




ALL HAZARDS: severe winter storms, flooding, tornados, dam failure, hurricanes/tropical storms, thunderstorms/microbursts, wildfire, earthquake, landslides, drought, extreme temperatures, invasive species

V = Vulnerability **S** = Strength

Warwick's Top Hazards of Concern: Warmer/Extreme Temperatures; Precipitation Extremes; Severe Wind & Storms; Invasive Species & Pests

Features

Infrastructure	Location	V or S	Identified Strength or Vulnerability	Resiliency Action/s 	Priority H, M, L
Power lines	Throughout Town	V	Power lines are vulnerable to high winds, downed trees and limbs, and ice.	Conduct proactive tree maintenance near power lines.	High
			Highway and tree crews cannot work to clear roads near downed wires until National Grid provides clearance. Warwick is often a low priority for the utility company during power outages.	Work with National Grid to improve communication with the Town regarding restoration of power and when it is safe for Town departments to begin road clean-up.	High
Communication towers	Mt. Grace	S	Battery back-up power is being added to the cell tower, and is expected to provide up to seven days of back-up power; the Mt. Grace radio tower is being replaced with a new, taller tower that will include emergency communication channels and back-up power - will have AT&T FirstNet which will create civilian cell capacity.	Encourage MA DCR to proceed with permitting the new tower on Mt. Grace to include AT&T FirstNet and civilian cell capacity.	High
		V	The Mt. Grace radio tower is vulnerable to wildfire and extreme weather. If the tower goes down, there is no back-up public safety communication system in place.	Conduct proactive tree maintenance or removal of trees capable of striking communication towers.	High
				Work with the Regional Emergency Planning Committee (REPC) to develop a back-up communication plan and conduct a drill to test a situation where the Mt. Grace tower is out.	High
Develop a back-up communication network and plan for Town communications.	High				
Roads	Throughout Town	V	Gale Road, Chestnut Hill, White Road, Robbins Road, Flower Hill Road and Winchester Road are vulnerable to wash-outs.	Continue to maintain existing drainage infrastructure. Assess areas prone to washout for possible drainage improvements including stormwater Best Management Practices to protect the road, improve water quality in roadside streams and drinking water wells; prioritize areas where washouts would isolate residents.	High

Culverts	Route 78 and throughout town	V	A redesign of the Route 78 culvert in the gulf is needed - it routinely gets clogged and has washed the road out in the past.	Apply for funding to redesign the Route 78 culvert, taking into account climate projections.	Medium
			Other culverts in town also routinely are clogged by debris and need to be periodically cleaned out.	Inventory, assess, and prioritize culverts in town; utilize assessment and right-sizing protocol for drainage culverts that do not cross a perennial stream (currently in pilot phase). When replacing culverts at road/stream crossings, meet the MA Stream Crossing Standards to promote fish and wildlife movement and flood resiliency, when feasible.	Medium
				Assess and design drainage improvements along Northfield Road to incorporate into an upcoming re-paving project.	High
				Assess upstream areas for conservation and management strategies to slow floodwater and reduce the amount of debris carried downstream (see also Environment actions)	High
No cell coverage / old landline infrastructure	Throughout Town	V	Warwick has no cell coverage, and landlines rely on old wires that frequently have issues, leaving residents without reliable phone service. Back-up power is needed to use wifi calling during power outages.	Deploy civilian cell service in town as part of the AT&T FirstNet tower build on Mt. Grace. Improve the Warwick broadband network to be more dependable, making it possible for calls to be made via wifi for residents that have a phone and plan that supports it.	High
				Create neighborhood communication hubs where residents with back-up power and/or redundant phone service can serve as a resource to neighbors during emergencies.	Medium
Code Red reverse call system	Police Department	S	The Town now has Code Red through the Police Department to send emergency messages to residents.	Educate Town departments and boards about the new Code Red reverse call system, and protocols for how to send a message to residents' phone and email. Periodically remind residents to sign up.	Medium
Drinking water	Roadside wells	V	Road salt contamination from storm water runoff is an ongoing issue for some areas of town where drinking water wells are located close to the road.	Develop a winter road maintenance plan that includes more environmentally friendly alternatives to road salt use.	High
Energy Resilience	Town Buildings	S	Warwick is a designated Green Community. The Warwick Energy and Buildings Committee has secured numerous grants to improve energy efficiency and move towards electrification in Town buildings, and to install a small solar PV array at Town Hall	Pursue additional energy reduction, efficiency and electrification options at Town buildings; explore installation of more solar PV on Town land or buildings, combined with battery storage; explore feasibility of a solar-powered micro-grid in the Town center.	High
		V	Town Hall is not equipped with back-up power; The generator at Warwick Community School needs upgrades; Town facilities are in need of HVAC upgrades to improve air circulation and ventilation and energy resilience.		
Mill pond dams and	Throughout	V	The condition of mill pond dams is a concern, especially as ponds may fill quickly during heavy precipitation events, but during dry	Monitor dams in town; conduct outreach to landowners on options for mitigating risks including resources for removing dams.	Medium

beaver dams	Town	V	periods, exposed natural stone dams can deteriorate. Old beaver dams can fail, causing clogged culverts and road washouts.	Inventory beaver damage locations. Evaluate areas of impacts and discuss mitigation options with Massachusetts Fish and Game.	Medium
Water for firefighting	Surface water throughout town	S/V	The Town usually has enough water sources, though they can get low during droughts. Neighboring towns can supply tanker trucks when needed.	Maintain access to surface water sources for fire trucks and enhance connections with dry hydrants; maintain mutual aid agreements with neighboring towns.	High
				Consider rainwater harvesting and storage potential at public buildings as another water source for fire fighting in the Town center.	Medium
Stormwater runoff at Warwick Community School	Warwick Community School	V	Runoff from the roof of the school building is causing flooding issues.	Conduct a Green Infrastructure assessment at the school to identify stormwater Best Management Practices (BMPs) for roof runoff, such as swales and rain gardens, to collect and infiltrate stormwater; assess options for rainwater harvesting and storage for use in landscaping, gardening, or for firefighting.	Medium
Forest fire access	Throughout Town	V	Access to many forested areas - both State-owned and privately-owned - is difficult and would hamper firefighting efforts in the event of a forest fire.	Coordinate with landowners and foresters when harvests are being planned in order to improve fire access roads.	Medium
Mt. Grace Fire Tower	Mt. Grace State Forest	S	MA DCR seasonally staffs a fire tower in Warwick on Mt. Grace, providing early warning to the Town, and assisting local fire departments with response. DCR is currently training a county wildfire crew, and can offer training to Warwick firefighters.	Continue strong relationships with MA DCR Forest Fire Control; take advantage of trainings for local firefighters to build local capacity.	High
Society	Location	V or S	Identified Strength or Vulnerability	Resiliency Action/s 	Priority H, M, L
Power outages / home energy resilience	Throughout Town	V	Back-up generators hooked up improperly pose serious health and safety concerns - they can back-feed through electrical lines, endangering line workers, and can result in CO fumes in homes.	Launch an educational campaign for homeowners on how to properly install a generator; consider offering small grants for homeowners to hire an electrician to evaluate and fix problems.	Medium
			Many residents do not have generators or a safe way to heat or cool their homes during a power outage.	Periodically send out information to residents through the Town newsletter about Mass Save weatherization programs, clean energy rebates, and incentives for renewable energy and battery storage.	Medium
				Conduct a Warwick-style HeatSmart campaign - highlighting local heat pump case studies and connecting residents to local installers - to promote clean energy adoption in town.	Medium
				Seek funding for housing rehabilitation grants or loans to help residents with addressing health and safety issues.	High
		S	When trees are cleared from roads, the wood is left for abutters. If not claimed, other residents will typically collect it to use for firewood.	Consider creating a wood bank for residents when downed trees are cleared from public property. What is current policy?	Medium

Large Scale Solar PV	N/A	V	Warwick has not adopted a large scale solar pv bylaw to regulate this type of development.	Develop and adopt a large scale solar PV bylaw to limit impacts on natural resources and direct this type of development to appropriate areas of town (see also Environment)	Medium
Sheltering	Town Hall / individual residences	V	Town Hall is the designated shelter, but is not equipped with back-up power. The Warwick Community School has a back-up generator, but the Town does not have the capability to operate a shelter on its own; residents need to shelter in place or go to a regional shelter.	Equip Town Hall with a back-up power source. Explore installation of more solar PV on Town land or buildings, combined with battery storage; explore feasibility of a solar-powered micro-grid in the Town center.	Medium
				Periodically send out information to residents about how to be prepared to shelter in place, and what should be included in a "go bag" if evacuation to a shelter is required.	Medium
				Establish neighborhood shelter plans (in concert with neighborhood communication and food plans) to identify households capable and willing to provide daytime and/or overnight shelter for neighbors.	Medium
Warming / Cooling Center	Town Hall	S/V	Town Hall can serve as a warming or cooling center but lacks back-up power.	Equip Town Hall with a back-up power source. Explore installation of more solar PV on Town land or buildings, combined with battery storage; explore feasibility of a solar-powered micro-grid in the Town center.	Medium
	Warwick Community School	S	Warwick Community School has a back-up generator, but is not currently used as a warming or cooling center.	Consider using the Warwick Community School as a warming or cooling center during times when school is not in session. Upgrade the back-up generator as necessary.	Medium
Forest fires	Throughout Town	V	Stronger storms add fuel to the forests, and recent dry weather has resulted in moderate fire risk in town. Forest fires in Warwick and Leverett in the past year burned hotter and deeper than what firefighters typically see. Homeowners, hikers, and other outdoor recreation enthusiasts could inadvertently start a forest fire.	Work with DCR to acquire more educational signs indicating fire risk and install at Town trailheads and recreation areas. Continue to work with DCR to offer Smoky the Bear fire prevention training at the school.	Medium
Forestry	Privately-owned forestland	S	Private forestland owners are actively engaged in stewardship of their land, sustaining the many benefits forests provide and supporting local forestry and wood products businesses.	Implement a landowner incentive payment program in Warwick for implementing both passive and active forestry Best Management Practices (BMPs) that promote forest health, carbon sequestration and storage, resiliency to climate change, and local wood products.	Medium
		V	Less frozen ground in the winter makes it difficult to access certain forested areas for logging.		
		S	Warwick farms produce hay, beef, dairy, and other products, contributing to the local and regional food economy. Over 7,000 acres in Warwick contain prime farmland soils, most of which is reforested.	Assess forested areas abutting farmland in Warwick with prime farmland soils to understand the trade-offs of returning forest to agriculture and where conversion could be beneficial or problematic.	Medium

Farms and Agriculture	Privately-owned farmland	V	Over half of the open farm fields in Warwick are not protected from development. Farmland access is a challenge for beginning farmers or farmers looking to expand.	Utilizing the 2016 Warwick Farmland Inventory, work with the staff of the Farmland Conservation Program at MGLCT to prioritize farmland parcels for protection and facilitate discussions with land owners to permanently protect Warwick farmland.	Medium
			Work with land trusts and local farm organizations to connect farmers to landowners willing to lease their land for farming.	Medium	
Food Security	Throughout Town	S	Both the Town Hall and Warwick Community School have kitchens that are certified for food production. During COVID, the school has served as a free food distribution site, and is currently seeking approval as a food storage site which would allow the site to operate for longer hours and make it easier to accept food donations.	Collaborate with the Greater Quabbin Food Alliance, the Quabbin Food Connector, and others to connect farmers, home gardeners, food pantries, processing and storage resources, distributors, and consumers, and identify local actions to respond to food insecurity needs in Warwick.	High
			Complete Board of Health approval process for designating the Warwick Community School as a food distribution site.	High	
			There are four home kitchens in Warwick that are certified for food processing.	Establish neighborhood food security plans (in concert with neighborhood communications and shelter plans) to identify homes where neighborhood meals could be prepared, homes with food storage capabilities during power outages, etc.	Medium
Town-owned open space and forestland	Warwick Community School; Town center; Warwick Town Forest parcels	S	The Town of Warwick owns over 400 acres of open space, including the Warwick Town Forest parcels, Warwick Community School, Town common, and Moores Pond Beach. Warwick has an active Open Space Committee that spearheads open space conservation projects in town.	Develop management plans for Town-owned open space with community input. Seek funding to implement management goals, such as wildlife habitat, sustainable forestry, trail development, local food production and outdoor education and recreation programs.	High
Outdoor recreation	State Forests, Town Forest, non-profit and private lands	S	Warwick has an abundance of outdoor recreation resources: State Forests make up almost 50% of the town; Town and non-profit parcels contribute additional passive and active recreation resources; the New England Trail and the Appalachian Trail pass through town on private and public land.	Plan a trail system and trail map for Warwick to link recreation and community resources; establish a Trail Committee to map trails and work on trail development; involve youth, seniors, and others in planning, creating, and maintaining trails that promote community connections and public health.	Medium
Private wells	Throughout Town	V	All residents have private drinking water wells or springs in Warwick. During the 2020 drought, it was reported that several wells ran dry in town.	Send out information through the Town newsletter about water conservation measures; promote rainbarrels for home gardening use; consider purchasing rainbarrels in bulk for distribution to residents.	Medium
			During power outages, residents may not have access to clean drinking water.	Inform residents of public locations to fill water jugs. Encourage residents to store water at their homes. Incorporate drinking water into neighborhood plans.	Medium

Insect-borne disease	Throughout Town	V	Insect borne diseases such as Lyme disease and Eastern Equine Encephalitis (EEE) are already impacting Warwick. The Warwick Board of Health periodically places information in the Town newsletter about tick and mosquito-borne diseases, and pass out brochures at town events that advise residents about mitigation strategies like removing standing water from yards.	Utilize Code Red to provide timely notification to residents of mosquito-borne disease threats and precautions to take. Continue to inform residents about mitigation strategies like removing standing water from yards.	Medium
				Consider participating in the Pioneer Valley Mosquito Control District to receive weekly monitoring of vector species and the presence of West Nile Virus and EEE via trapping, sorting, lab testing, and reporting.	Medium
Environment	Location	V or S	Identified Strength or Vulnerability	Resiliency Action/s 	Priority H, M, L
Forests	Throughout Town	S	Large protected blocks of forestland support biodiversity and species migration, carbon sequestration and storage, and serve as green infrastructure by slowing, absorbing, and storing flood waters.	Identify parcels of land important to conserve or that are at risk of losing conservation values, utilizing tools such as BioMap2 and MassAudubon's MAPPR. Work with land trusts and willing landowners on premanently protecting parcels.	High
		V	The 1938 hurricane blew many trees down in Warwick. There has not been a similar significant event since that time, so most trees are now at a size where they are vulnerable to blow down	Explore implementing a landowner incentive payment program in Warwick for forestry Best Management Practices (BMPs) that promote forest health, carbon sequestration and storage, resiliency to climate change, and local wood products.	Medium
Invasive species and pests	Throughout Town	V	Invasive species and pests, no longer kept in check by cold winters, may change forest composition in Warwick	Educate the public about invasive species and insects, and steps landowners can take to address them. Initiate a town-wide invasive species awareness day.	High
				Install boot brushes and educational signage at trailheads to curb the spread of invasive species.	Medium
	Town roads		Roadside maintenance may inadvertently spread invasives.	Inventory and prioritize invasive species threats along Town roads and develop management and control options.	Medium
Streams and brooks	Throughout Town	S	Warwick contains many coldwater fish resources, which provide critical habitat for coldwater fish species.	Conduct River Corridor mapping and adopt River Corridor Protection zoning to protect riverine areas.	Medium
		V	The small streams and rivers in Warwick can swell quickly; Mill Brook along Northfield Road is experiencing scouring, causing sediment shifts in the brook and impacting water quality and habitat; blocked culverts from flood debris blocks aquatic passage.	Work with land trusts to implement a River Corridor easement program to conserve property within the River Corridor area. Work with Trout Unlimited, land trusts, private landowners, and DCR on assessing streams for conservation and management strategies to slow floodwaters and reduce debris, habitat destruction, and impacts to downstream infrastructure.	High High
Floodplains and wetlands	Throughout Town	S	There is not much development in or near the floodplain. Wetlands act as flood storage, and some former meadows and hayfields are growing back into brush and may be doing a better job at storing water.	See River Corridor mapping, zoning, and easement actions above.	

Prime Farmland Soils	Throughout Town	S/V	31 percent of Warwick is covered by prime farmland soil, much of which has been reforested. Fields and forested areas could potentially be reclaimed for agriculture if there is local demand.	Assess forested areas abutting farmland in Warwick with prime farmland soils to understand the trade-offs of returning forest to agriculture and where conversion could be beneficial or problematic.	Medium
Large Scale Solar PV	N/A	V	Warwick has not adopted a large scale solar pv bylaw to regulate this type of development.	Develop and adopt a large scale solar PV bylaw to limit impacts on natural resources and direct this type of development to appropriate areas of town (see also Society)	Medium