



21. Pathways for Adaptation and Building Resilience in Communities and the Built Environment

Resilience thinking in the built environment recognizes that our communities are deeply linked with their natural environments. Our response to a changing climate therefore must consider how climate change will disrupt communities and the businesses and individuals within them. We must identify strategies to adapt or transform, develop holistic land-use patterns, and ensure all Vermonters are supported through these transitions. By seeing our communities as connected to both people and nature instead of treating them as separate, standalone places, resilience thinking can work to address climate-related challenges while fostering sustainable local development through collaborative, participatory processes.

Vermont has experienced 25 federally declared major disasters due to extreme weather between 2011 and 2024. Every county has had five or more recent major disasters, and eight counties have had at least 11.⁽¹⁵⁶⁾ Ten disaster declarations have occurred since the *Initial Vermont Climate Action Plan* was adopted in December 2021.⁽¹⁵⁷⁾ In the last three years (2022–2024) Vermont has had four billion-dollar disasters.⁽¹⁵⁸⁾ While catastrophic flooding has been the primary disaster, Vermonters have also been subject to drought and extreme heat events—a less obvious but deadly health risk—and have

156 “Building Resilience in Rural Communities Speaker Series.” Rebuild by Design.

157 “Vermont Declared Disasters.” FEMA.

158 NOAA National Centers for Environmental Information (NCEI) [U.S. Billion-Dollar Weather and Climate Disasters: Vermont Summary](#) (2025).

experienced more frequent and severe impacts from landslides, wind, winter storms, and smoke from wildfires burning in other parts of the North American continent. These hazards have caused, in many cases, irreparable harm to individuals and families, entire neighborhoods, businesses, municipalities, and critical public infrastructure.

Proactive Flood Mitigation along the Lamoille River



In the wake of devastating floods in 2023 and 2024, communities like Wolcott are proactively preparing for future events. Its work to increase flood resilience aims to lower the height of floodwaters, have fewer people in harm's way, and reduce damage to critical public infrastructure. Wolcott exemplifies a watershed-scale approach, partnering with state agencies, regional groups, and non-profits.

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To successfully address the climate factors underlying these disasters, concerted efforts must take place at a global scale. This is currently not occurring at the pace necessary to limit these types of events in the near or medium term. And while mitigation measures have been taken to improve climate adaptation and resilience in Vermont, the underlying historical settlement patterns that put large numbers of people and civic, economic, cultural, and public infrastructure at risk have not changed to a meaningful degree. Understanding that this takes time, it is important to seek both immediate opportunities to reduce risk and long-term strategies to build infrastructure and landscape-level resilience.

Since the adoption of the Initial Plan in 2021, the following important steps have been taken toward building resilience in Vermont communities and the built environment:

- Formation of the Climate Action Office: The CAO has developed the [Municipal Climate Change Vulnerability Indicators Tool](#), begun development of the [Municipal Climate Toolkit](#) (to be completed by Fall 2025), and supports the [Resilience Implementation Strategy](#) in collaboration with the Office of the State Treasurer.
- Enactment of the [Flood Safety Act](#) (Act 121 of 2024): This will move regulation of development in high-hazard river corridors to the state, establish a net-gain wetlands policy, improve dam safety through consolidated oversight, dam owner maintenance

requirements, investment in strategic removal of dams, and study how flood hazard policy might be more effectively administered.

- Enactment of [Act 181](#) of 2024, an act relating to community resilience and biodiversity protection through land use: This overhauls Vermont’s planning framework for coordinating state, regional, and municipal land use. It will better enable the mapping of future growth areas that consider the evolution of historic compact settlements up and away from flood hazard risks, plan for new neighborhoods and growth centers, and protect large forest blocks to better protect headwaters and buffer runoff.
- Enactment of Act 59 of 2023, the [Community Resilience and Biodiversity Protection Act](#): The intent is to protect the ecological functions of our landscapes, with the ambitious goals of conserving 30% of Vermont’s landscape by 2030 and 50% by 2050. A [draft conservation inventory](#) is complete, and the development of a Comprehensive Conservation Plan will soon be underway to be presented to the Legislature in the summer of 2026.
- Enactment of Vermont’s HOME Act: This amends the Planning and Development statute, Act 250, and other laws to enable new opportunities for housing development within state, regional, and local planning and development regulations.
- Creation of the [Flood Resilient Communities Fund](#): This prioritizes projects in communities and/or for homeowners with greatest economic need and projects that mitigate repetitive loss among low-income and marginalized portions of the population. The program was designed to fund voluntary buyouts of flood-vulnerable properties that typically would not qualify for federal funding. All available funding has been obligated.
- Opening of a proceeding at the Public Utility Commission (Case No. 25-0339-PET) on grid resilience: This seeks to develop a common and robust framework for planning, valuing, and measuring grid resilience investments (e.g., line hardening, undergrounding energy storage, enhanced vegetation management, storm response, etc.).
- Issuance of an \$8 million funding opportunity for grid resilience: Funds were awarded to Vermont through the federal Infrastructure Investment and Jobs Act.
- Development of a Transportation Resilience Improvement Plan: This is prioritizing high-risk locations along state and local highway systems.

While progress is being made, we know there is much more to be done for the 61% of Vermonters living in rural areas. Rural resilience needs to be informed by the people experiencing the impacts.

“Until we start talking to communities about what they care about, we’re having the wrong conversation.”

KELLY PFLICKE

AICP Resiliency Specialist, FEMA Region II ⁽¹⁵⁹⁾

159 FEMA. [A Guide to Supporting Engagement and Resiliency in Rural Communities](#). July 2020.

Centering Community in Flood Emergency Management



Following devastating floods in 2023 and 2024, Hardwick has transformed its approach to emergency management to one led by the community in an effort to be better prepared for the next emergency. This approach views planning, emergency management, and recovery as a continuous cycle, where every solution centers on local knowledge and collaboration to strengthen future preparedness. It also acknowledges the interdependence of Vermont's towns and the power of regional, collaborative solutions.

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Vermonters have voiced the need to recognize the overlap between resilience in our built environment and our natural and working lands. Many stress the importance and need for more compact development that provides resilience through thoughtful planning and siting of infrastructure in community centers that are surrounded by—and where climate impacts are buffered by—natural and working lands. Others point out the importance of resilient businesses that contribute to the economic vitality of communities and the workforce and housing needed to support both. Communities, businesses and people need incentives, grants, and low-cost loan programs that offer financial and technical assistance to support planning and informed decision-making as well as implementation of existing plans (such as Local Hazard Mitigation Plans) to promote proactive solutions. There is a call to focus on strengthening what exists rather than creating something new and for funding to go to trusted entities that have existing and strong relationships with communities, businesses and individuals.

Resilience in the built environment comes through a focus on communities and infrastructure. It means supporting communities through increased capacity for proactive planning and implementation of solutions that consider adaptive land use as well as ensuring all people have access to safe, accessible, energy-efficient and affordable housing. It means proactively and strategically evaluating risks and vulnerabilities to infrastructure serving communities, evaluating the costs and benefits of different types of

interventions and investments available to mitigate those risks, and prioritizing solutions based on factors including the needs of communities and vulnerable Vermonters. Additional context around the rationale to prioritize health impacts is included in Chapter 7, Understanding the Indirect Impacts of Climate Change on Human Health and Wellbeing in Vermont. The recommended priority actions of this section speak broadly to building upon existing structures, relationships, and programs to provide technical support, proactive planning and implementation of projects, and dedicated and sustained funding.

Summary of Pathways to Support Successful Community and Infrastructure Planning and Project Implementation

Integrating actions required by recently passed statutes, rather than taking a piecemeal approach, creates the opportunity to achieve more holistic and comprehensive plans and actions to achieve climate-adapted and resilient communities and infrastructure.⁽¹⁶⁰⁾ Taken together the statutes modernize Vermont's approach to regional and municipal planning to more uniformly and specifically designate areas suitable for development, encourage the construction of more housing where supported by infrastructure, establish the creation of a statewide land conservation plan, and support state regulation of river corridors, conservation of wetlands, planning for dam safety, and consideration of the efficacy of the current approach to flood hazard regulation. If brought together at the regional scale, in collaboration with planning at the municipal scale, the opportunity exists to:

- Plan more intentionally for future land use that integrates conservation, flood safety, compact settlement and housing, while also identifying gaps and needs for infrastructure investment to make adaptive and resilient community development possible.
- Establish more intentional land-use patterns that consider conservation, development, and infrastructure needs that transcend municipal boundaries.
- Create a statewide land-use map by stitching together the new regional land-use maps, which can both guide development and tell the story of opportunities and barriers to making a more adaptive and resilient Vermont possible.

Resilient community development requires detailed physical master planning, capital improvement and investment planning, and public financing strategies and tools to create conditions for resilient development. Physical master planning considers the appropriateness of particular locations on the Vermont landscape to support resilient development and guides where infrastructure—including water and wastewater, streets, power, and public spaces—should be located. Capital planning must include asset

¹⁶⁰ [Act 47, HOME Act](#); [Act 181, an act relating to community resilience and biodiversity protection through land use](#); [Act 121, Flood Safety Act](#); [Act 59 Community Resilience and Biodiversity Protection Act](#)

Local Trees Grow Resilient Communities



Vermont communities are grappling with big challenges that hit locally—more extreme weather, aging infrastructure, health disparities, and more. Urban and community trees are a practical, place-based response. They soak up excess water, cool our streets and buildings, capture planet-warming carbon, and improve air quality. They also offer something less quantifiable but deeply needed in hard times: comfort, connection, and a sense of place.

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assessments and prioritize projects that provide long-term resilience. This will likely necessitate the development of public investment and operational structures that are intermunicipal or regional in nature and that involve close coordination between municipal, regional, and state planners as well as utilities and other public and private entities planning for infrastructure serving Vermont communities.

Vermont is currently experiencing a housing crisis driven by high demand and low supply. At the same time, large areas of the state have lost significant numbers of housing units to flooding. Vermont needs not only more housing, but housing where it is best suited to withstand climate risks and the right types of housing for different life stages. The housing status quo threatens the resilience of our economy, social wellbeing, health and healthcare system, education system, senior care, public safety, and tax base, among others. The latest [\(June 2024\) Vermont Housing Needs Assessment](#) concludes that 36,000 primary homes are needed in the state in the 2025–2029 period.⁽¹⁶¹⁾ Developing such quantities of housing requires greater density and while this strategy should make the most of our existing compact settlements, all new settlement and its related infrastructure must occur in a manner that minimizes flood hazard and landslide risk. Creation of new and use of existing tools and resources is critical to thoughtful planning and ensuring successful, long-term sustainable and equitable development.

Compact settlement planning should not occur in a vacuum. What happens on the landscape around the compact settlement influences its success as a desirable place

161 Vermont Housing Finance Agency. [VHFA Housing Needs Assessment](#). June 2024.

to live as well as its ability to be a means of climate resilience and adaptation—and to be climate resilient and adaptive itself. The infrastructure that supports the compact settlement must promote resilience and be resilient. This includes accommodation of drinking water wellhead protection areas, and wastewater disposal sites that minimize energy consumption and minimize the risk of groundwater and surface contamination. Streets leading to, through, and from the settlement should promote—not impair—quality of life. Any development outside designated centers should be well planned. Forest and habitat blocks, and habitat connectors, should be maintained and improved not only for the benefits of habitat and working lands, but also to sequester carbon and maintain land cover and soils that mitigate GHGs and flood and drought risks. Floodplain conservation and improved floodwater access to the floodplain will help mitigate against both flood and drought. Planning compact settlement with river and brook channel migration (fluvial erosion) in mind is essential to avoid the state’s primary and most violent hazard. And incorporating wildland fire–adapted community strategies into all aspects of development planning will help mitigate a lesser known but increasing risk in New England and the northeast.

Providing planning resources, in the form of tools and guidance as well as technical assistance in the use of available tools, that assists with applying for grants, implementing projects, and financial assistance, is foundational to a broad array of state, regional, and local policy directives related to land use, energy development and conservation, GHG reduction, land conservation, transportation, education, and economic development.

Summary of Pathways for Strategic and Sustained Funding

We are “Vermont Strong,” but the landscape of disaster, recovery, and mitigation aid is changing with the sheer frequency, intensity and scale of events as well as the quantity, terms and conditions of funding. For example, the mitigation funding the state and municipalities receive in the wake of disaster, after damage is done, is orders of magnitude greater than what is normally available in the absence of a disaster. Indications are that longstanding and reliable federal funding formulas could change, requiring state and local governments—as well as Vermont’s 16 municipal and cooperative utilities—to provide more of their own taxpayer or ratepayer funding for recovery and mitigation. It is also possible, or likely, that federal disaster declaration thresholds will be elevated and the support services in the immediate aftermath of a disaster, which have traditionally been provided by FEMA, diminished—decreasing the likelihood that robust federal aid will be made available. At the household and business level, the catastrophic floods of 2023 and 2024 were severe enough that federal Individual Assistance (IA) disaster declaration thresholds were exceeded. An IA declaration brings in federal resources to assist individuals, families and businesses with recovery that otherwise would not be available, as Vermonters in towns not included in the IA declarations discovered. This threshold, too, could and likely will increase. As we have learned, IA assistance is insufficient to support

full recovery. By design it is intended to be supplemented by local philanthropic and volunteer aid.

Increasingly, federal and state funding that is intended for resilience and adaptation is being directed to support property buyouts to prevent future damage caused by flooding, fluvial erosion, or landslides. In fact, the majority of mitigation funding Vermont received following the 2023 and 2024 federally declared disasters has gone to buyouts. While these buyouts can result in community-scale flood hazard mitigation outcomes, most are at the individual property level rather than a floodplain or river corridor level. This is of great benefit to individual Vermonters whose property has been or could be damaged or destroyed. However, it is imperative that Vermont also invest in community-scale flood adaptation and resilience, including growing up and away from flood hazards and brook and river channel migration. This is essential to develop and protect our civic, economic, cultural and housing infrastructure in anticipation of more frequent and intense events that threaten our historical settlements that will continue to lie in harm's way.

It is imperative that Vermont establish policies and protocols and recovery and funding structures so that individuals, communities and businesses can properly plan and implement solutions prior to disaster striking and so that they can know before disaster strikes what support for recovery might be available. This will also serve as a framework that allows everyone involved in response and recovery work—state agencies, municipal governments, non-profits, businesses—to anticipate their roles and responsibilities. Preparedness is a form of adaptation and essential to resilience.

Similarly, it is essential that entities planning for critical infrastructure serving communities, such as utilities, are modeling future climate risks and evaluating their systems to understand where vulnerabilities exist and to plan for the appropriate scale, pace and types of investments to cost-effectively reduce the risks and resulting costs to Vermonters of impacts from severe storms and other threats to that infrastructure (e.g., widespread and long-duration power outages).