

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 2011-2024. Every county has had 5 or more recent major disasters, and 8 counties have had at least 11.^x Ten disaster declarations have occurred since the initial Climate Action Plan (CAP) was adopted in December, 2021.¹ In the last 3 years (2022-2024) Vermont has had four billion-dollar disasters.² While catastrophic flooding was the primary disaster, Vermonters are also subject to drought and extreme heat events, a less obvious but deadly health risk, and are experiencing 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.

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

^x [Building Resilience in Rural Communities Speaker Series - Rebuild by Design](#)

¹ <https://www.fema.gov/locations/vermont#declared-disasters>

² <https://www.ncei.noaa.gov/access/billions/state-summary/VT>

to improve climate adaptation and resilience in Vermont, the underlying, historic 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 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 Climate Action Plan in 2021, the following important steps have been taken towards building resilience in Vermont communities and the built environment:

- Formation of the Climate Action Office and its development of the [Municipal Climate Change Vulnerability Indicators Tool](#), the beginning of the development of the [Municipal Climate Toolkit](#) to be completed by Fall, 2025, and its support of the [Resilience Implementation Strategy](#) in collaboration with the Office of the State Treasurer.
- The enactment of the [Flood Safety Act](#) (Act 121 of 2024), which 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, and investment in strategic removal of dams, and study how flood hazard policy might be more effectively administered.
- The enactment of [Act 181](#) of 2024, which 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.
- The enactment of Act 59 of 2023, the [Community Resilience and Biodiversity Protection Act](#), the goal of which 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.

- The enactment of the [Vermont HOME Act](#), which 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.
- The creation of the [Flood Resilient Communities Fund](#), which 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.
- The opening of a grid resilience proceeding at the Public Utility Commission (Case No. 25-0339-PET), 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.).
- \$8m funding opportunity for grid resilience through federal Infrastructure Investment and Jobs Act funds awarded to Vermont issued
- The development of a Transportation Resilience Improvement Plan that prioritizes high risk locations along both state and local highway systems.

While progress is being made, we know there is much more to be done. 61% of Vermonters live 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 ^Y

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 surrounding 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 (i.e Local Hazard Mitigation Plans) to promote proactive solutions. There is a call to focus on strengthening what exists rather than creating 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 the Health Chapter of this document. 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.

^Y https://www.fema.gov/sites/default/files/documents/fema_rural-guide_jan-2021.pdf

Supporting 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 infrastructure². 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:

- More intentionally plan 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 uses patterns that consider conservation, development, and infrastructure needs that transcend municipal boundaries.
- Create a statewide land use map by stitching together the new regional future 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 ranging from water and wastewater, streets, power, and public spaces, should be located. Capital planning must include asset assessments and prioritize projects that provide long-term resilience. This will likely necessitate the development of public investment and system operations structures that are intermunicipal, or regional, in nature, and that

² Act 47 – HOME Act (<https://legislature.vermont.gov/bill/status/2024/S.100>); Act 181 Regional Planning Act (<https://legislature.vermont.gov/bill/status/2024/H.687>); Act 121 Flood Safety Act (<https://legislature.vermont.gov/bill/status/2024/S.213>); Act 59 Community Resilience and Biodiversity Protection Act (<https://legislature.vermont.gov/bill/status/2024/H.126>)

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 well-being, health and health care 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 2025-2029.³ Developing such quantities of housing requires greater density and while this strategy should make the most of our existing historic 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 to live, as well as its ability to both 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 habitat and working lands benefits, but also to sequester carbon and maintain land cover and soils that mitigate greenhouse gases and flood

³ <https://accd.vermont.gov/housing/plans-data-rules/needs-assessmentment>

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

Strategic and Sustained Funding

We are “Vermont Strong,” but the disaster, recovery, and mitigation aid landscape is changing with both the sheer frequency, intensity and scale of events, and 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 long-relied upon federal funding formulas could change, requiring state and local government – 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 and 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 historic 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 Vermonters, communities and businesses can properly plan and implement solutions prior to disaster striking and so 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 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).