031, annually	**Medium**
	Support removal and mitigation of Eurasian Milfoil	None	Volunteer Time	Private landowners	2030	**Medium**
	Provide education and monitoring of Ash Trees and Emerald Ash Borer damage.	None	Volunteer Time	Private landowners	2030	**Medium**
Infectious Disease Outbreak (Pandemic)	Support training of the Town Health Officer to help mitigate the effects of a pandemic	$500	Town operating Budget	Town Health Officer	2026-2031	**Medium**
Hail Storm	Provide hail-safety education materials on the town and ACRPC website	None to Town	Volunteer Time, ACRPC annual fee	ACRPC	2026-2031, Ongoing	**Low**

Hazard	Suggested mitigation action(s) for this hazard?	Estimated Cost	Source of Funds	Responsible Entity	Time-frame	Priority
Wildfire	Aggressively require outdoor burn permits prior to any outdoor burning and consider fines for violation.	Annual stipend	Town operating Budget	Town Fire Warden	2026-2031, Ongoing	**High**
	Maintain dry hydrants throughout town.	$1000-$5000	Rural Fire Protection Grant Program	Orwell FD	2026-2031, Ongoing	**Medium**
	Update and maintain wildland fire PPE and tools	None to Town	State Grant funds, Volunteer time	Orwell FD	by 2029	**Medium**
	Acquire utility technical vehicle (i.e. Gator UTV) for use as agile rapid-response vehicle	$20,000	Fundraising, grants	Orwell FD	by 2031	**Medium**
	Support ongoing wildland fire training efforts of the Orwell Volunteer Fire Department	None to Town	Volunteer Time	Select Board, EMD	2026-2031, Ongoing	**High**
Severe Cold	Work with school district to maintain Town Hall as emergency heating shelter with generator	$10,000	State grants	Select Board	by 2030	**Medium**
	Encourage residents to sign up for the CARE registry and set up a process to check on vulnerable populations during severe cold events	None to Town	Volunteer Time	Emergency Management Director	2026-2031, Ongoing	**High**
	Develop and implement a Warming Shelter plan	None to Town	Volunteer Time	Em. Management Director	by 2030	**Medium**
Landslide/ Rockslide/ Shore Slide	Provide landslide-mitigation education materials on the Town website	None to Town	EMD Time	ACRPC	2026-2031, Ongoing	**Low**
	Maintain and enforce Shoreland Overlay District in zoning with minimum development distance from Lake Champlain, East Creek, and Sunset Lake shorelines to avoid erosion and slumping	None to Town	N/A	Zoning Administrator	2026-2031, Ongoing	**Medium**

Hazard	Suggested mitigation action(s) for this hazard?	Estimated Cost	Source of Funds	Responsible Entity	Time-frame	Priority
Insect-borne Illness	Provide mosquito-safety educational materials on the use of appropriate repellants and behavior patterns to reduce bites	None to Town	EMD Time	Em. Management Director	2026-2031, Ongoing	**Medium**
	Encourage reporting of potential cases of insect-borne illness by residents	None to Town	EMD time	Em. Management Director	2026-2031, Ongoing	**Medium**
Tornado	Remove dead and dying trees from town rights of way as part of normal maintenance	$5,000	Town highway budget	Town road crew	2026-2031, Ongoing	**Medium**
	Provide tornado-safety education materials on the Town and ACRPC website	None to Town	EMD time	Em. Management Director	2026-2031, Ongoing	**Low**
Flash Flooding & Fluvial Erosion	fund attendance by the Zoning Administrator at NFIP trainings when offered locally	$300	Town operating Budget	Zoning Administrator	2026-2031	**Medium**
	Include additional flood resiliency language in the next rewrite of the Town Plan	None	N/A	Planning Commission	by 2031	**Medium**
	Evaluate the adoption of more stringent river corridor regulations in next zoning update.	None to Town	Volunteer Time	Planning Commission	2026-2029	**Medium**
	Stone Line ditches when work is being completed on any road.	Varies dependent on project	Town highway budget	Joint Town Highway Dept and Selectboard	2026-2031, Ongoing	**High**
	Specific road projects to mitigate the effects of flooding and/or flash flooding in the road network system:					
	• Improve drainage along Singing Cedars Rd.	~$20,000	Town highway budget	Joint Town Highway Dept and Selectboard	by 2031	**Medium**

5.5 Mitigation activities undertaken since 2017 plan adoption

Hazard	Action Description	Project Status
Winter Storm/Ice Storm	install an appropriately sized generator and connections to town office (to improve the ability of the town offices to remain open during an extended power outage)	Not completed, still needed
	improve the wiring connection to the school to allow full use of the building during power outages.	Not completed- School now owned by Slate Valley School District
	purchase a "V" plow for their loader to increase the capacity of that vehicle to plow heavy snow as a preparedness action.	No longer needed
	support ongoing efforts by power companies to mitigate power outages due to ice storms by pruning and tree removal activities.	In Progress-Ongoing
High Winds	support ongoing efforts by power companies to mitigate power outages due to high winds by pruning and tree removal activities by allowing such use along town rights of way.	In Progress-Ongoing
	support limiting damages due to high winds by removing dead and dying trees within the town right-of-way that could fall during a high wind event.	In Progress-Ongoing
Hazardous Materials and Highway Transport Accidents	support Installation of additional signage along Rte. 22A (Blind Drive, No Passing Zone)	Still needed
	support Installation of additional parking controls along Rte. 22A in front of the "Gas-n-Go" to eliminate illegal parking.	Completed
	supports mitigation of the hazard in any future construction/reconstruction activities at the following high-risk locations on its highway system:	
	Intersection of Rte. 22A and Rte. #73 west of the village	In Progress-Ongoing
	Reduce speed along Rte. 22A and add signage at dangerous locations	In Progress-Ongoing
Structure Fire	support efforts by the fire department to install dry hydrants throughout town. (5 hydrants have been installed since 2012. Project is ongoing.)	In Progress-Ongoing
	support installation of a dry hydrant off Sunset Lake Rd.	Completed
	support development of a fire pond and associated dry hydrant near the Thomas residence on Rte. 73	Not completed, found to be too expensive
	support installation of a sprinkler system into both the Town Hall and elementary school.	In Progress-Ongoing

Hazard	Action Description	Project Status
Drought	support recent changes to state rules which require a potable water supply and septic plans in place prior to granting a subdivision and supports groundwater protection efforts around both public and private water supplies.	No longer needed
	support negotiating with Tri-Town water district to evaluate the possibility of sharing water systems.	No longer needed
Widespread Power Failure	balance town support for GMP efforts with resident's desires to keep the beauty of tree-lined rural roads.	In Progress-Ongoing
Flood/Flash Flood	Support enrollment in the NFIP to allow residents the option of purchasing flood insurance on their properties. In supporting this enrollment, the Town passed interim zoning to amend its flood bylaws to meet basic NFIP requirements. Permanent adoption is still needed.	Adopted-implementation Ongoing
	The following specific road projects have been identified which will serve to mitigate the effects of flooding and/or flash flooding in the road network system:	
	• Remove ledge to allow larger ditch capacity on:	
	o Needham Hill Road	Completed
	o Royce Hill Road	Completed
	• Upgrade Ditching to new standards including installation of a fabric base and lining with stone rip-rap on:	
	o Sunset Lake Road	Completed
	o Old Sawmill Road	Completed
	• Gravel Removal under bridge B3	No longer needed
	• Beaver relocation along Fisher Road	Completed
	• Elevate Murray Road	Completed
	• Ongoing upgrade of culverts and improvement of ditches throughout town to meet current standards.	In Progress-Ongoing
	• Improve drainage along Singing Cedars Rd. by removing ledge and relocating culvert	Still needed
Landslide/Erosion Hazard	supports actions taken by individual landowners to protect their properties from landslide/erosion property losses. The Town's support is limited to projects which comply with all state and federal permit requirements and that do not put other properties at risk due to the action.	In Progress-Ongoing
Lightning	the risk to private residences of lightning strike should be borne by each resident on their own.	In Progress-Ongoing
	Evaluate installation of lightning rods on Town Hall, Town Office, Fire Station and School	Completed

Hazard	Action Description	Project Status
Wildfire	support the fire warden system requiring outdoor burn permits prior to any outdoor burning.	In Progress-Ongoing
	Town believes it is the homeowner's responsibility to mitigate their own susceptibility to wildfire through "firewise" practices.	In Progress-Ongoing
	Adopt fire ordinance to allow FD to charge for calls w/o burn permit	No longer needed
Earthquake	responsibility of private homeowners to be ready for earthquakes. The town generally believes that building construction standards are the responsibility of each private homeowner.	In Progress-Ongoing
	Inspect school and other town-owned buildings for earthquake hazards	No longer needed
Dam Failure	leaving the protection of the public up to State dam safety inspectors.	In Progress-Ongoing

6. Plan Maintenance Procedures

Any Hazard Mitigation Plan is dynamic and should not be fixed. To ensure that the plan remains current and relevant, it is important that it be updated periodically. The plan will be integrated into other plans and updated at a minimum every five years.

6.1 Hazard Mitigation Plan Integration

Requirement 44 CFR § 201.6(d)(3) (Process of mitigation plan integration) Requirement 44 CFR § 201.6(c)(4)(ii)) (Integration process and planning mechanisms)

The municipality will integrate the goals and actions of this hazard mitigation plan into all other municipal planning mechanisms, including the annual Local Emergency Management Plan, annual municipal budget, and Orwell Municipal Plan (re-adoption due in 2032). The Emergency Management Director and Emergency Management Coordinator will be responsible for integrating the goals, information and strategy of the mitigation plan into other planning mechanisms

6.2 Hazard Mitigation Plan Review/Update Process

1. The Orwell Selectboard assembles a Review/Update Committee to include government officials and interested public.
2. The Committee will discuss the process to determine if any modifications or additions are needed due to changing conditions since the last update occurred. Data needs will be reviewed, data sources identified and responsibility for collecting/updating information will be assigned to members.
3. Other Town plans (Emergency Management Plan, Town Plan, Road Plan, etc.) will be reviewed to ensure a common mitigation thread still exists throughout.
4. A draft update will be prepared based on these evaluation criteria:
    - Changes in community and government processes, which are hazard-related and have occurred since the last review.
    - Progress in implementation of plan initiatives and projects.
    - Effectiveness of previously implemented initiatives and projects.
    - Evaluation of unanticipated challenges or opportunities that may have occurred between the date of adoption and the date of the report.
    - Evaluation of hazard-related public policies, initiatives and projects.
    - Review and discussion of the effectiveness of public and private sector coordination and cooperation.
5. The public will be invited to review and give input on drafts as they are produced.
6. Selectboard members will have an opportunity to review the draft update. Consensus will be reached on any changes to the draft.
7. The Selectboard will notify and schedule a public meeting to ensure adequate public input.
8. The Selectboard will recommend incorporation of community comments into the draft update.

Requirement 44 CFR § 201.6(c)(4)(i)
(Monitoring, Evaluating, and Updating)

6.3 Mitigation Project Status Monitoring and Evaluation

The town of Orwell has outlined a process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy. The plan will be reviewed and updated in its entirety at least every five years as described in Section 6.2 above, the Town will monitor and evaluate its hazard mitigation goals, strategies and actions/projects annually as the town budget is created. A town budget is created by the Selectboard of a town in publicly noticed meetings utilizing budget requests from town committees and the citizenry. This will ensure that progress will be reviewed and actions/projects either added or removed from the towns work plan based on changing local needs and priorities. In creation of the municipal plan by the planning commission, concepts, goals and strategies from this plan will be used to inform the development of that plan and will be incorporated into that plan when appropriate. The progress/status of the mitigation actions identified within the mitigation strategy will be tracked by the Selectboard and Emergency Management Coordinator, who will be responsible for this process and bring mitigation actions to other planning processes. The plan will be evaluated for effectiveness annually and post-disasters (see section 6.5).

Requirement 44 CFR § 201.6(c)(4)(iii)
(Future public participation)

6.4 Public Participation

This Hazard Mitigation Plan solicited and received public input, especially in developing the hazard risk and vulnerability assessment. The municipality will continue to encourage future public participation in mitigation actions after the plan has been approved. Notice of the plan will be made and a copy of the plan along with contact information will be made available on the town website and at the Town Office. While the public are encouraged to read and comment on the plan, the committee understands that the length of the plan following all FEMA requirements is unwieldy and time-consuming for review, and has therefore provided a concise executive summary to provide the main Vulnerabilities, Goals and Mitigation actions The Emergency Management Director and Emergency Management Coordinator will provide a status report on mitigation action progress at the annual Town Meeting and provide information on potential weather-hazards via local networks including Front Porch Forum. Public comments and suggestions will be recorded and incorporated into the upcoming hazard mitigation plan.

6.5 Post-Disaster Review Procedures

Should a declared disaster occur, a special evaluation process will occur in accordance with the following procedures:

1. Within six (6) months of a declared emergency event, the Town will initiate a post disaster review and assessment of actions.
2. This post disaster review and assessment will document the facts of the event and assess whether the existing Hazard Mitigation Plan effectively addressed the hazard.
3. A report of the review and assessment will be created by a Review/Update Committee.
4. The committee will make a determination whether the plan needs to be amended. If the committee determines that NO modification of the plan is needed, then the report is distributed.
5. If the committee determines that modification of the plan IS needed, then the committee drafts an amended plan based on its recommendations and forwards to the Selectboard for their input.
6. Following completion of a public input process, further amendments may be made and a final plan delivered to the Selectboard for adoption.
7. The Selectboard adopts the amended plan.

7. Plan Adoption Resolution

Requirement 44 CFR § 201.6(c)(5)
(Documentation of adoption)

TOWN OF ORWELL, VERMONT SELECTBOARD ADOPTION RESOLUTION

WHEREAS, the Town of Orwell has occasionally experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **Town of TOWN, Vermont Single Jurisdiction All-Hazards Mitigation Plan (Plan)**, which can result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of TOWN has developed the **Plan** and received conditional approval from the Federal Emergency Management Agency (FEMA); and

WHEREAS, the **Plan** identifies specific hazard mitigation strategies, and plan maintenance procedures applicable to the Town of Orwell; and

WHEREAS, the **Plan** identifies actions and/or projects intended to provide mitigation for specific natural hazards that impact the Town of Orwell; and

WHEREAS, adoption of this **Plan** will make the Town of Orwell eligible for additional funding to help alleviate the impacts of future hazards;

Now, therefore, be it RESOLVED by Town of Orwell Selectboard:

1. The **Town of Orwell, Vermont Single Jurisdiction All-Hazards Mitigation Plan** is hereby adopted as an official plan of the Town of Orwell, Vermont. While content related to Orwell may require revisions to meet the plan approval requirements, changes occurring after adoption will not require Orwell to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions;

2. The respective Town officers identified in the action plan are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Support agencies within the Town of Orwell are also requested to implement actions assigned to them within this plan;

4. Plan maintenance procedures described in Section 6 of this plan are also adopted as part of this resolution.

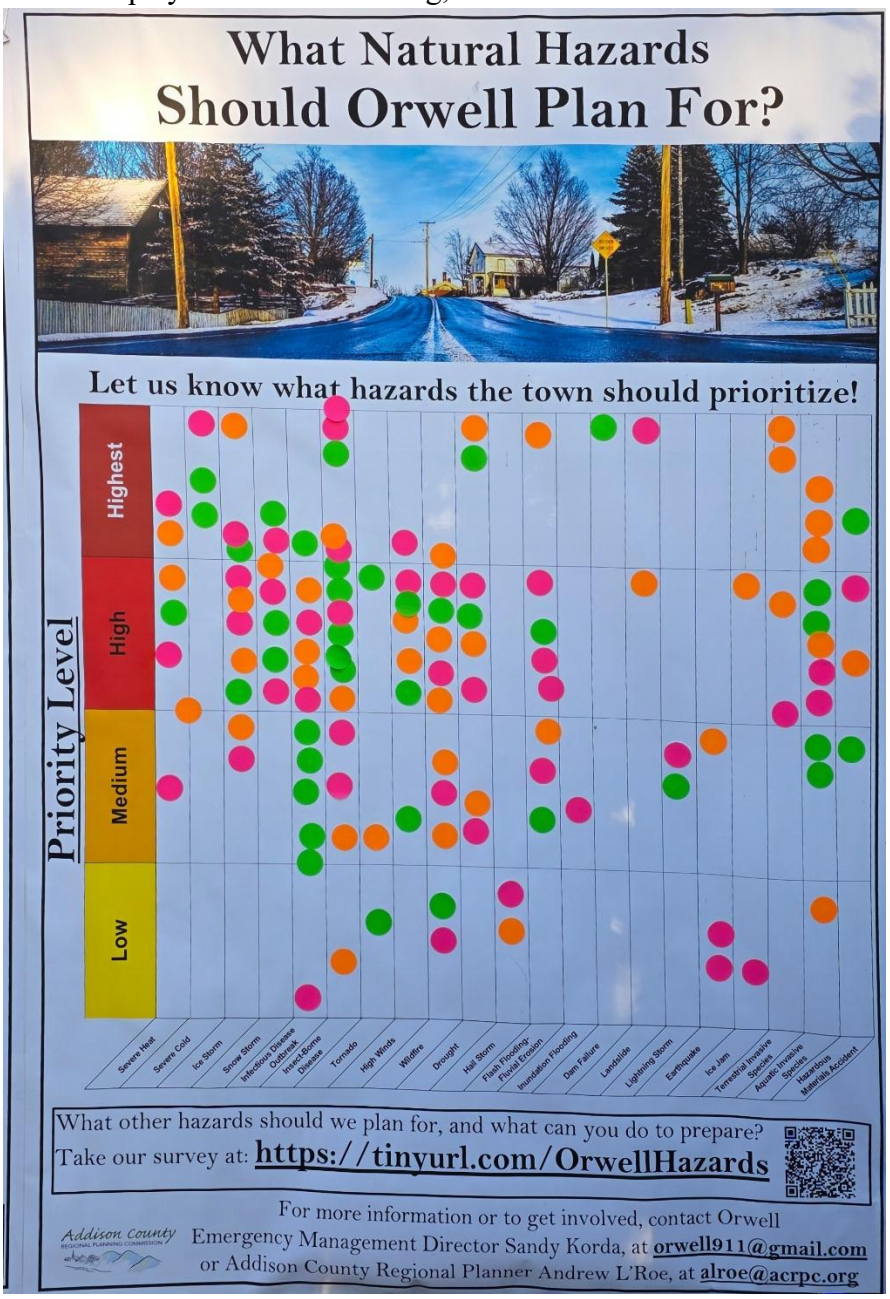
IN WITNESS WHEREOF, the undersigned have affixed their signatures for the Town of Orwell, this ____ day of _____ 202__.

_____	_____	_____
Selectboard Chair	Selectboard Member	Selectboard Member

ATTEST:_____

Appendix 1. Public Outreach

Poster displayed at Town Meeting, March 2025

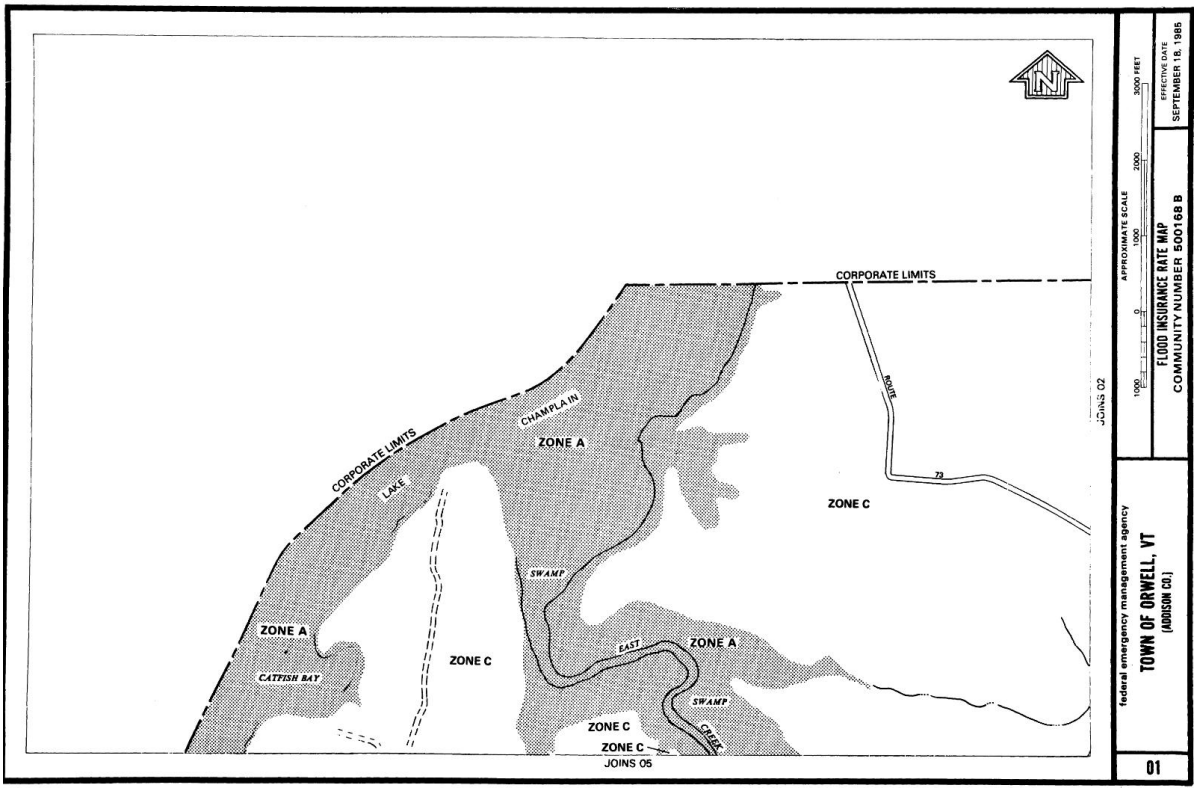


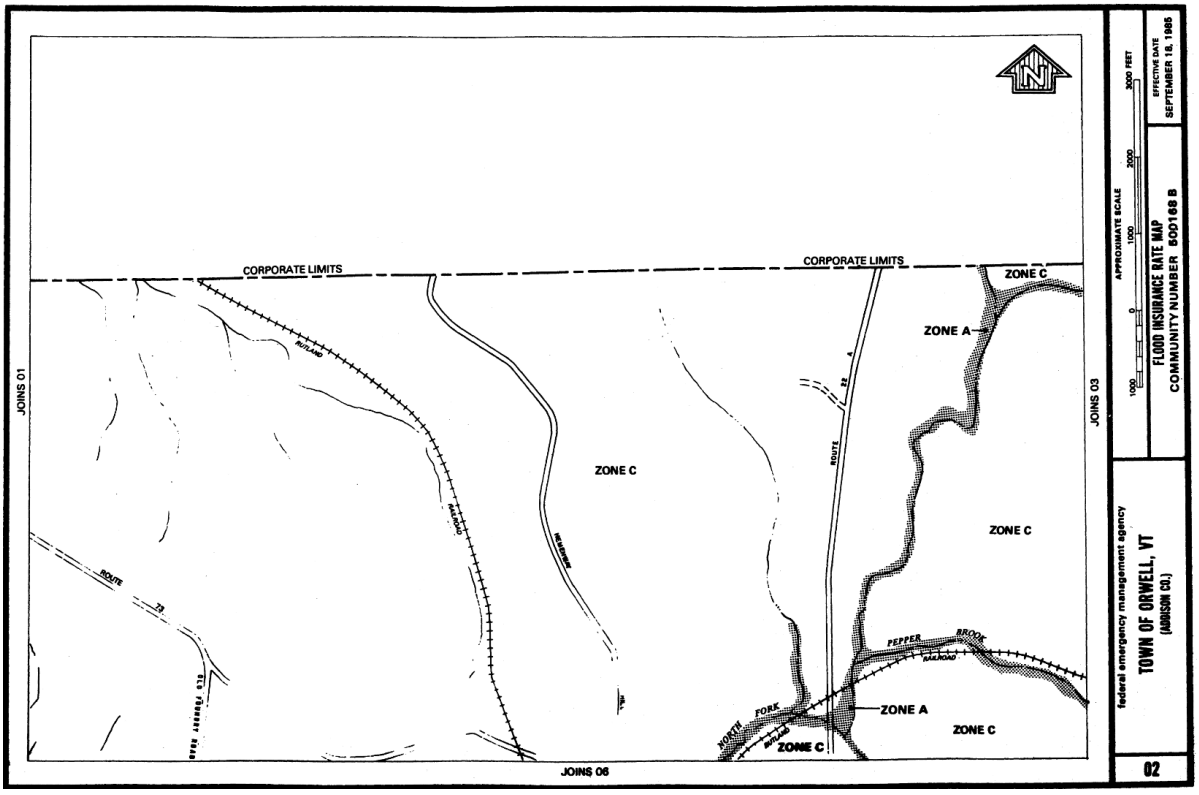
Online Survey Responses

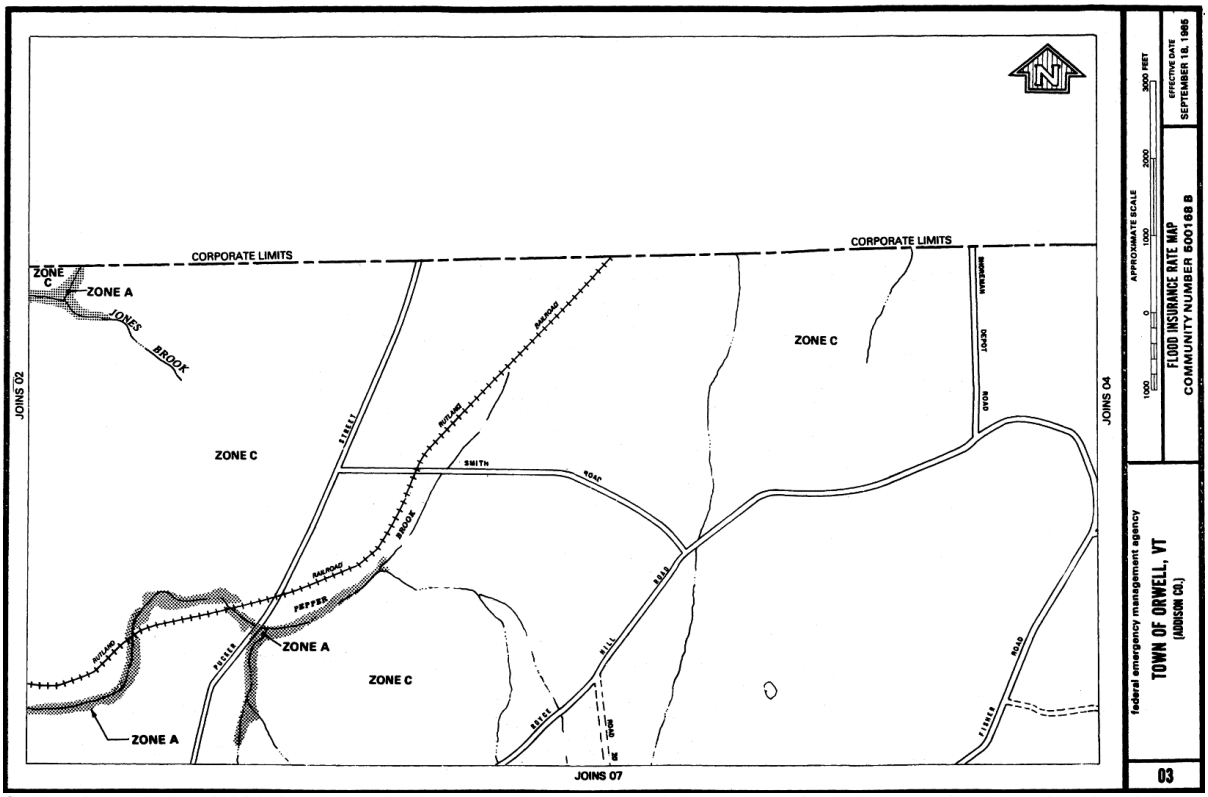
The online survey received 16 responses from Orwell residents. The survey and poster responses were tallied for the following hazard priority rankings (on 1-5 scale, where 5 = Most Concerned, 1= Least Concerned).

Hazard	Avg Rank	"Most Concern" Count
Extreme Cold	5.0	3
Dam Failure	5.0	1
Invasive Species- Terrestrial	4.5	2
Landslide	4.5	1
Snow Storm	4.4	2
Ice Storm	4.1	3
Extreme Heat	4.1	2
Drought	4.0	2
Hazardous Materials Spill/Release	4.0	1
Windstorm-High Winds	4.0	1
Insect-borne Disease	3.9	5
Invasive Species- Aquatic	3.8	3
Flash Flooding/Erosion	3.8	1
Infectious Disease	3.6	1
Wildfire	3.3	1
Inundation Flooding	3.0	0
Lightning Strike	3.0	0
Tornado	2.7	0
Ice Jam	2.5	0
Earthquake	1.7	0
Hail Storm	1.0	0

Appendix 2. FEMA Flood Insurance Rate Map
Number 500168B, effective 9/18/1985
(Available at https://msc.fema.gov/portal/search?AddressQuery=ORWELL%20VT)



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TOWN OF ORWELL, VT
(ADDISON CO.)
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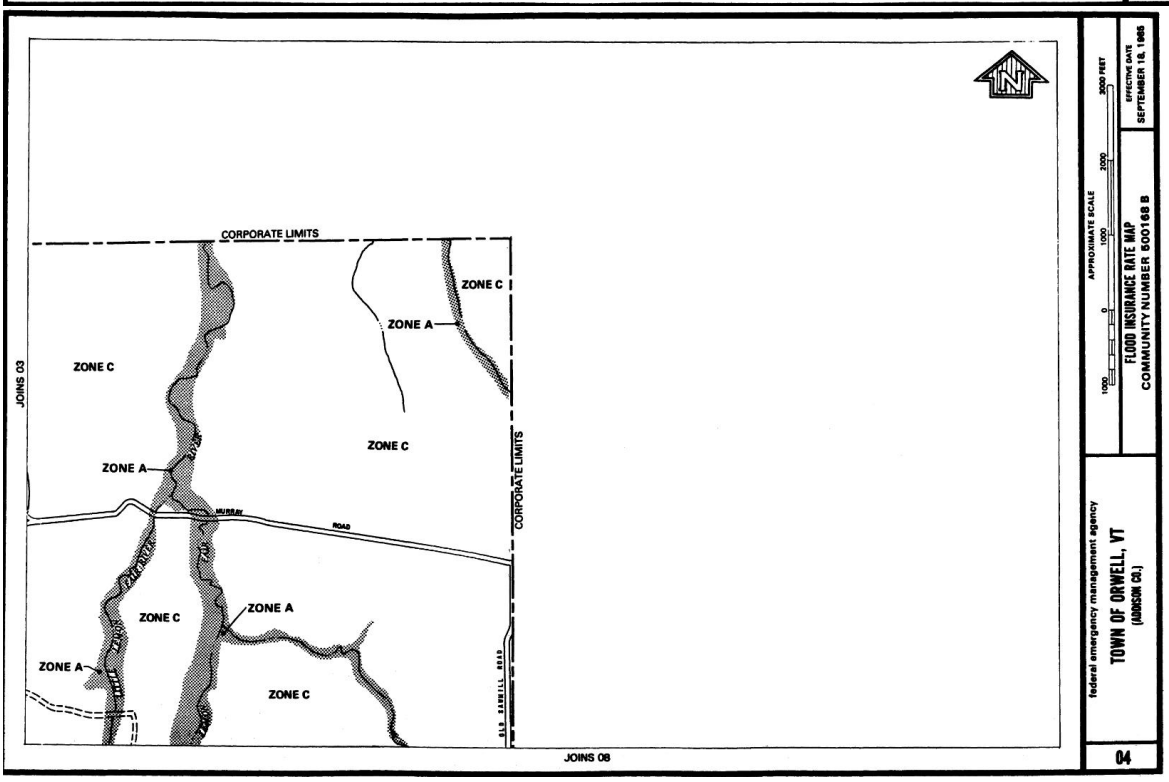
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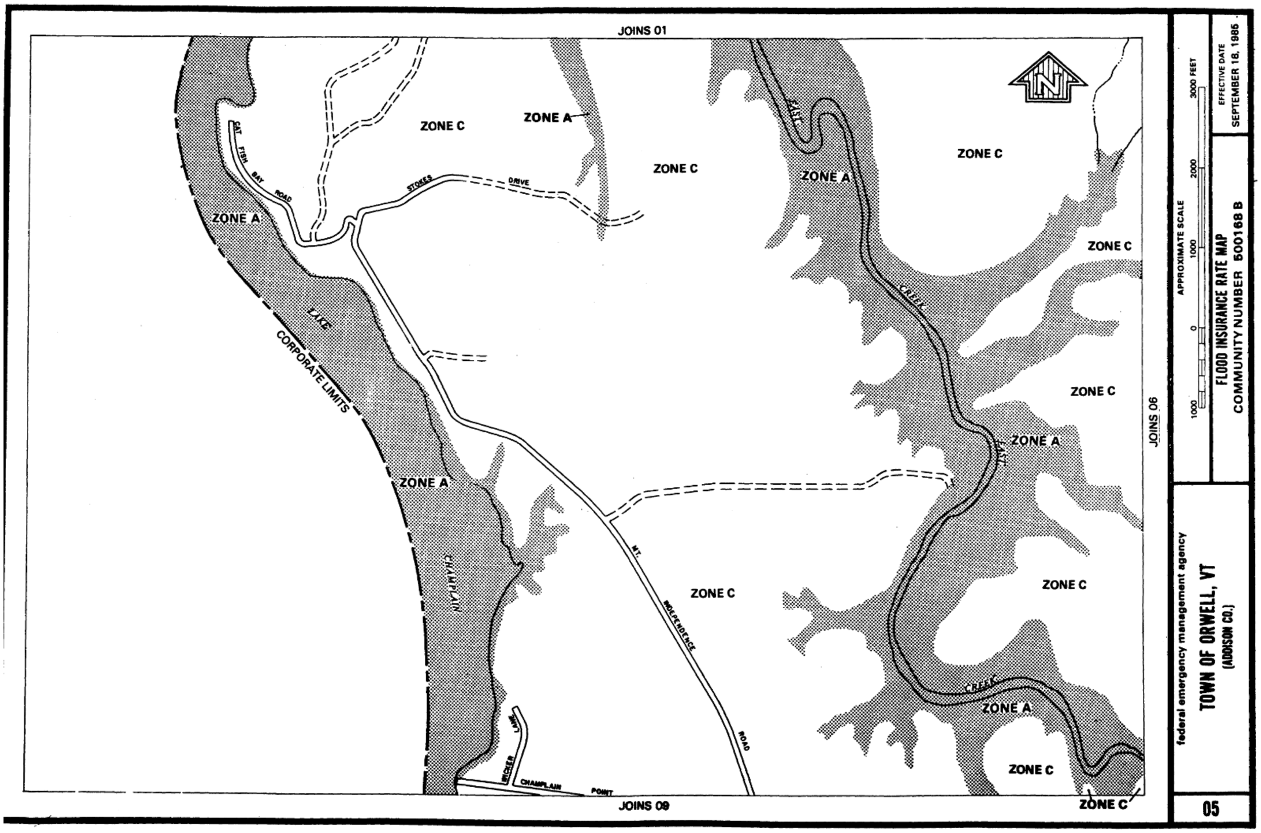
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MT. INDEPENDENCE ROAD
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CREEK
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JOINS 06
federal emergency management agency
TOWN OF ORWELL, VT
(ADDISON CO.)
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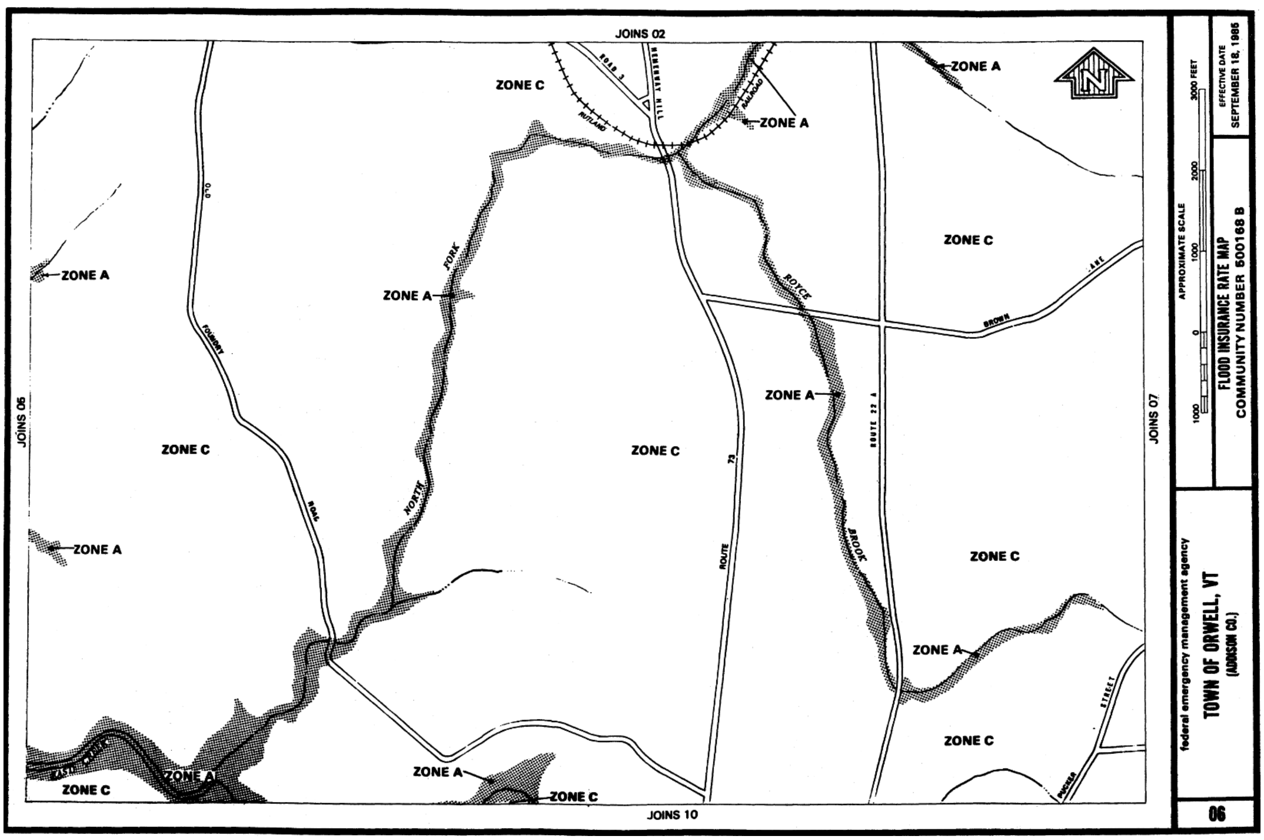
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ZONE A
ZONE C
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JOINS 07
JOINS 10
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TOWN OF ORWELL, VT
(ADDISON CO.)
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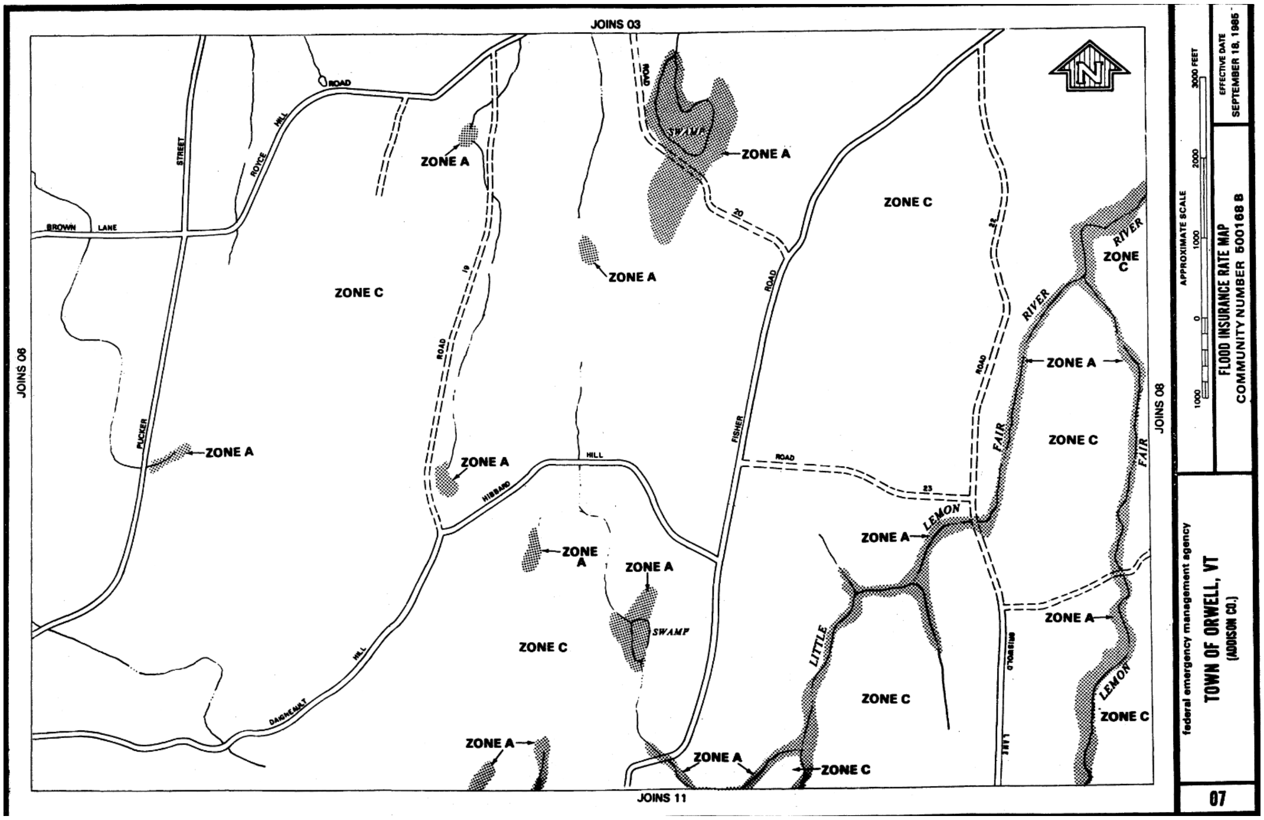
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DAIGNEAULT HILL
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federal emergency management agency
TOWN OF ORWELL, VT
(ADDISON CO.)
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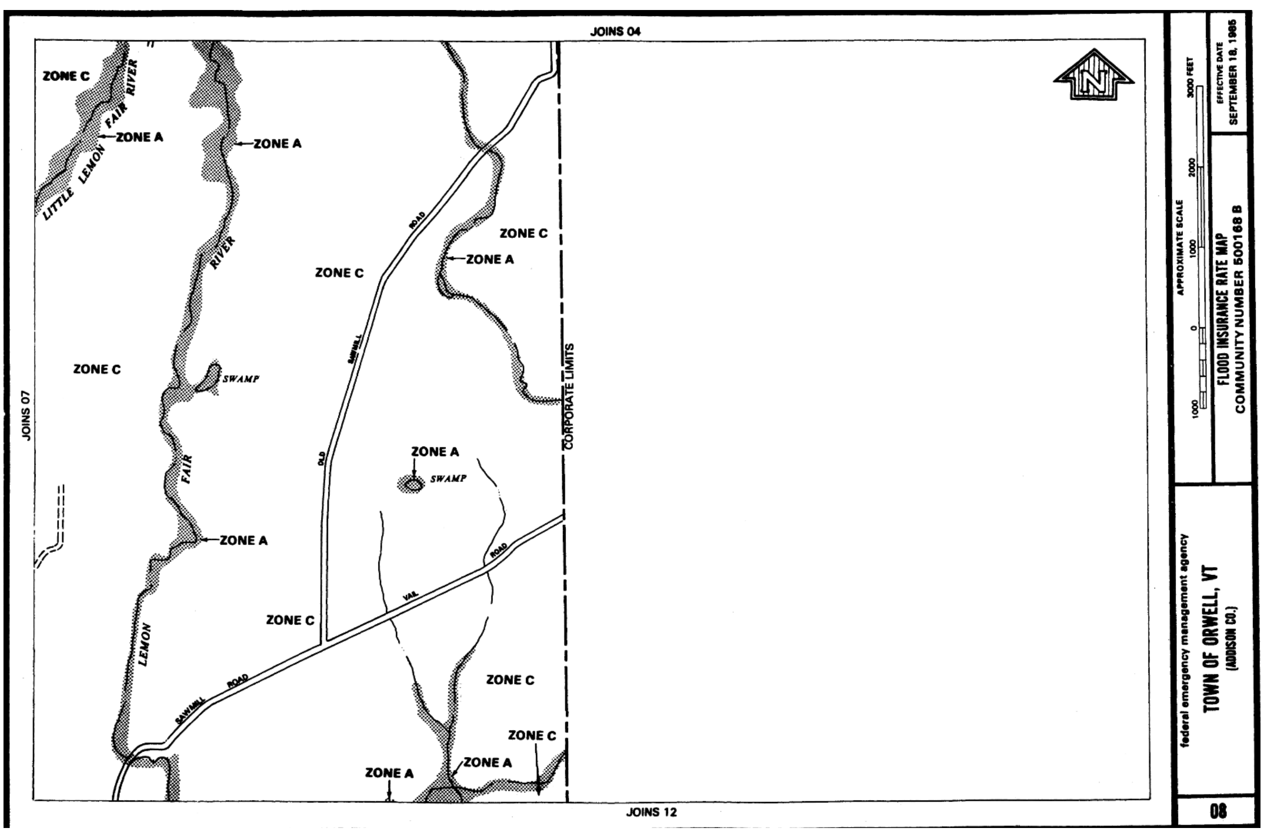
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SAWMILL ROAD
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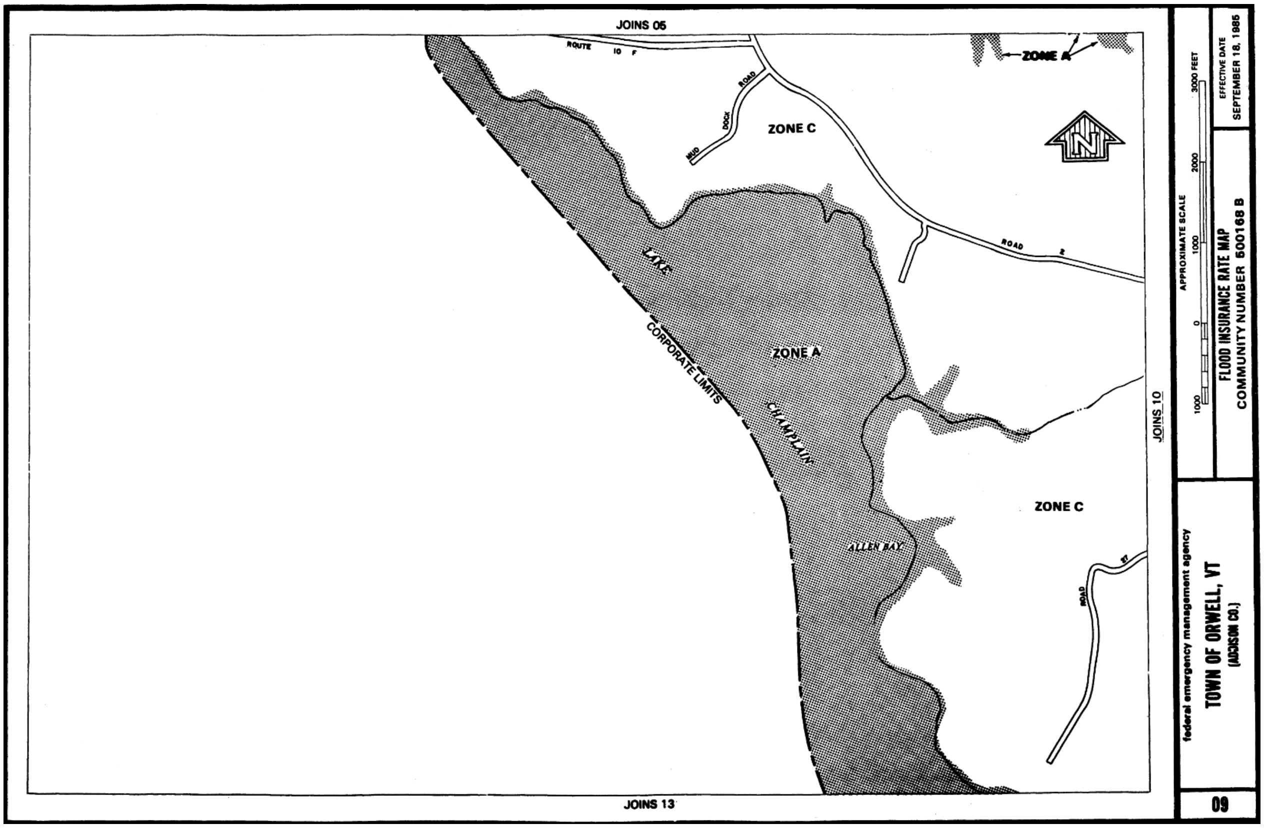
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(ADDISON CO.)
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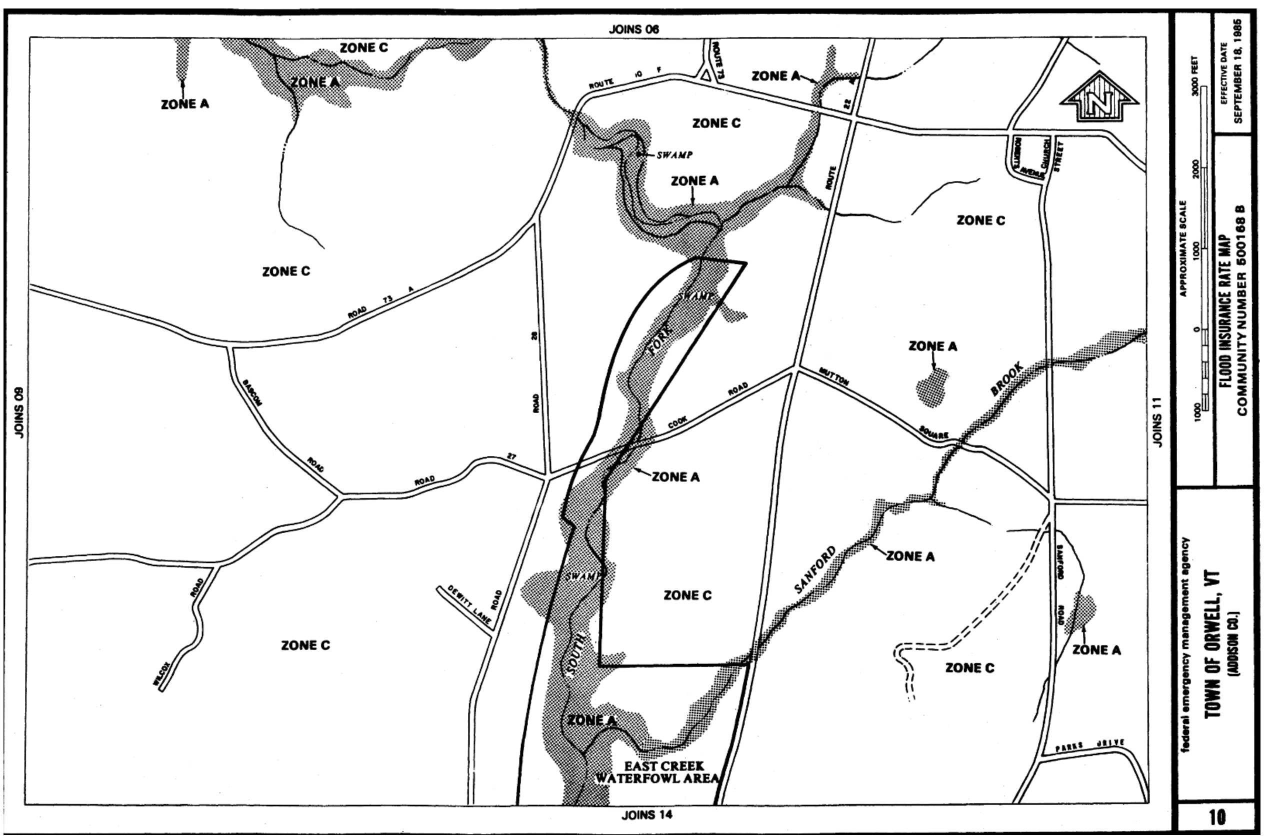
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COOK ROAD
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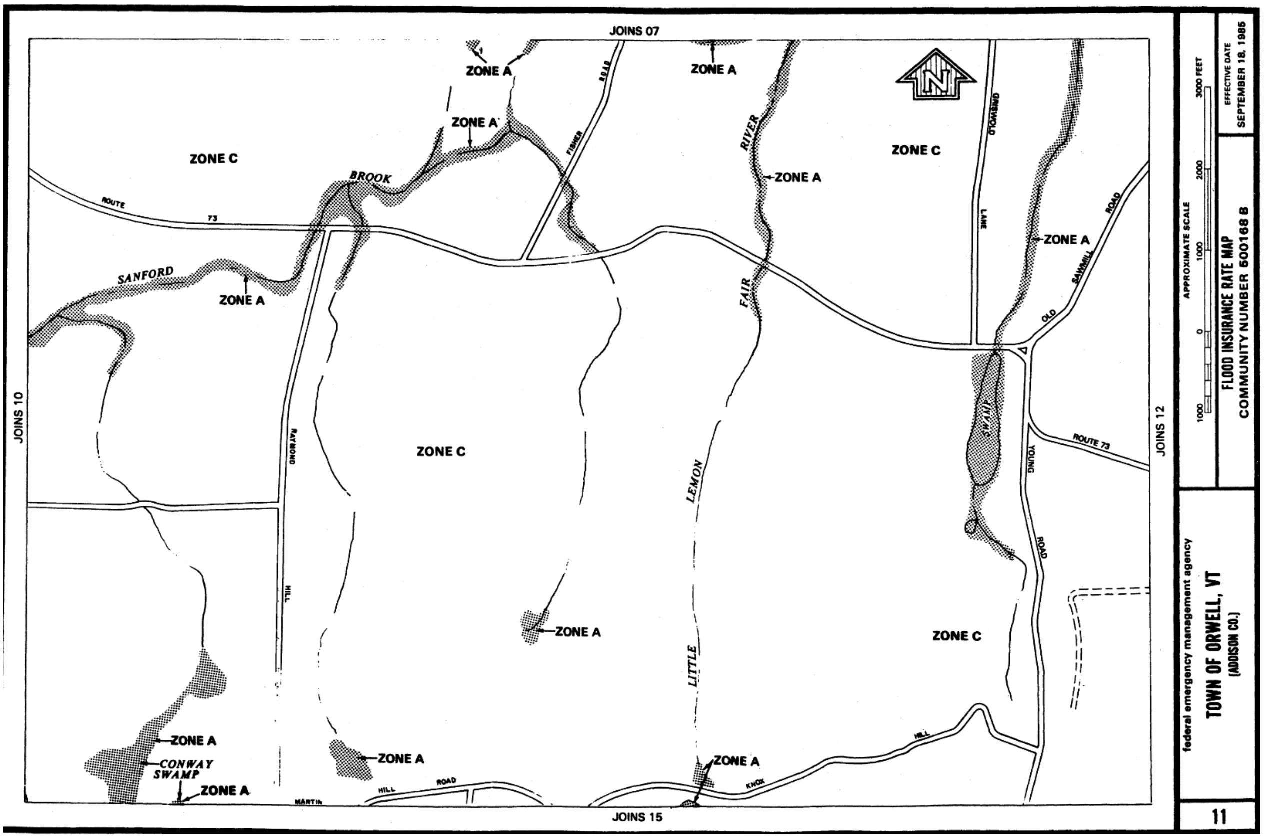
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TOWN OF ORWELL, VT
(ADDISON CO.)
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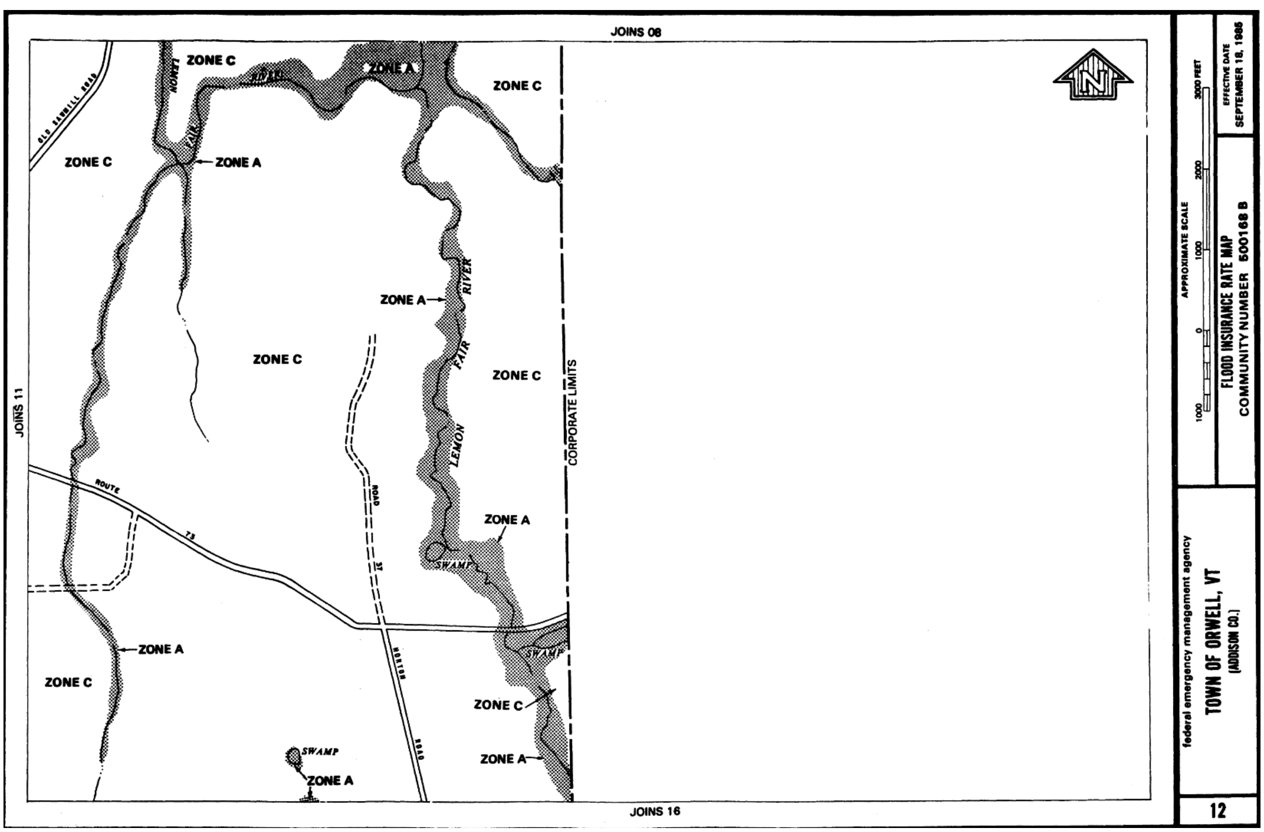
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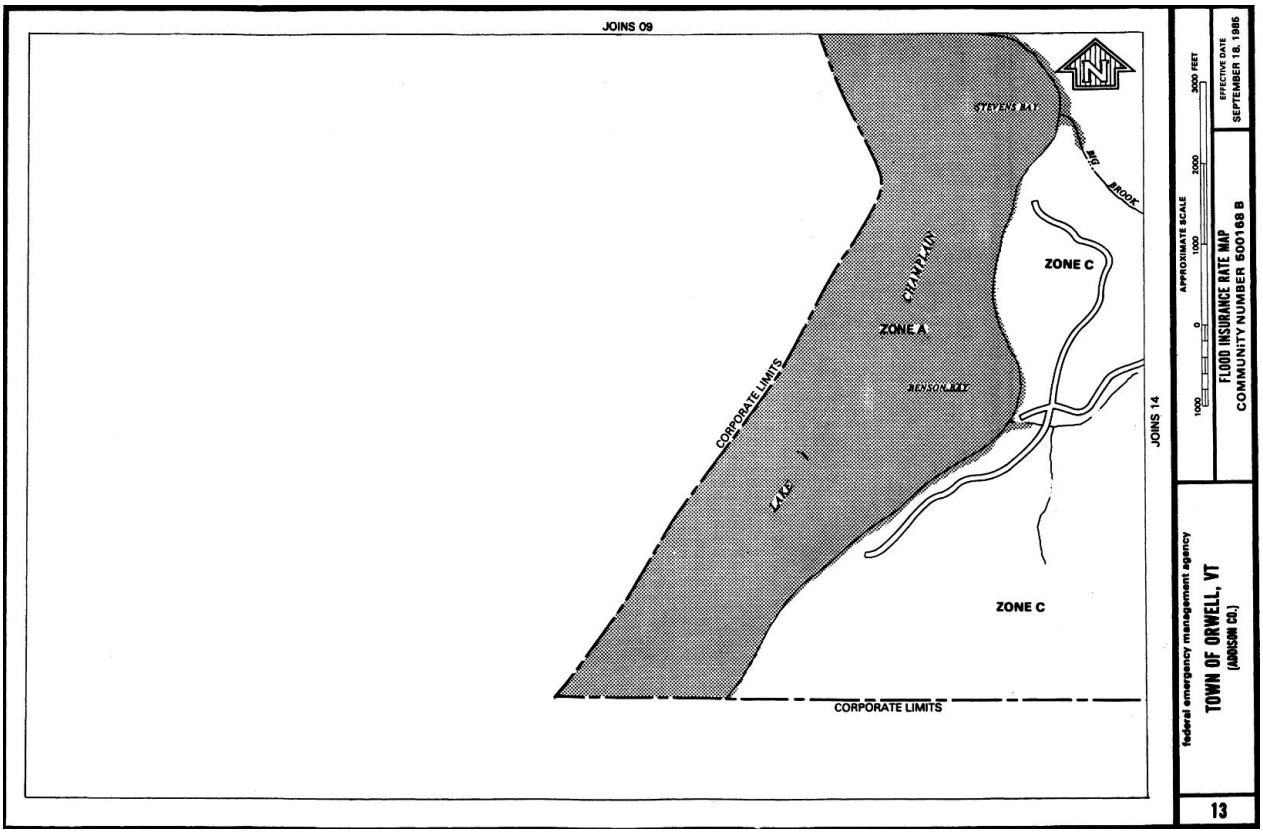
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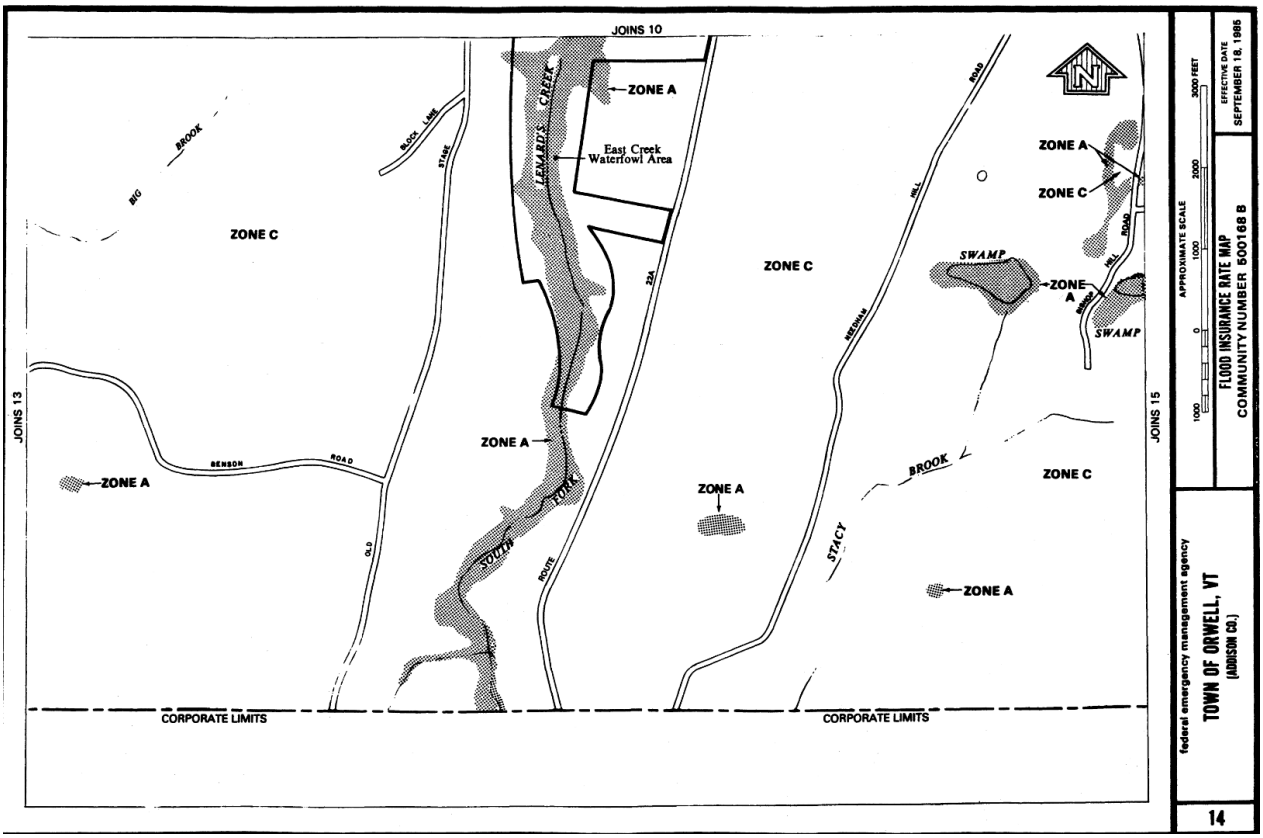
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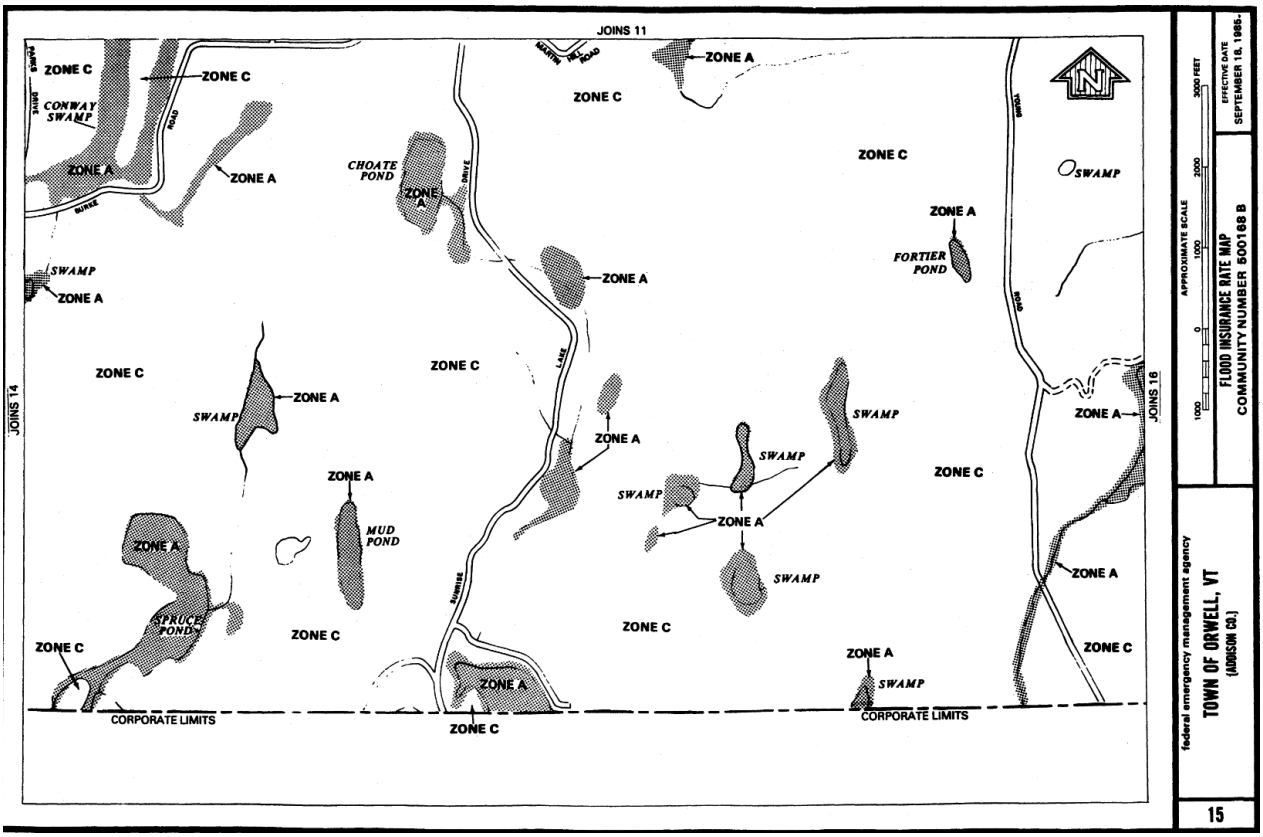
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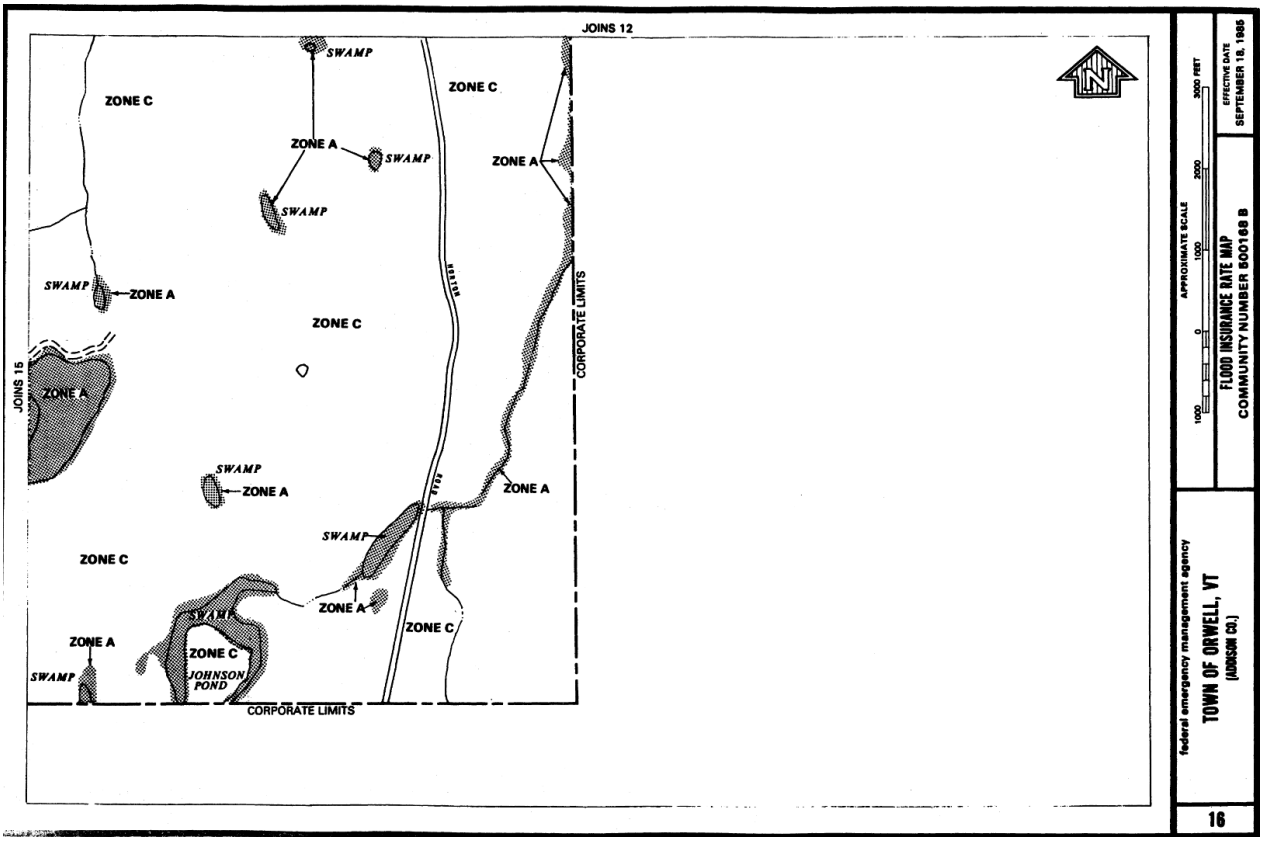
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SWAMP
JOHNSON POND
CORPORATE LIMITS
APPROXIMATE SCALE
1000 0 2000 3000 FEET
EFFECTIVE DATE SEPTEMBER 16, 1985
FLOOD INSURANCE RATE MAP
COMMUNITY NUMBER 500188 B
federal emergency management agency
TOWN OF ORWELL, VT
(ADDISON CO.)
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Appendix 3. Flood Hazard language in Orwell 2019 Land Use Regulations

Section 2.9 Flood Hazard Overlay District (FHO)

(A) **Purpose**. The purpose of the Flood Hazard Overlay District is to promote public health, safety and welfare by preventing or minimizing hazards to life or property due to flooding. It is the intent of the Town of Orwell to limit future development and prohibit the construction of new dwellings within identified flood hazard areas. It is also the town's intent to meet the requirements of state and federal law in order to ensure that private property owners are eligible for flood insurance through the National Flood Insurance Program. This overlay district includes areas identified as being within the 100-year floodplain on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), dated November 1, 1985 and as amended.

(B) **Permitted Uses**	(C) **Conditional Uses**
(1) Accessory apartment*	(1) Accessory use
(2) Agriculture	(2) Community infrastructure
(3) Childcare home*	(3) Outdoor recreation
(4) Forestry	(4) Seasonal dwelling *(a pre-existing seasonal dwelling may continue in use or be converted to a year-round single-family dwelling)*
(5) Group home*	
(6) Home occupation*	
(7) Wildlife refuge	(5) Single-family dwelling *(a pre-existing year-round single-family dwelling may continue in use or be converted to a seasonal dwelling)*

** Only within pre-existing residences*

(D) **Dimensional Standards.** As set forth in the underlying district.

(E) **Flood Hazard Standards**

(1) No dwellings can be built within the Flood Hazard Overlay District.

(2) All other development within the Flood Hazard Overlay District is prohibited unless a registered professional engineer certifies that the proposed development will not result in any increase in flood levels during a 100-year flood.

(3) All development must be designed to minimize flood damage to the proposed development and to community infrastructure.

(4) All development must be designed to provide adequate drainage to reduce exposure to flood hazards.

(5) Permitted accessory uses (accessory apartment, childcare home, group home and home occupation) will only be allowed within dwellings constructed as of the effective date of these regulations.

(6) Existing seasonal dwellings may be converted to year-round use subject to conditional use approval and the standards of these regulations.

(7) Structures to be built or substantially improved within the Flood Hazard Overlay District must be certified by a registered professional engineer that they:

(i) Are designed and adequately anchored to prevent flotation, collapse or lateral movement of the structure during the occurrence of the 100-year flood.

(ii) Are constructed with materials resistant to flood damage.

(iii) Are constructed by methods and practices that minimize flood damage.

(iv) Are constructed with electrical, heating, ventilation, plumbing, air conditioning and other service facilities that are designed and located so as to prevent water from entering or accumulating within the components during conditions of flooding.

(v) Have water supply and wastewater systems that are designed to minimize or eliminate the infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

(vi) Have their lowest floor, including the basement, at or above the 100-year flood elevation.

(F) Flood Hazard Administration

(1) The Zoning Administrator will measure the boundaries of this overlay district by scaling distances on the Official Zoning Map or the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, if more recently amended. All decisions of the Zoning Administrator may be appealed by following the procedures outlined in Section 3.5.

(2) The Zoning Administrator cannot issue any permits for development within the Flood Hazard Overlay District until:

(i) A copy of the application is mailed or delivered by the Zoning Administrator to the Agency of Natural Resources; and

(ii) Either 30 days elapse following the mailing, or the agency responds with comments on the application.

(3) The Zoning Administrator will submit an annual report with respect to the administration and enforcement of the town's flood hazard area regulations to Federal Emergency Management Agency and the Vermont Agency of Natural Resources.

(4) Where a use is permitted in the underlying zoning district, but conditional in the Flood Hazard Overlay, the DRB will use only the standards in Subsection (E) above and any applicable requirements of the underlying district when reviewing applications for conditional use approval.

(5) Requests for variances within the Flood Hazard Overlay District will be reviewed under Section 3.7, including but not limited to the criteria specific to variances within designated flood hazard areas.

Appendix 4. Wind Scales

Saffir-Simpson Hurricane Wind Scale				
Tropical Depression		≤38 mph, ≤33 knots, ≤62 km/h	**Tropical Storm**	39–73 mph, 34–63 knots, 63–118 km/h
Category	**Wind Speed**	**Types of Damages Due to Hurricane Winds**		
1	74-95 mph 64-82 kt 119-153 km/h	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding, and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.		
2	96-110 mph 83-95 kt 154-177 km/h	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.		
3 (Major)	111-129 mph 96-112 kt 178-208 km/h	Devastating damage will occur: Well-built frame homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.		
4 (Major)	130-156 mph 113-136 kt 209-251 km/h	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.		
5 (Major)	≥ 157 mph ≥ 137 kt ≥ 252 km/h	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.		

Source: https://www.nhc.noaa.gov/aboutsshws.php

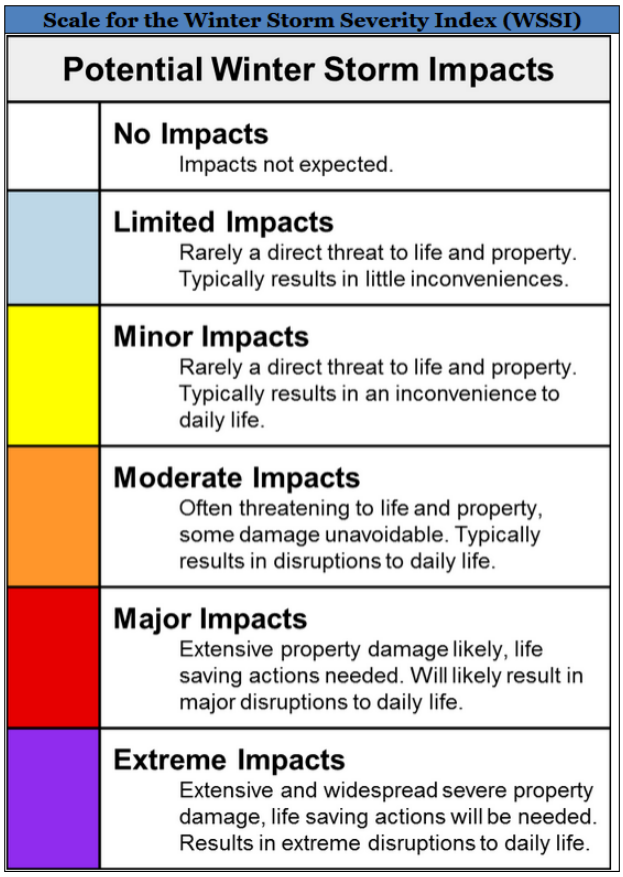
Enhanced Fujita Scale			
Scale	**Wind Speed**		**Types of Damages Due to Hurricane Winds**
	mph	km/h	
EF0	65-85	105-137	*Minor or no damage.* Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	138-177	*Moderate damage.* Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	178-217	*Considerable damage.* Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	218-266	*Severe damage.* Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations are badly damaged.
EF4	166-200	267-322	*Devastating damage.* Well-constructed and whole frame houses completely leveled; cars and other large objects thrown and small missiles generated.
EF5	>200	>322	*Extreme damage.* Strong-framed, well-built houses leveled off foundations are swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; some cars, trucks, and train cars can be thrown approximately 1 mile (1.6 km).

Source: http://www.spc.noaa.gov/efscale/ef-scale.html

Appendix 5. Winter Storm Severity Index

The WSSI is broken down into six components that are individually weighted based on the WSSI categories and then summarized into overall severity:

- **Snow Amount:** to depict severity due to total amount of snow or rate of snowfall accumulation. (Adjustments are made based on climatology and urban areas, e.g. 4" of snow in Atlanta is more severe than 4" in Minneapolis.)
- **Snow Load:** to depict severity due to total weight of snow on trees and power lines.
- **Blowing Snow:** to depict severity mainly to transportation due to blowing and drifting snow.
- **Ice Accumulation:** to depict severity of transportation and downed trees/powerlines due to the accumulated ice in combination with wind.
- **Ground Blizzard:** to depict severity to mainly transportation of ground blizzards that develop due to a pre-existing snowpack and strong winds.
- **Flash Freeze:** to depict severity primarily to transportation of situations where temperatures rapidly fall below freezing during precipitation.



Source: https://www.weather.gov/ict/WSSI_Overview