Flood Resilience and Emergency Management

The Addison Region has done significant work to increase Flood Resilience over the past decades and is now more resilient than many other areas. However, like most of Vermont, portions of the Addison Region are increasingly vulnerable to flood-related hazards as precipitation patterns shift across the Region. Average annual precipitation in Vermont has risen by nearly seven inches over the past 50 years, and climate models project wetter winters and springs, with heavier and more frequent rainfall events under high greenhouse gas emission scenarios. These changes are expected to alter hydrology and increase the likelihood of inundation flooding, flash flooding, riverine erosion, and landslides especially in mountainous towns. The resulting risks threaten public safety, property, infrastructure, and natural resources.

In recent years, Addison County has endured substantial flooding impacts, most notably during the record-rain events of the summer of 2023 and again in July 2024. Heavy rains in 2023 caused swollen rivers such as the Middlebury River and Otter Creek to surge, inundating homes and basements in low-lying areas, two triggering mudslides (for example along Route 125 in East Middlebury), and collapsing portions of Route 116 in Middlebury. In July 2024, a renewed wave of extreme rainfall dropped three to six inches across the Region, tearing up roads in Ferrisburgh, Monkton, New Haven, and Starksboro, closing multiple routes and prompting a federal disaster declaration for the County. Tropical Storm Irene in 2011 caused severe flooding across Addison County washing out roads and bridges, damaging homes and farmland, and isolating mountain towns like Ripton and Lincoln. Together these events strained local infrastructure, interrupted lives, damaged property and farms, and highlighted the Addison Region's vulnerability to intense rainfall and flash-flooding. (See **Table 1**)

NEW AND FUTURE DEVELOPMENT

Future development in Vermont should be carefully planned to avoid flood hazard areas and river corridors, where the natural movement of rivers and periodic flooding maintain ecological balance, reducing downstream damage. Building in these areas disrupts the natural flow of water, accelerates erosion and sedimentation,

Ripton storm damage, 2024

and exposes people and property to repeated flood risks. Instead, this Plan directs development toward stable upland areas, where infrastructure can be safely maintained without the burden of costly flood recovery efforts. By preserving floodplains and allowing rivers to overflow and dissipate naturally, Vermont can protect ecosystems and enhance the resilience of communities.

In the Addison Region, the river corridors of the Otter Creek, New Haven River, Lewis Creek, and their smaller tributaries are particularly important to keep free from encroachment. These waterways naturally shift and expand during storm events. Development too close to their banks can worsen flooding. Preserving open space, agricultural land, and vegetative buffers along these corridors helps slow runoff, stabilize streambanks, and improve water quality. Local zoning and state river corridor protection standards


East Shoreham Railroad Covered Bridge

Table 1: Major Incidents in the Addison Region with FEMA Declarations

Year	Incident Date	Description	Declaration #
2024	July 9 - 11, 2024	Severe Storms, Flooding, Landslides, and Mudslides	DR4810
2023	August 3 - 5, 2023	Severe Storms and Flooding	DR4744
2023	Jul 7- 21, 2023	Severe Storms, Flooding, Landslides, and Mudslides	DR4720
2022	Dec 22- 24, 2022	Severe Storms and Flooding	DR4695
2021	July 29 - July 30, 2021	Severe Storms and Flooding	DR4621
2020	Jan 20, 2020 - May 11, 2023	COVID-19 Pandemic	DR4532
2019	April 15, 2019	Severe Storms and Flooding	DR4445
2019	Oct 31- Nov 1, 2019	Severe Storms and Flooding	DR4474
2017	Oct 29 - Oct 30, 2017	Severe Storms and Flooding	DR4356
2017	June 29 - Jul 1, 2017	Severe Storms and Flooding	DR4330
2015	June 9, 2015	Severe Storms and Flooding	DR4232
2015	December 9 - 12, 2014	Severe Winter Storms	DR4207
2012	May 29, 2012	Severe Storm, Tornado and Flooding	DR4066
2011	Aug 26 - Sept 2, 2011	Hurricane Irene	EM3338
2011	Aug 27 - Sept 2, 2011	Tropical Storm Irene	DR4022
2011	April 23- May 9, 2011	Severe Storms and Flooding	DR1995
2008	June 14 - 17, 2008	Severe Storms and Flooding	DR1778
2008	July 21 - Aug 12, 2008	Severe Storms and Flooding	DR1790
2004	Aug 12- Sept 12, 2004	Severe Storms and Flooding	DR1559
2001	March 5-7, 2001	Snowstorm	EM3167
2000	July 14-18, 2000	Severe Storms and Flooding	DR1336
1998	Jan 6-16, 1998	Ice Storms	DR1201
1998	July 17 - Aug 17, 1998	Severe Storms and Flooding	DR1228
1996	Jan 19 - Feb 2, 1996	Storms and Flooding	DR1101
1993	April 24 - May 26, 1993	Flooding, Heavy Rain, and Snowfall	DR990
1989	Aug 4 - 5, 1989	Severe Storms and Flooding	DR840
1977	Sept 6, 1977	Drought	EM3053
1976	Aug 5, 1976	Severe Storms, High Winds, and Flooding	DR518
1973	July 6, 1973	Severe Storms, Flooding, and Landslides	DR397

Middlebury, 2024

Salisbury, Upper Plains, 2024

Starksboro (Hillsboro), Route 116, 2024

will guide land use to prevent new structures in these sensitive areas while promoting flood-resilient development elsewhere.

The Region's resilience depends on proactive land use planning that integrates floodplain protection with community goals. By steering growth away from flood hazard zones and strengthening natural water storage systems, towns can reduce both financial and environmental costs of future disasters. Avoiding development in these vulnerable areas protects environmental functions and safeguards people, infrastructure, and the long-term vitality of the Addison Region's communities.

PROTECTION AND RESTORATION OF FLOODPLAINS, WETLANDS, AND FORESTED AREAS

ACRPC's flood resilience strategy emphasizes the protection and restoration of natural features that play a critical role in reducing flood hazards and maintaining water quality. Key areas for protection maintaining vegetated buffers along larger rivers and the many small tributaries feeding them, help stabilize streambanks, filter runoff, and provide space for natural channel adjustment during high water events.

Wetlands further contribute to flood resilience by storing excess water, trapping sediment, and slowly releasing flows to downstream areas, thereby lessening flood peaks and erosion. The large Otter Creek wetland complex in Cornwall, Salisbury, and Leicester provides immense flood-mitigation benefits for downstream communities, especially Middlebury. Smaller significant wetlands also play a crucial role in storing floodwaters, filtering pollutants, and providing significant wildlife habitat within the Region's Watersheds.

Floodplain forests, which have declined more than any other natural community since Vermont's colonization, reduce flood risk in the Addison Region by slowing and storing high water during storm events. Their deep-rooted vegetation stabilizes soils, absorbs excess runoff, and buffers nearby towns and farmland from erosion and flood damage along rivers like the New Haven and Otter Creek.

Upland forests in the Region are also critical for managing stormwater and mitigating flood damage. Healthy forests, with intact canopy cover, root networks, and coarse woody debris, slow rainfall runoff, promote infiltration, and help regulate the timing and volume of streamflow during storm events. These upland areas, along with low-lying wetlands and riparian corridors, form an interconnected natural system that works together to reduce flood impacts on infrastructure, roads, and developed properties.

There are several tools for protecting natural ecosystems that are important for reducing flood risk. River corridor easements are a voluntary conservation tool that can mitigate floods by allowing rivers to move naturally within a protected corridor, reducing conflict and damage to property. This is achieved by purchasing a landowner's development and river management rights, which prevents new structures from being built, and requires a buffer of native vegetation along the river. These easements restore the river's natural processes, which attenuates flood flows, stores sediment, and restores aquatic habitats. Many headwater streams are located within the Green Mountain National Forest and managed as Wilderness and Remote Backcountry areas. Other forested areas are maintained by the Vermont Family Forest Foundation and as town forests. This landscape-based approach supports both ecological integrity and community safety, ensuring that the Region remains resilient to increasingly frequent and intense precipitation events.

ACRPC recognizes that beaver activity and natural wetlands play an important role in enhancing local flood

Starksboro, Lewis Creek watershed looking south

resilience. Beaver dams and wetland systems slow the movement of water across the landscape, reducing downstream peak flows, stabilizing streambanks, and increasing groundwater recharge during storm events. In mountainous communities, where steep slopes and narrow valleys heighten the risk of flash flooding, riverine erosion, and sediment deposition, these natural water retention features act as valuable buffers that moderate flood impacts. Supporting coexistence strategies with beaver populations, protecting and restoring wetland areas, and allowing floodplains to function naturally are cost-effective, nature-based mitigation measures that can complement engineered infrastructure and strengthen the Addison Region's long-term resilience to flooding.

Emergency Preparedness and Flood Response Planning

Municipalities can take specific actions to become more flood resilient. In the event of a federally declared disaster, municipalities can make a claim for funds to assist in post-disaster relief. The Emergency Relief and Assistance Fund (ERAF) provides state funding to match federal public assistance after such disasters. A municipality's eligible public costs are reimbursed by the federal government at a rate of 75%. For disasters after October 23, 2014, Vermont contributes an additional 7.5% toward reimbursing the town's costs for a combined total of 82.5% reimbursement. For communities that take specific steps to reduce flood damage, Vermont will contribute either a total of 12.5% or 17.5% of the total cost.

Table 2: ERAF

Steps for Municipalities to Recieve Additional Emergency Relief Funds through ERAF

Municipalities normally recieve 82.5% with 75% Federal and 7.5% State contributions

LEVEL 1 Town Recieves 87.5%

12.5% State Contribution

1. National Flood Insurance Program (NFIP)- participate in NFIP
2. Vermont Road and Bridge Standards - adopt 2013 standards
3. Local Emergency Operations Plan (LEOP) - update annually before May 1
4. Local Hazard Mitigation Plan - adopt or have a draft submitted to FEMA

LEVEL 2 Town Recieves 92.5%

17.5% State Contribution

5. River Corridor Protection Regulations:
   Adopt no new development in a River Corridor
   -OR-
   Participate in the NFIP Community Rating Syster and adopt no new development in Special Flood Hazard Areas

As of May 2026, only two municipalities in Addison County qualify for the maximum 17.5% State contributions through the Emergency Relief and Assistance Fund, 19 municipalities participate in the National Flood Insurance Program, 20 comply with Vermont Road and Bridge Standards, and 21 have an annually updated Local Emergency Management Plan. Twelve municipalities have a current approved Local Hazard Mitigation Plan, while six have Hazard Mitigation plans in progress. River Corridor protection regulations constitute the main reason most of the Region's municipalities do not maximize ERAF funds. Most towns consider the river corridor requirements overly burdensome, and not related to flood safety, especially on a small stream. They have only been adopted in four municipalities (Ripton, Lincoln, Orwell, Shoreham), and all but one are currently considered "interim" by the State of Vermont.[1] Two communities (Lincoln and Ripton) currently qualify for the highest ERAF level.

NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION AND SPECIAL FLOOD HAZARD AREA ADOPTION

The National Flood Insurance Program (NFIP), administered through the Federal Emergency Management Agency (FEMA), provides flood insurance for buildings in communities that choose to participate. Nearly 90% of Vermont communities are enrolled in NFIP, making flood insurance available for buildings and their contents throughout participating communities. Without access to NFIP, flood insurance may be unavailable or unaffordable through private insurers.

To participate in NFIP, a community must regulate all new development in high-risk Special Flood Hazard Areas (SFHA) to ensure that new development is safe from flood damage.

In the Addison Region, nearly all municipalities have been members of NFIP since the 1980s. As a result,

they have adopted zoning bylaws that designate Flood Hazard Areas and include specific regulations for development in them. Much of the mapped floodplain overlaps with extensive wetlands along major rivers. The regularity of flood events and the lack of availability of alternate sites combined with the challenges of wastewater disposal and the cost of complying with floodplain regulations has generally discouraged development along these low-lying areas.

FEMA first created Flood Insurance Rate Maps (FIRMs) in the 1980s to identify SFHAs—commonly referred to as the base flood or "100-year floodplain" or areas with a 1% chance of flooding each year. These are the areas of greatest concern for inundation flooding. NFIP floodplain management regulations must be enforced in these areas, and the mandatory purchase of flood insurance applies. Nearly all municipalities have adopted these maps as the basis for the SFHAs within their boundaries.

FEMA, in conjunction with the US Geological Survey, is updating the Flood Insurance Rate Maps and SFHA boundaries with new maps expected by 2027. There are likely to be differences in the Special Flood Hazard Areas on the updated maps. Preliminary drafts of these maps increase the SFHA in many locations. However, as the SFHAs are mapped in greater detail, some former floodplain areas may shrink as boundaries are refined.

The Special Flood Hazard Area (or floodplain) includes the stream channel plus adjacent land inundated by river discharge during a "base flood". The base flood is sometimes referred to as the "100-year flood", which may give the false impression that a base flood can only occur once every 100 years. A more accurate way of describing the base flood is to say that in any given year, there is a 1% chance that a flood of this size will occur. However, climate change has increased the risk percentage and is expected to continue to do so in future years. Some areas have already experienced more than one "100-year flood" within a decade.

Map 2 shows the topographically-defined floodplain areas created by researchers at the University of Vermont with flood severity zones representing how water that spreads out from riverbanks might look for eight storm sizes, from 50% annual chance (2-year) to 0.2% annual chance (500-year) flood probabilities.

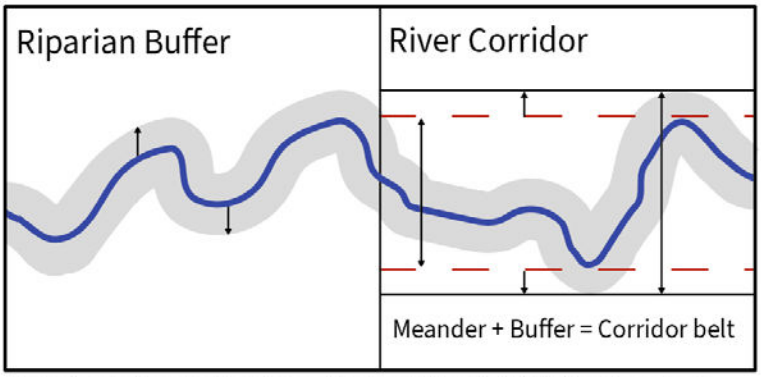
Map 3 shows digitized FEMA Special Flood Hazard Areas from Flood Insurance Rate Maps created and adopted by municipalities in the 1980s.

FEMA and USGS are currently updating Special Flood Hazard Areas based on digital mapping, but those maps are not available for public distribution at this time.

ACRPC will evaluate these updates and work with municipalities to adopt and enforce the updated Special Flood Hazard Areas in order to remain enrolled in the National Flood Insurance Program.

- **19 municipalities in NFIP**
- **20 comply with Road/Bridge Standards**
- **Only 2 qualify for maximum ERAF funding**
- **Only 4 have River Corridor protections**

Figure 1: Riparian Buffer and Corridor



Comparing a buffer setback to a river corridor. Adapted from Ohio DNR, Rainwater and Land development manual, 2006 Ed., Ch 2. Post Construction Stormwater Management Practices, p.21.

TOWN ROAD AND BRIDGE STANDARDS

Nearly all municipalities have adopted and meet the Vermont Agency of Transportation Town Road and Bridge Standards. This includes the "hydrologically connected" local roads covered by Municipal Roads General (stormwater) Permit (MRGP) standards, as well as town highways.

LOCAL EMERGENCY MANAGEMENT PLANS

The annual Local Emergency Management Plan (LEMP, formerly Local Emergency Operations Plan) establishes lines of responsibility during a disaster and identify vulnerable (high risk) populations, hazard sites, procedures, and resources. The LEMP should be updated every year after Town Meeting. All municipalities in the Region updated their Local Emergency Management Plans in 2025 and should continue to do so annually.

LOCAL HAZARD MITIGATION PLANS

The Local Hazard Mitigation Plan (LHMP) helps communities identify important local hazard issues, prioritize future mitigation actions, and provide access to funding through the FEMA Hazard Mitigation Assistance Program. The LHMP is also one of the mitigation actions needed to qualify for additional post-disaster funding through the Emergency Relief and Assistance Fund (ERAF). They are approved by the FEMA and valid for five years. Fluvial erosion and flash flooding are the hazards ranked as creating the greatest vulnerability for the Addison Region's municipalities. Lesser threats include ice storms, high winds, and highway accidents. This Plan encourages municipalities to integrate the goals and actions of their hazard mitigation plan into all other municipal planning mechanisms, including the annual Local Emergency Management Plan, municipal budget, Municipal Plan, and zoning or unified development regulations.

RIVER CORRIDOR PROTECTION REGULATIONS

River Corridor areas identify the space that a stream or river needs to maintain fluvial geomorphic equilibrium, that is, the space in which streams and rivers will move. River Corridors include the width of the meander belt of a river and an additional 50-foot buffer to allow for a stable wooded bank when the river is at its equilibrium or least erosive slope. The Vermont Rivers Program has developed the Statewide River Corridor, using map-based data on watershed catchments, stream gradient, reference channel width, meander belt widths, valley walls, and major transportation features, to identify corridors of all rivers and streams with watersheds over two square miles across the state. For small streams, with watersheds less than two square miles but more than 0.5 square mile, the state has set a default width measured on the ground as 50 feet from the top of both sides of the stream bank as the corridor.

River Corridor maps themselves do not indicate any required action on the part of municipalities. They were developed to facilitate ANR's responsibilities in Act 250 to protect public safety from fluvial erosion hazards and

to regulate activities exempt from municipal regulation under the Flood Hazard Area and River Corridor Rules. Regulations that reference river corridors include:

- State regulation of berms as described in the Stream Alteration Rule;
- Act 250 regulated land use in floodways;
- ANR floodway determinations; and,
- State regulation of developments that are exempt from municipal regulation (generally energy generation or transmission projects).

A municipality may regulate land uses within River Corridors by adopting those areas as part of its zoning regulations. Communities may conduct their own geomorphic assessment, a field-based study of the physical condition of local rivers and major tributary streams, to determine River Corridors more accurately.

In order to achieve full River Corridor adoption, municipalities have to adopt the 2019-identified State River Corridor for larger rivers and streams as well as buffers on all small streams. Additionally, for small streams with watersheds less than two square miles, a default width measured on the ground as 50 feet from the top of the stream bank is required as the corridor. By updating or adopting a River Corridor Overlay area within its zoning bylaws, municipalities become eligible for increased funding in the event of a federally declared disaster. However, many towns that have considered adoption find these requirements overly restrictive and too broad, especially for small streams where the size of the setbacks dwarfs the stream itself.

Only one municipality in the Addison Region has adopted full River Corridor protections in their zoning. Several towns have adopted partial River Corridor protections in their zoning bylaws that have smaller buffer areas or do not include small stream buffers, and are presently labeled by the State of Vermont as “interim.”

At some point soon, municipalities will be required to update zoning bylaws to adopt a new River Corridor map and regulations. Until that time, those interim adopters of River Corridors and the associated regulations provide them with the highest rating the State awards under its Emergency Relief and Assistance Fund.

Lewis Creek erosion along Ireland Road, Bristol-Starksboro

Middlebury River Flood Mitigation Project, East Middlebury

Middlebury, South Street Extension

Flood Risk Mitigation

ACRPC can play a leading role in fostering flood resilience by guiding towns to limit new development in flood and erosion hazard areas, such as floodplains and River Corridors. Through regional planning, technical assistance, and coordination with state agencies, ACRPC can help municipalities update zoning bylaws, River Corridor maps, and hazard mitigation plans to direct growth away from vulnerable areas. Encouraging compact, upland development patterns reduces the risk to people and infrastructure while preserving the natural flood storage capacity of the Region's waterways. Educational outreach and data-sharing can also help local officials and residents understand the long-term costs of floodplain encroachment and the benefits of flood-safe land use.

ACRPC supports mitigating flood risks to historic structures by combining flood proofing, elevation, and strategic relocation with nature-based mitigation actions such as floodplain restoration. In addition to preventing high-risk development, ACRPC strengthens community resilience by promoting the protection and restoration of floodplains, wetlands, and upland forested areas that absorb and slow floodwaters. ACRPC supports conservation projects, riparian buffer plantings, and land use policies that enhance natural flood mitigation functions while improving water quality and habitat connectivity. Integrating emergency preparedness and response planning, such as local hazard mitigation plans, evacuation routes, and infrastructure assessments, ensures that communities are better equipped for extreme weather events. By combining proactive land use management with ecological restoration and coordinated emergency planning, ACRPC helps Addison Region communities adapt to increasing flood risks and safeguards public safety, property, and natural resources.

Weybridge

Farm fields and roads

Salisbury

Goals, Objectives, and Actions

GOAL: To encourage flood resilient communities.

Objective 1:

Avoid new development in identified flood hazard and River Corridor protection areas and ensure that new reasonable development does not exacerbate flooding and fluvial erosion.

a. Guide municipalities in updating zoning and flood hazard bylaws using current FEMA maps, DEC River Corridor data, and best practices for resilient land use.

Objective 2:

Encourage and support the protection and restoration of floodplains and upland forested areas that attenuate and moderate flooding and fluvial erosion.

a. Support projects including wetland and floodplain restoration and establishment of riparian buffers to reduce downstream flood impacts.

Objective 3:

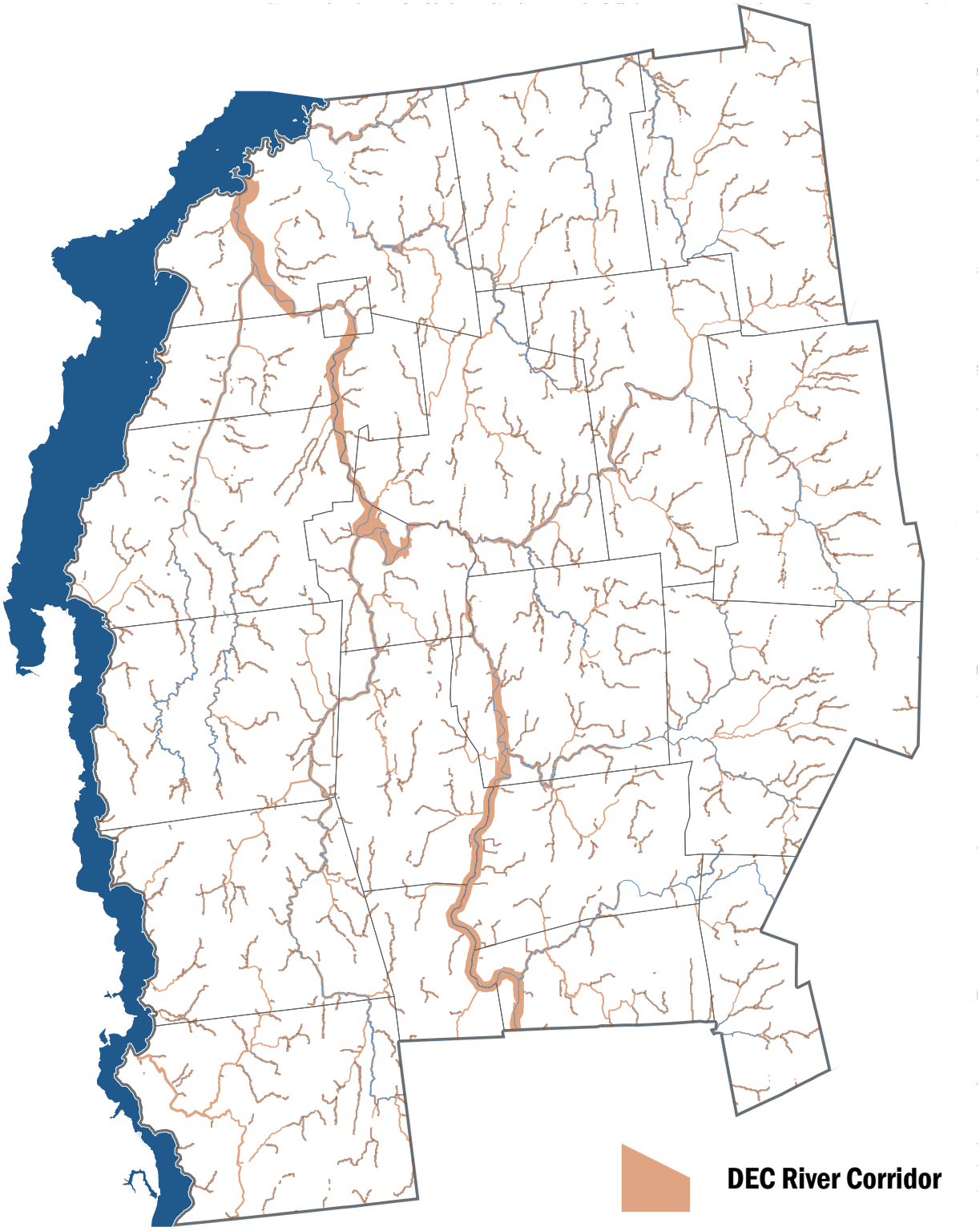
Maintain flood emergency preparedness and response planning and enact measures when necessary.

a. Help towns update Local Hazard Mitigation Plans, identify critical infrastructure at risk, and coordinate regional response and recovery strategies.

ENDNOTES

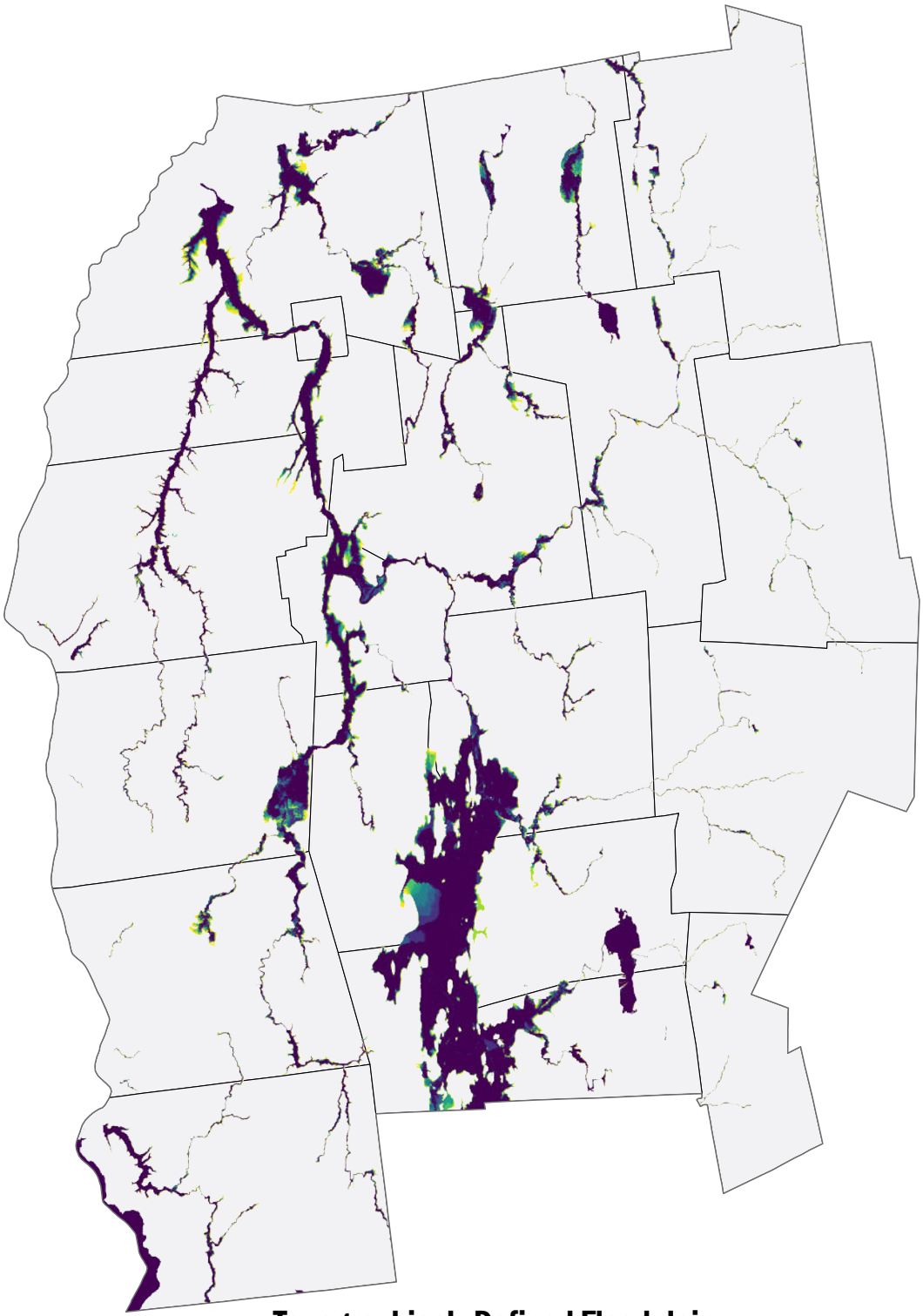
[1] Vermont Agency of Natural Resources. (n.d.). Expanded community report [Interactive database]. Department of Environmental Conservation. Retrieved December 10, 2025, from https://anrweb.vt.gov/DEC/FoFReports/SSRSReportViewer.aspx?RepName=ExpandedCommunityReport

Map 1: Addison Region River Corridors



River Corridors are delineated by the Department of Environmental Conservation as described in the Flood Hazard Area & River Corridor Protection Procedure.

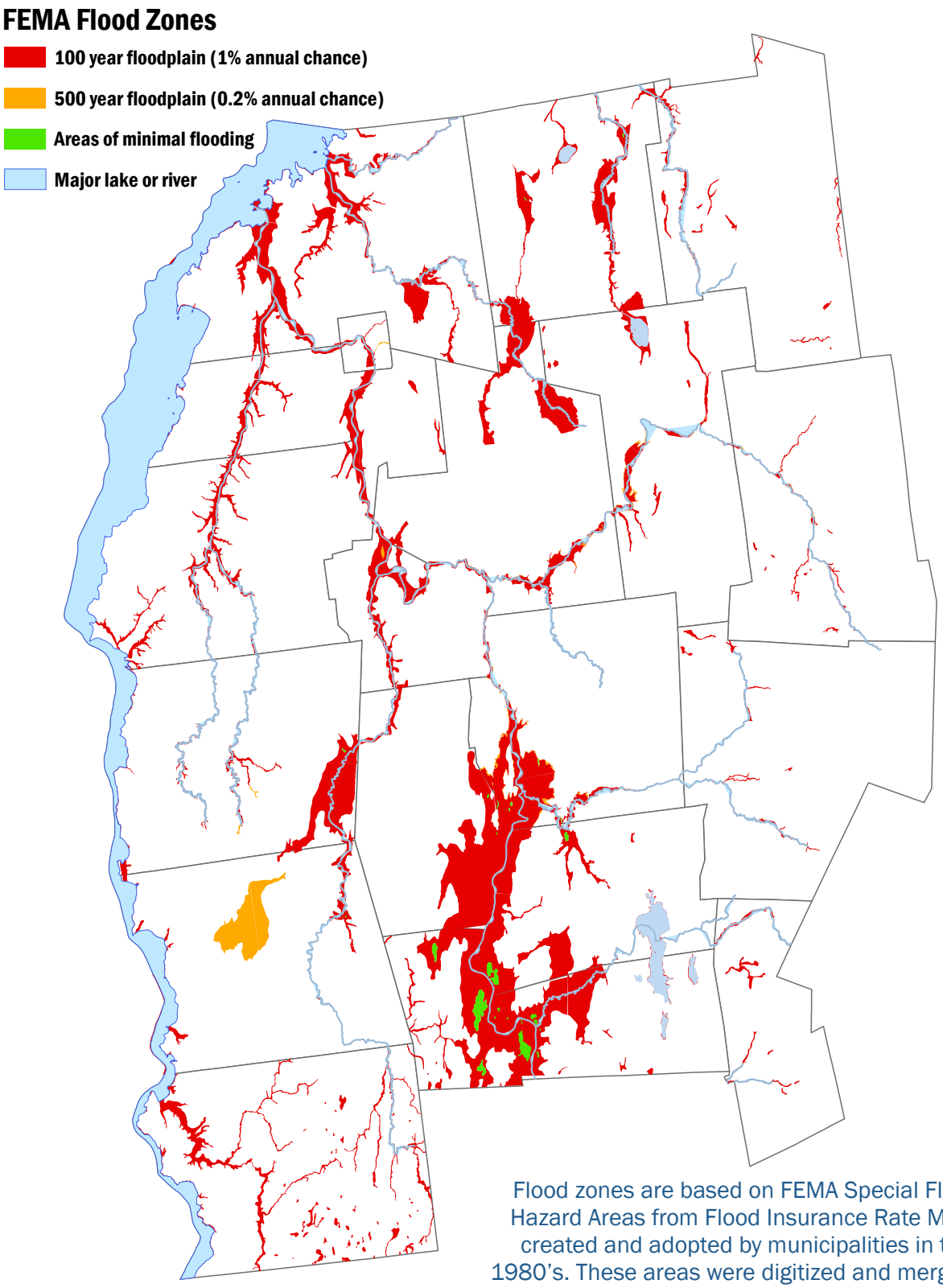
Map 2: Addison Region Floodplains



Topographicaly Defined Floodplains

- 50% annual chance (2 year)
- 20% annual chance (5 year)
- 10% annual chance (10 year)
- 4% annual chance (25 year)
- 2% annual chance (50 year)
- 1% annual chance (100 year)
- 0.5% annual chance (200 year)
- 0.2% annual chance (500 year)

Map 3: Addison Region FEMA Flood Hazard Areas



Flood zones are based on FEMA Special Flood Hazard Areas from Flood Insurance Rate Maps created and adopted by municipalities in the 1980's. These areas were digitized and merged by ACRPC and are not official FEMA products