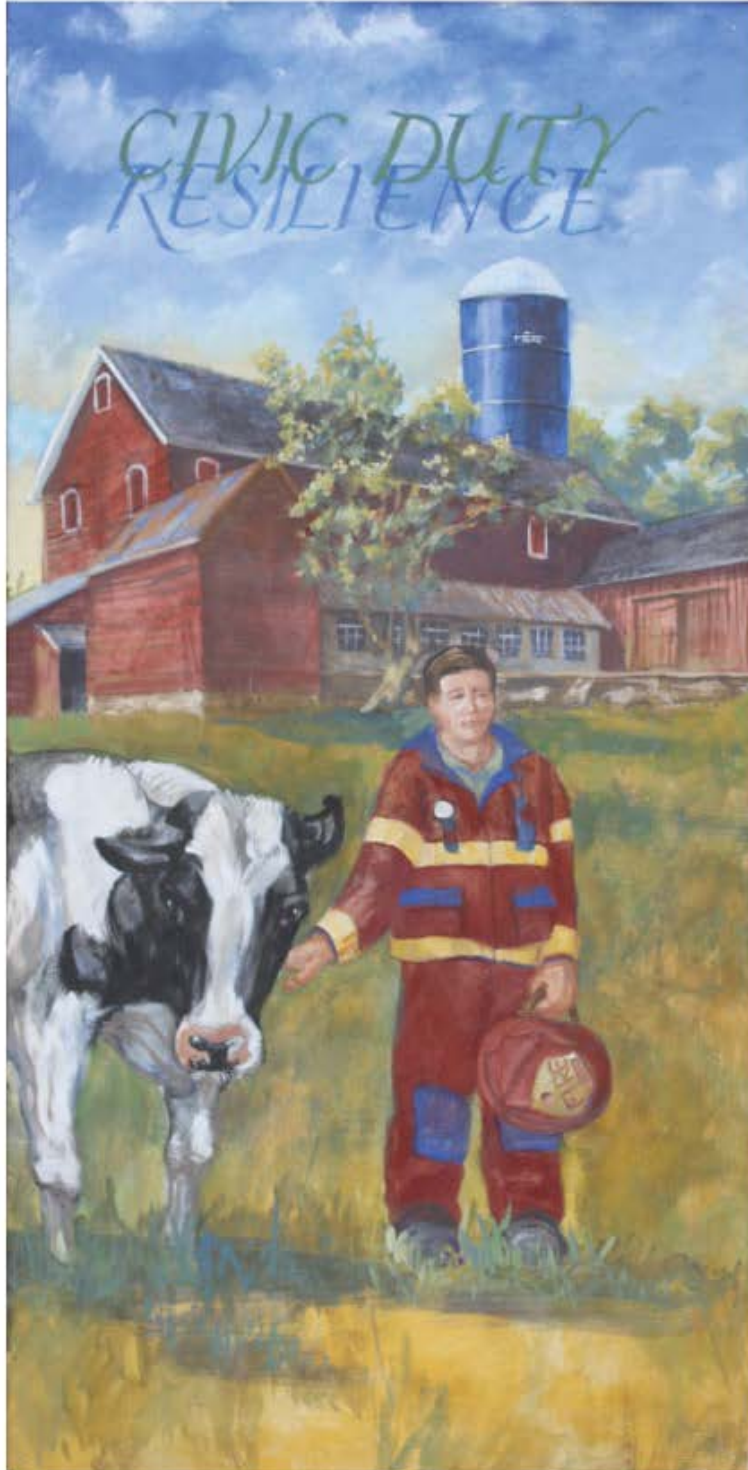




# Community Guidebook: BANGOR AREA

Bangor Borough • East Bangor Borough • Lower Mt. Bethel Township • Portland Borough  
Roseto Borough • Upper Mt. Bethel Township • Washington Township



## What is a resilient community?

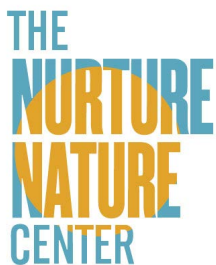
"I envision a community that is well-informed about where to go in case of emergency and/or evacuation where food and shelter are supplied for all residents at a moment's notice."

"... Ensuring that all residents are given adequate and appropriate concern and care in the event of emergencies. "

– CREATE Participants

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Nurture Nature Center  
518 Northampton Street  
Easton, PA 18042

610.253.4432  
[www.nurturenaturecenter.org](http://www.nurturenaturecenter.org)



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About the Cover:

*Bangor Area CREATE Resilience Mural* (detail) by artist James Gloria. This mural is one of three community-specific murals created as part of the CREATE Resilience Project. Each artist participated in the four-year project, designing and painting large, multi-paneled public artworks that represent their community's vision of resilience. Artist James Gloria is a muralist, arts educator, and founder of the Heritage Mural Education Program, Bangor, PA.

# Introduction

**This guidebook is intended to support neighborhoods and local municipalities in identifying the ways that dealing with hazard risks head-on can help build stronger, more connected, more resilient communities.**

The rich history of the Lehigh Valley region is shaped by its landscape: lush farmland, mountainous regions, magnificent rivers and dense forested areas rest next to historic urban areas, bringing dynamic ecosystems and economies alike. These landscapes create the basis for home, culture and community. Nevertheless, the region also faces serious risk from a range of natural hazards, including flooding, winter storms, extreme temperatures and more. Living safely in the Lehigh Valley's many urban, suburban and rural communities requires a deeper knowledge of those hazards and the strategies for preparing, mitigating and staying safe and resilient in the face of risk.

This guidebook is intended to support neighborhoods and local municipalities in identifying the ways that dealing with hazard risks head-on can help build stronger, more connected, more resilient communities. You will first find information about some of the natural hazards that most significantly affect our area, along with personal stories from residents about their experiences with each hazard. Then, the Preparedness and Mitigation section will explain how to prepare your household, including creating an emergency plan and kit, and discuss some of the strategies communities can implement together to build resilience. At the end of this resource, you will find tear-out pages with an emergency kit checklist, emergency plan template, and a list of important contacts and places to find additional information.

The preparedness and mitigation strategies highlighted in this guidebook are certainly helpful during a natural hazard event. However, implementing these strategies also presents opportunities to improve quality of life on sunny, pleasant days. It is our hope that a community that works together to become more resilient will experience more resident engagement with important decisions, more equitable conditions for all community members, stronger connections to their natural environment, and heightened feelings

of security year-round, in addition to the ability to respond more effectively to hazard events. As you read this guidebook, we encourage you to think about your vision for an ideal resilient community and think about the steps it would take on an individual, neighborhood, municipal, or county level to achieve that. Community outcomes, both during hazard events and in everyday life, are the collective result of decisions made by each one of us, so we all have an important role to play in creating resilience.

## About CREATE Resilience

This guidebook is one outcome of Nurture Nature Center's CREATE Resilience project. A four-year, federally funded project, CREATE Resilience is a multi-disciplinary collaboration to engage youth and community in the Easton, Wilson, and Bangor school district areas to increase knowledge of weather and climate science, the risks from local hazards, and strategies for hazard mitigation, while storytelling and co-creating a vision for community resilience. Through public surveys, community discussion forums, youth-led individual interviews, and discussion with municipal officials and community leaders, we have heard from residents regarding what the priority natural hazards, feasible mitigation strategies, and holistic visions for a resilient community are in each of the Easton, Wilson, and Bangor regions. In addition, residents have attended CREATE Resilience public education events regarding the Lehigh Valley Hazard Mitigation Plan, the science of locally relevant hazards, and general and hazard-specific preparedness information. This project is working to link community members to one another, to emergency management professionals, to their local leaders, and to sources of accurate hazard knowledge in order to create more informed, collaborative, and beneficial responses before, during, and after natural hazard events. For more information on CREATE Resilience, please visit <https://nurturenaturecenter.org/create-resilience/>.



## The Bangor Area

The Bangor area, which here refers to all communities served by the Bangor Area School District, is home to more than 21,000 residents spread across Bangor Borough, East Bangor Borough, Portland Borough, Roseto Borough, Lower Mount Bethel Township, Upper Mount Bethel Township, and Washington Township. This area is part of the region often referred to as the Slate Belt, highlighting its industrial history in the 1800s and early 1900s when quarries produced more slate than any other region in the world. The area's geology made this possible, and this region of slate between the karst limestone geology to the south and Blue Mountain to the north is known as the Martinsburg Formation. After the slate industry declined, textile factories became a major source of employment in the area until the late 1980s. Today, many residents are employed in the Poconos, elsewhere in the Lehigh Valley, or even in New York City, which is made possible by access to major thoroughfares including State Routes 33, 512, and 611, and Interstate 80. Like other small towns in America, the Bangor area has been reinventing itself in this post-industrial era. Downtown commercial districts in Bangor and Portland are home to local restaurants and businesses, but the majority of the region is rural, residential, and agricultural.

Visitors and residents are often drawn to the area for its beautiful natural setting. With access to the Appalachian Trail, the Delaware River and many smaller streams and tributaries, and Minsi Lake (one of three public lakes that allow fishing and boating in the Lehigh Valley) in Upper Mount Bethel Township, opportunities for outdoor recreation in the region abound. Visitors can stop by the Environmental Welcome Center in Lower Mount Bethel before exploring many miles of trails along the Delaware River and Martins Creek, or nearby Delaware Water Gap National Recreation Area. A drive through the Bangor area can follow the Delaware River Valley Scenic Byway (the only PA Scenic Byway in Northampton County) or travel through rolling farmland; this rural character is something many communities take pride in and work to preserve. In addition to providing recreational opportunities, the

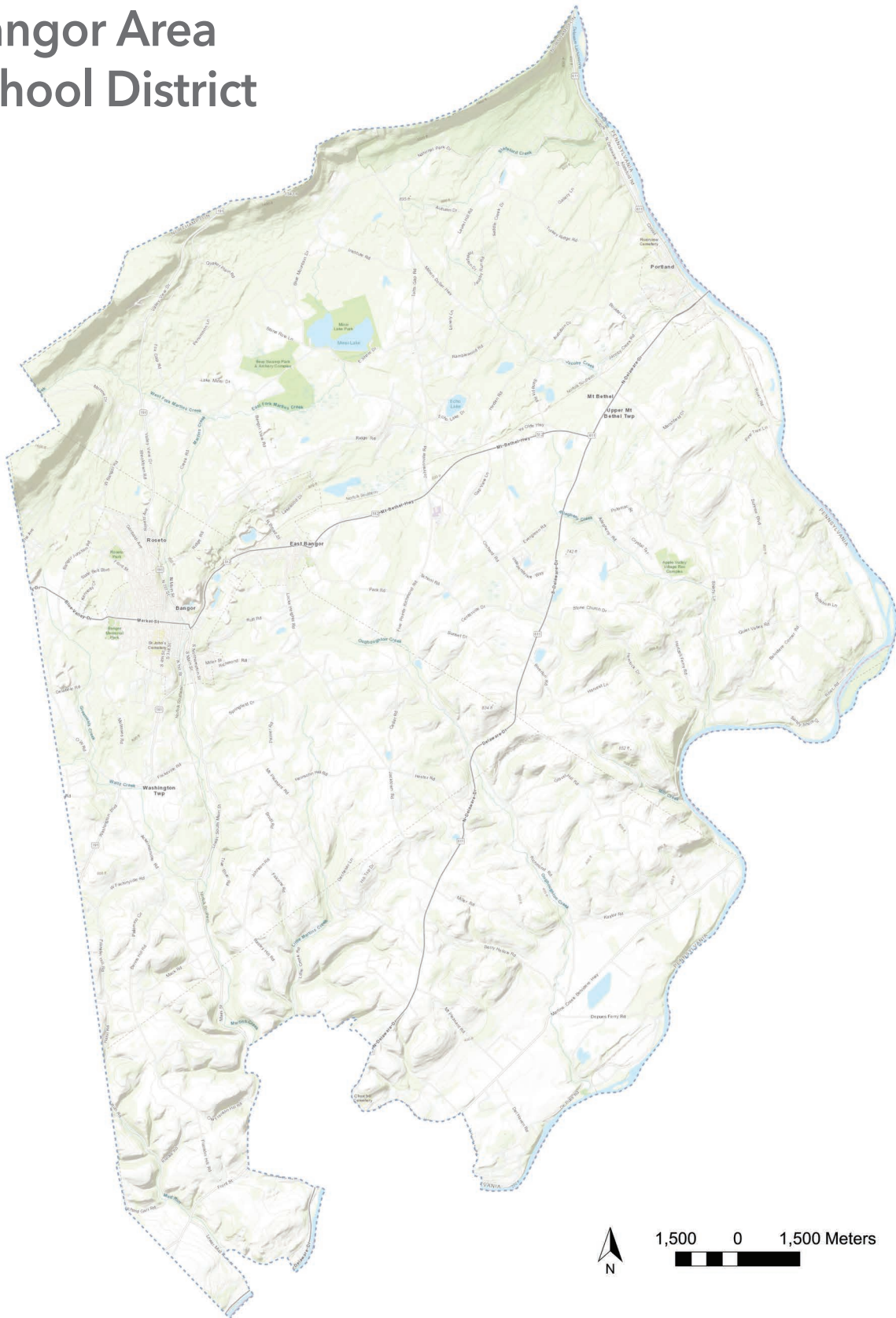


Church Hill Cemetery by Nicholas A. Tonelli from Northeast Pennsylvania, USA (CC BY 2.0).

natural areas in the region are environmentally significant. Upper Mount Bethel is home to the largest concentration of wetlands in the Lehigh Valley, including the Minsi Lake Vernal Pool Preserve, where rare, threatened, and endangered amphibian and plant species flourish. Forested areas and high quality streams support additional species. The Bangor area experiences a variety of weather conditions, with hot and often humid summers averaging high temperatures in the 80s and cold winters during which temperatures are often below freezing. Northampton County experiences an average of nearly 46" of precipitation annually, including snow in the winter. As our global climate changes, conditions are expected to become warmer and wetter overall, potentially resembling the current climate in locations further south, such as Richmond, Virginia.

The Bangor School District area is one of the most scenic parts of the Lehigh Valley, with a distinct regional history and variety of beautiful natural landscapes. Throughout this guidebook, we will discuss the natural hazards that are also inherent to the Bangor community's geographic location, as well as ways that residents can individually and collectively mitigate those hazards, protecting the area's natural and historical resources and building a more resilient future for those who live there.

# Bangor Area School District





# Hazards in Our Community

Being aware of the natural hazards that exist where you live before they occur allows you to prepare to stay safe and minimize damage during a hazard event.

The Bangor area is a great place to live, in part because of its natural environment - close proximity to scenic rivers and streams, seasonally variable climate, and open space. However, like any region, natural conditions in the area can also pose challenges to the safety of people and property. Being aware of the natural hazards that exist where you live before they occur allows you to prepare to stay safe and minimize damage during a hazard event. Through consultation with emergency managers,

local officials and residents, Nurture Nature Center has identified that priority hazards in the area include riverine flooding, flash flooding, winter storms, and extreme temperatures. While these hazards are most significant across the region as a whole, other hazards including radon, sinkholes, and invasive species also affect the community, so this guidebook provides information on them as well.



Bangor, PA by Cishuman (CC BY-SA 4.0)

## Riverine Flooding

Riverine flooding occurs when a river overflows its banks due to heavy rain, a combination of heavy rain and snow-melt (snow-melt by itself rarely causes riverine flooding in the Lehigh Valley), ice jam breaks, or dam breaks. Flooding along larger rivers, such as the Delaware, usually can be forecast a day or more in advance, and will cause a rise and peak that will last for a number of hours before receding. Floods can result in property damage and loss, streambank erosion, disruption to businesses and households, and temporary loss of electricity and running water. Upper and Lower Mount Bethel Townships and Portland Borough include properties along the banks of the Delaware that were dramatically affected by flooding in 2004, 2005, and 2006. Roadways and land on the banks eroded away or subsided, and residents had to evacuate their homes.

### Thinking about preparedness for Riverine Flooding:

Do you know where to find flood forecasts and information on the nearest river gauge? At what river level will your home flood? At what river level will access roads flood?

water.weather.gov - If you live near a river, this National Weather Service website allows you to check water levels at the nearest river gauge and forecasted flood risk.

Do you have an evacuation plan?

Do you have flood insurance if your home is subject to flooding?

Do you have a network of neighbors that can work together in the case of a flood event to notify each other and support preparedness efforts?

Have you reviewed your home to identify any changes you can make to mitigate losses during a future flood, such as elevating utilities or the first floor of the home?

### Community Voices:

**"My deck is gone. It ended up in somebody's car park half a mile away."**

#### John Mauser

In the building of his family's house along the Delaware River, John had to submit a plan to the township, showing the 100-year and 500-year flood plain. Even though he built his house out of the 100-year flood plain, the floods of 2004, 2005, and 2006 came up beyond that. Hurricane Ivan in 2004 had moved the Mauser's family's deck half a mile downstream, but the shrubs along the bank of the river withstood both the 2004 and 2005 floods, "so nature has a way of taking care of itself," John says. He takes care of himself and his home too, by keeping 30 sandbags filled up and stored on the side of the house in case of a flood.

### Lightning, Severe Weather, and Emergency Alerts

The weather conditions that cause flooding can bring other hazards as well. Thunderstorms, for example, can result in large amounts of rain but also the danger of lightning. It's important to check weather forecasts, especially if you plan to be outside, so that you can prepare for any severe storms. You can also check whether your local or state public safety agencies offer emergency alerts that you can sign up to receive on your phone or via email. Most smartphones automatically receive Wireless Emergency Alerts (WEA), which include severe weather warnings, AMBER alerts, information on local emergencies requiring evacuation, and more. If you receive one of these messages, read it and heed any advice it gives on what action you need to take. The best thing to do if you hear thunder - even if you think the storm is distant - is to seek shelter indoors. Avoid touching corded phones, electrical equipment, plumbing, and windows and doors, which may become electrified if lightning strikes. If you can't go inside a nearby building, a metal-topped car with the windows closed also offers protection from lightning. Finally, don't go back outside until at least 30 minutes after the last lightning or thunder. **Remember: When Thunder Roars, Go Indoors.** (<https://www.weather.gov/safety/lightning-safety>)

## Flash Flooding

**Flash flooding is the rapid flooding of low-lying areas, such as streams, washes, rivers, and depressions, within six hours of the causative event.**

Unfortunately, here in the Lehigh Valley, flash flooding can occur even sooner, sometimes in less than one hour! Causative events include intense, heavy rain from thunderstorms and tropical storms, a combination of heavy rain and snow-melt, ice jam release, or dam break. **Climate change contributes to the hazard,** as it has increased the occurrence of heavy precipitation events, which raises the risk of flash flooding in the Northeast region. Flooding can damage properties, disrupt transportation, and even lead to loss of life. Attempting to drive through flooded roadways is especially dangerous.

The Bangor area contains many creeks and tributaries of the Delaware that are susceptible to flash floods, including Martin's Creek, the Jacoby Creek, the Allegheny Creek, the Oughoughton Creek, and others.

### Thinking about preparedness for Flash Flooding:

Do you know what creeks or streams run nearest to your home? Do you know if they have a history of flash flooding?

Sometimes the only advance warning for flash flooding in your area is the heavy rain itself. Do you know where to find up-to-date weather information in order to maintain situational awareness for possible flooding? [www.weather.gov/phi](http://www.weather.gov/phi) is a great source for such information!

If you live in a high-risk area, are your furnace, water heater, and electrical panels elevated?

Is your yard watershed-friendly? This could include maintaining vegetated areas or rain gardens to help absorb runoff, or avoiding fertilizers or other chemicals that could run off into nearby bodies of water.

## Stormwater Runoff

In urban and suburban areas, flash flooding is closely related to the issue of stormwater runoff. As green space is replaced with asphalt and concrete, rain and meltwater can't be absorbed. Rather than slowly infiltrating through soil and plant matter, stormwater rapidly runs off of impermeable surfaces toward larger bodies of water, carrying any pollutants it encounters along the way. Stormwater runoff can impact the Lehigh Valley by bringing pollutants into rivers, which affects fish populations and human health, and by causing flash flooding. Green roofs, rain gardens, and rain barrels are some strategies for absorbing and/or slowing the flow of stormwater.



**"The whole entire block could be and has been underwater."**

Bangor Borough Manager **Nate Dysard** reflects on a variety of risks facing his municipality, but concludes that "flooding is the main hazard. We haven't had any recently, but it's only a matter of time until we have another." The biggest impacts are downtown, where Martin's Creek runs through the urban area in a man-made channel. New construction and renovations in the area will have to comply with current floodplain heights, but "some buildings have been owned by the same families for over 40 years and haven't had to update," Nate says. In the short term, municipalities like Bangor focus on keeping residents informed and helping them get to safety in the event of a flood, while in the long term they focus on smart development that takes into account where floodplains are and restores naturalized stream banks where possible.



## Winter Storms

Winter storms can bring cold temperatures, high winds, and frozen precipitation including snow, sleet, and freezing rain. This creates a variety of risks, including hypothermia, frostbite, damage to homes from falling branches, roof instability, damaged gutters, frozen pipes, carbon monoxide poisoning from generators or heating systems, power outages, and dangerous driving conditions. Snow squalls are especially dangerous as they produce an instantaneous reduction in visibility and traction for unsuspecting drivers traveling at high rates of speed on major highways and interstates. Nationally, thousands of people are involved in traffic accidents each year due to slippery roads or low visibility during winter storms. The Lehigh Valley as a whole averages about 30 inches of snow annually and regularly experiences temperatures below freezing during the winter.

“Your house can be replaced, but your life can’t be”

Community  
Voices:

### Russell Stout

Though he has moved several times over his lifetime, Mr. Russell Stout has lived in the Bangor area for eighteen years. “It’s the best of both worlds,” he says. “You’ve got a rural community, but you’re also close to a major highway in Route 80, so you’ve got lots of options to travel.” He travels Route 80 every day to his job as a teacher, so extreme weather, particularly winter storms, can significantly impact his daily life. The snowstorm that occurred on March 2, 2018 was certainly one that was unforgettable, bringing heavy snow and wind to much of the northeast and knocking out power for days—for weeks in some places. Mr. Stout was prepared, having learned from Superstorm Sandy in 2012, a ‘wake-up call’, that having a generator and emergency preparations are necessary. He respects local officials’ evacuation orders, noting that “Your house can be replaced, but your life can’t be.”



Late-day sky, Upper Mount Bethel Township, Northampton County, Nicholas\_T.

## Extreme Temperatures

Both extreme heat (temperatures 10 degrees or more above average that persist for several days or weeks) and extreme cold (temperatures below freezing for an extended period of time) can result in serious illness or even death due to rapid increase or decrease in body temperature. Extreme cold can cause hypothermia, a life-threatening condition. Hypothermia can even occur at temperatures as warm as 40 degrees in windy conditions or if a person becomes damp from precipitation or sweat. Heat-related illnesses are a leading cause of death from weather-related hazards. Heat exhaustion and heat stroke, often caused by the combination of heat and humidity, are very dangerous conditions, and children, the elderly, and people with preexisting conditions are at an elevated risk. In urban areas with minimal vegetation, hot weather can be made worse by the “urban heat island effect,” where the prevalence of concrete and asphalt raises temperatures above that of surrounding areas. Heat effects can accumulate within the body, so heat waves are especially dangerous when it does not cool off at night and people’s homes remain above 70 degrees for an extended period of time. As a result of climate change, these conditions are expected to become more frequent in this region, increasing the importance of preparing for extreme temperatures.



Photo courtesy of Katy Hunter.

Community  
Voices:

“Moving towards a more  
protected growing environment”



Photo courtesy of Katy Hunter.

### Dan Hunter

Hunter Hill CSA in nearby Forks Township is, like all farms, reliant on favorable weather and environmental conditions for a successful harvest. While high temperatures and dry conditions may benefit watermelon, peppers, and tomatoes, those conditions also make it more difficult to grow cool weather crops, as it’s too hot for the seedlings if they’re planted at the same time of year as in previous seasons, says Dan Hunter. Most years, he loses some broccoli, but the impact seemed more intense this year with the heat waves the area experienced. In response, Dan has implemented shade cloth to grow greens, and moved to overhead irrigation to cool off crops in the afternoons instead of using drip tape. To continue to grow in a changing climate requires constant adaptation, and Dan looks for all the information he can get about what others are doing to manage changes.



## Additional Hazard Information

### Radon

**Radon is a naturally occurring radioactive, odorless, colorless gas. Radon is present at low concentrations in the natural environment, but high levels concentrated in basements can cause lung cancer.** In Pennsylvania, the Reading Prong is an area where radon levels are extremely high. Radon affects the Lehigh Valley due to this geology, resulting in high levels in some homes, far above 4 pCi/L, the radon level above which some type of mitigation measure is recommended, often the installation of a ventilation system. The best way to prevent radon exposure is to first know the level of exposure. Families can purchase a radon test kit that is placed in the basement or crawl space for a period of time and determines the level of radon. If there is indeed an elevated level of radon, a variety of measures are available to reduce it, and can be explored with a certified radon mitigation professional.

For more information: [radonlehighvalley.org](http://radonlehighvalley.org)

### Sinkholes

**A sinkhole is a subsidence feature that occurs when a void forms under the Earth's surface and the soil and rock above it becomes unable to support its own weight, resulting in a collapse or sinkhole.** This typically occurs in areas with underlying carbonate or limestone bedrock, which are easily dissolved by flowing rain or ground water to form subsurface voids. Parts of the Bangor area, particularly Upper Mount Bethel Township, are considered to have a lower risk of sinkholes because they are not underlain by carbonate/limestone geology. Sinkholes come in many shapes and sizes, and although caused by naturally occurring processes such as dissolution of limestone, their formation can be accelerated by human activities, such as by pumpage and drainage of groundwater. Sinkholes can occur without much warning, but people can look out for "slumping or falling fence posts, trees or foundations, sudden formation of small ponds, wilting vegetation, discolored well water and structural cracks in walls and floors" (LV Hazard Mitigation

Plan 2018). In Pennsylvania, property owners are responsible for sinkhole damage on their property, even if the issue was not caused by the owner. Individuals can invest in sinkhole insurance if they live in sinkhole-prone areas.

To learn more about sinkholes: <https://www.dcnr.pa.gov/Geology/GeologicHazards/Sinkholes/Pages/default.aspx>



Spotted Lanternflies cover the base of this tree. Photo by Andy Carr.

### Invasive Species

**Invasive species are any non-native species (not typically found in an area) that outcompete native plant/animal populations for resources.** Common invasive plant species in the Lehigh Valley include Multiflora Rose, Japanese Barberry, Garlic Mustard, Bush Honeysuckle, Autumn Olive, Japanese Knotweed, and Tree of Heaven. Invasive species can result in mortality of other native species of flora and fauna, and can impact an area's agriculture and local economy. The Spotted Lanternfly, for example, has the potential to cost Pennsylvania billions in damage to the grape, hops and apple industries.

**Climate change can have a drastic impact on invasive species populations, enabling them to move to new environments and spread farther while making existing ecosystems more vulnerable.** Early detection by communities, before invasive species begin to grow exponentially, can save time and money and help the community develop a plan to eliminate or control the population.

For more information: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/pa/technical/ecoscience/invasive/>



# Preparedness & Mitigation

## Individual & Household Level

Fortunately, although every community faces multiple potential hazards, **taking a few basic actions can make you and your family more prepared for any type of hazard.** By reading this guidebook and learning about the kinds of emergency hazard situations that could affect you and your community, you have already taken the first step in being prepared. This section will help you take steps to protect yourself and your loved ones in the event that you do experience a natural hazard.

### Make an emergency plan

Many disasters can interrupt communication lines, result in road closures, and generally make it difficult to get in touch with the people you live with if you aren't together when the disaster occurs. For this reason, and because it can be difficult to make important decisions during a stressful and chaotic time, **it's important to have an established emergency plan before a hazard occurs.** This includes choosing family meeting places - one outside of your home in case of an event like a fire that forces you to go outside, and one elsewhere in your neighborhood in case it becomes dangerous for you to return home. If there are children or pets in your family, also discuss who will be responsible for picking them up and bringing them to your safe meeting location. You should also plan for potentially needing to evacuate your home or neighborhood - mapping out safe routes, establishing an out-of-town emergency contact in case local phone lines are tied up, and knowing where you will go to be safe. Reviewing your emergency plan at least a few times a year can help children and adults feel confident that they will know what to do to stay safe during a hazard event. See the perforated template in the back of this book for more detailed guidance on what to include in an emergency plan.

### Create and maintain a preparedness kit

A disaster might make it difficult to find and purchase food, water, and other essential supplies. **An emergency kit contains the things you and your family will need to sustain yourselves for at least three days, either in your home or while evacuating.** It should be in an easy-to-transport container in case you need to leave quickly, and include any pet supplies, medical supplies, important documents, and other items that meet your family's specific needs. See the perforated emergency kit checklist in the back of this book to start assembling your own kit.

### Stay informed

**You can get the information you need to respond to a hazard emergency by signing up for services that will send alerts to you and by knowing where you can go to seek out up to date information yourself.** Many communities have a system (Nixle, CodeRED, Reverse 911, etc.) for sending weather and hazard alerts to their residents, and you can subscribe for severe weather alerts from the National Weather Service as well. Sources that you can utilize for hazard information include local radio, TV, social media, and online forecasts. PennDOT provides up to date information on road conditions throughout the state at [511pa.gov](http://511pa.gov).

NOAA Weather Radio All Hazards (NWR) - NWR broadcasts 24/7 weather information nationwide. You need a special radio receiver to pick up the signal, but it is a valuable source of reliable local information for weather as well as other natural and public safety hazards. There are many reasonably priced commercially available radios that include a hand-crank function that activates emergency power, including a built-in flashlight or device charging capability.

[weather.gov](http://weather.gov) - This is the National Weather Service's website where you can look up your zip code and find weather forecast information as well as any active weather watches or warnings.

[water.weather.gov](http://water.weather.gov) - This is the site for river and stream forecasts from National Weather Service, which you can

use for daily river/stream forecasts as well as to identify how high rivers or streams near you might reach during a potential flood event.

**CodeRED - Northampton County** - CodeRED is an emergency notification service that will send you phone calls, text messages, emails, social media alerts, and/or CodeRED Mobile Alert app notifications in case of local events such as evacuations or shelter-in-place orders. All residents within Northampton County can register for free on the county emergency management website: [ncem-pa.org](http://ncem-pa.org), or by texting "NCEM" to 99411 (from a smartphone).

### How to sign up for local information and alerts:

Many municipalities encourage residents to sign up for local emergency and community alert services. If your municipality does not offer an alert service, you can check its website or social media pages for updates and be sure to sign up for county emergency alerts.

**Bangor** - <https://bangorborough.org/> Facebook.

**East Bangor** - <https://eastbangorborough.org/> Facebook.

**Lower Mount Bethel** - Lower Mount Bethel uses the CodeRED emergency notification system. Register through the link on the homepage of the township website, [www.lowermtbethel.org/](http://www.lowermtbethel.org/), or by texting LMBT to 99411. Facebook. <http://www.lowermtbethel.org/>

**Upper Mount Bethel** - Upper Mount Bethel uses the CodeRED emergency notification system. Register through the link on the homepage of the township website, [umbt.org](http://umbt.org), or by going to <https://public.coderedweb.com/CNE/en-US/BFBC770DF166>. Facebook/Twitter. <https://umbt.org/>

**Portland** - Facebook/Twitter. <http://portlandboroughpa.com/>

**Roseto** - To join the Roseto Emergency and Announcements Hotline, contact the Borough office with your name, address and contact telephone number. Facebook. <http://boroughroseto.com/>

**Washington** - <https://www.washington-township.com/>

### Weather Watch vs. Warning

The National Weather Service uses different alerts to indicate the severity and immediacy of hazardous weather events like floods, winter storms, and tornadoes. A **watch** indicates that hazardous weather is possible in the near future and you should start making plans to stay safe. A **warning** indicates that hazardous weather is imminent or already happening, and you should get to a safe location NOW!

### Explore insurance options

Most homeowners' insurance does not cover damage from floods or sinkholes. While those in Special Flood Hazard Areas (SFHA) or high-risk areas with federally backed mortgages are required to have flood insurance, others also face risks of flood damage and might not have looked into insurance options. More information on the National Flood Insurance Program can be found at [floodsmart.gov](http://floodsmart.gov). Similarly, homeowners should assess the risk of sinkholes in their region and decide whether investing in sinkhole insurance is right for them. In PA, property owners are responsible for sinkhole damage on their property, even if the issue was not caused by the owner.

### Mitigation strategies for serious situations

In some cases, it might be necessary to take more drastic action before disaster occurs in order to avoid even larger losses in a hazard event. This can include elevating utilities or structures above anticipated flood levels or implementing floodproofing strategies on a property. Structural elevation has been undertaken in multiple instances for flood-prone homes along the Delaware River. Contractors can help explore options for these large-scale projects.

## Neighborhood & Community Level

**Individual preparations are very important, but some preparedness and mitigation measures require the involvement of a group of people, municipal government, and/or outside funding sources.** These can include infrastructure improvements, development of green infrastructure, improved communication and community relationships, a municipal or county level emergency plan, and more. Community resilience can come from actions as simple as checking in on elderly neighbors or as complex as multi-year projects carried out by many community partners.

**In Pennsylvania, many important decisions regarding hazard preparedness and mitigation are made at the municipal government level.** In order to be eligible for grants and funding for mitigation work, each municipality must provide input for the **Lehigh Valley Hazard Mitigation Plan**. This includes identifying the mitigation actions they plan to take, which can include retrofitting buildings to make them more resilient to future damage, conducting public education and outreach about potential hazards and preparedness strategies, participating in programs like the federal Community Rating System (which can reduce flood insurance premiums for residents when communities take certain actions to reduce their overall flood risk), finding funding to repair or update bridges and other infrastructure, creating new zoning ordinances and codes to reduce damage from hazards like flooding, developing plans to better enforce existing ordinances, purchasing or relocating structures in hazard-prone areas, and more. Community input shapes how municipalities prioritize these actions and helps build momentum for achieving them.

If you're curious about mitigation strategies your municipality may be pursuing, you can view an annex to the Lehigh Valley Hazard Mitigation Plan for each municipality in the Lehigh Valley, which includes a table of planned mitigation actions. (<http://ncem-pa.org/hazard-mitigation/>) Then, by attending borough/city council or town-

ship board meetings, you can stay informed about which strategies may currently be underway and provide your input to municipal officials and staff.

**In addition to formal community mitigation efforts, there are many informal ways of collaborating with your neighbors to make everyone safer in the event of a natural hazard event.** Ties to the people around us and to community organizations that can provide help are some of the most valuable resources during an emergency. In preparation for a potential urgent situation in the future, you can start fostering relationships with people in your community, getting to know if elderly people or other vulnerable individuals live nearby and checking on them. You can also begin discussing with others what would make your community more resilient and taking those steps with the help of local organizations or government bodies as needed.



Volunteers at a community center prepare boxes of food for those in need.

So what specifically might resilience at the neighborhood or community level look like? Here are some local success stories of preparedness and mitigation efforts for a variety of hazards.



## SPOTLIGHT ON RESILIENCY:



### Lower Mount Bethel Township Welcome Center

A place for community that educates and demonstrates green stormwater practices.

Tributaries to the Oughoughton Creek in Lower Bethel Township would occasionally flood and carry cobbles onto roadways and erode fill around culverts causing road collapse. In particular, the Martins Creek/ Belvidere Highway at the intersection of DePues Ferry Road which is the main access to the PPL facilities in Lower Mount Bethel Township, would flood and disrupt transportation. With a changing climate, more heavy rain events are occurring and will continue to occur - together with more development and impervious surfaces, the excess water results in stormwater runoff and localized flooding. To make the area better able to manage stormwater runoff in a sustainable way, Lower Mount Bethel Township, with funding from the Delaware River Joint Toll Bridge Commission and PPL, designed and constructed a Welcome Center that incorporates stormwater management and green building best practices. The design of the Lower Mount Bethel Township Welcome Center encompasses multiple strategies for mitigating stormwater runoff, in addition to green building practices (solar panels, energy efficiency, etc.). An array of 14 solar panels located on the roof can create up to 3.15 kilowatts of electricity every hour. The building also has a green roof that captures some stormwater, and pipes surplus water to a stormwater infiltration device. There is a walking path made of permeable macadam that allows water to penetrate the surface and prevents runoff. Grassy swales, planted with native plants, slow the flow of runoff and allow water to absorb into the ground, and are located around the site, as are infiltration trenches that are filled with stones and allow for water infiltration. The nearby Park & Ride lot drains water to various rain gardens, which promotes slow uptake by the surrounding soil and native plants. Overflow is directed to a constructed wetland and permanent pond, allowing all stormwater to be managed on site. Volunteers have helped make the site what it is today - planting native species in the rain gardens and in the green roof - and are always welcome to help with maintenance.



The Welcome Center's green roof helps to capture rainwater.



Grassy swales, native plantings and stone-filled infiltration trenches all prevent runoff.



Rain gardens help to absorb and filter stormwater runoff from the parking lot.



## SPOTLIGHT ON RESILIENCY:



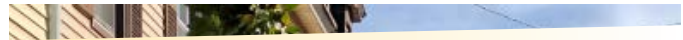
### Easton's Urban Forest

Heat-related illnesses are a leading cause of death from natural weather-related hazards. The implications of extreme heat in urban communities are magnified in areas experiencing what is called the "Urban Heat Island Effect." Areas with excessive pavement, dark surfaces (like macadam) and limited vegetation can have ambient temperatures significantly higher than nearby rural areas.

Easton's West Ward neighborhood is a highly urbanized area with few green spaces. The City of Easton through its Public Works Department decided to undertake a large shade tree planting initiative to bring trees to this area to help reduce the heat island effect and lower ambient temperatures, while also improving air quality and bringing aesthetic appeal to the streetscape. Working with the Easton Environmental Advisory Council, the city undertook a street tree inventory and developed a list of appropriate street trees. As part of this initiative, in 2019, working with funds from the PA DCNR TreeVitalize program, the City of Easton Forester Robert Christopher, other City staff, and neighborhood homeowners and volunteers planted 52 trees along four city blocks, from 600 to 900 Ferry Street. To calculate the effect of this planting, the City forecasted the benefits these trees would bring, such as carbon sequestration, pollution particulate absorption, greenhouse gas mitigation, stormwater runoff interception, and heating and cooling savings. Easton has continued an active street tree planting program throughout its four neighborhoods, planting hundreds of trees and providing education to residents about the proper care and maintenance of trees outside their homes.

Right above: Homeowners work together to plant a tree on their block as part of a city street tree planting program.

Right below: City of Easton Forester Robert Christopher inspects the roots of a tree being planted along Ferry Street.



In 2019, homeowners helped the City of Easton plant 52 trees to help shade four city blocks.





## SPOTLIGHT ON RESILIENCY:



### Sullivan Park

A Lafayette College class partnered with conservation organizations to turn an underutilized section of a local park into a stormwater detention wetland that helps to protect neighbors from flood damage.

After the remains of Hurricane Ivan came through the Lehigh Valley in September 2004, bringing a large amount of rain over the course of just a few hours, many areas experienced flooding, including a College Hill neighborhood which saw major runoff from Forks Township above. This large volume of water caused overflow of storm drain infrastructure and caused significant damage to streets in the neighborhood. At the time, Sullivan Park was not very widely used and was home to baseball fields that were always wet. This gave rise to the idea for a project to use a portion of the park to construct a stormwater detention wetland. Dr. David Brandes's Lafayette College Civil and Environmental Engineering class began testing the site that spring and subsequent classes developed a conceptual plan for the constructed wetland. Lafayette, Bushkill Stream Conservancy, the Northampton County Conservation District, and the City of Easton obtained grants from the Pennsylvania Department of Environmental Protection and Department of Conservation and Natural Resources for final design and construction, which involved constructing the necessary structures to divert and retain water. Native plants were added to the wetland and students continued to work to monitor the site and manage invasive plant species. The wetland has since grown into a forest-like park, home to birds, butterflies, turtles, and other animals. The site also collects rainwater, retains it as sediment settles out, and allows water to slowly infiltrate into the ground or flow out of the wetland. The Sullivan Park project increases biodiversity, prevents runoff from causing damage to the College Hill neighborhood, and serves as an outdoor laboratory for students learning about wetlands and stormwater management. This project is also a great example of how partnerships - between the college, the stream conservancy, the city, and others - can enhance all participants' abilities to achieve a community goal.



Damage from Hurricane Ivan, fall 2004.



Planting day, spring 2010.



Summer 2010

Photos courtesy of David Brandes.



# Conclusion

Building community resilience is an ongoing process that needs the involvement of individual citizens, businesses, local government, community organizations, and state and national partners.

The Bangor area is a unique region with unique natural hazards. Part of living here is being knowledgeable about what those hazards are and how you and those around you plan to respond to those hazards as a resilient community. Building community resilience is an ongoing process that needs the involvement of individual citizens, businesses, local government, community

organizations, and state and national partners. By being prepared at the household level, supporting and leveraging the resources available from local institutions and government entities, and visioning with our neighbors what future resources and programs would enhance the community, everyone can be part of creating resilience.



Residents' vision of a resilient community was described as sustainable, informed, prepared, connected, cooperative, educated, healthy, green and awesome.

# Emergency Kit Checklist

An emergency kit contains the things you and your family will need to sustain yourselves for at least three days, either in your home or while evacuating.

## Emergency Kit Checklist

- Important emergency phone numbers
- First aid kit
- Non-perishable food (three day supply for evacuation, two week supply for home)
- Can opener
- Bottled water - one gallon per person, per day (three day supply for evacuation, two week supply for home)
- Radio and batteries
- Flashlight and/or glow sticks
- Basic toiletries
- Any medications or medical supplies (hearing aids, contact lenses, cane, syringes) your family members or pets need
- Whistle
- Cash and coins

### Also consider including:

- Extra clothes and blankets
- Extra set of car/house keys
- Sleeping bags
- Pet food and supplies
- Infant formula, diapers
- Sturdy shoes and heavy socks
- Water purifying tablets
- Matches or a lighter
- Nylon cord
- Plastic garbage bags and ties
- Family photographs or important documents (copies or photos at minimum)
- Small toys
- Hand wipes
- Sanitation/personal hygiene items, bleach
- A map of the area
- Basic tools (multipurpose pocket knife, pliers, wrench, scissors)
- Duct tape



# Emergency Plan

Make sure each member of your family has a copy of your emergency plan, and keep a copy with your emergency kit.

## Creating an Emergency Plan

### Think about or discuss with those you live with:

- Which hazards are most likely to affect you?
- Where will you get information? (forecasted river levels, precipitation amounts, active weather watches or warnings, local road closures/evacuation orders, etc.)
- How will you get in contact with each other if you are apart when a hazard event occurs?
- What is your plan for taking care of your pets or service animals?
- What steps can you take ahead of time at your property to make it safer? Can you install a quick-disconnect furnace, or elevate electrical and mechanical equipment? Have you moved photos or items that could be damaged by flood waters to elevated shelves or higher floors of your home?

### Record the following:

Meeting place outside your home -

|                     |
|---------------------|
| Local meeting place |
| telephone number    |
| address             |
|                     |

|                     |
|---------------------|
| Evacuation location |
| telephone number    |
| address             |
|                     |

|                          |
|--------------------------|
| Planned evacuation route |
|                          |

|                            |
|----------------------------|
| Secondary evacuation route |
|                            |

**Out-of-town emergency contact**

|                  |
|------------------|
| Name             |
| Telephone number |
| Address          |
|                  |

**Contact Information and Important Resources**

In case of emergency, call **9-1-1**

**Northampton County Emergency Management:  
610-746-3194**

**Northampton County Non-Emergency Numbers:**  
610-759-2200, 610-865-7171, 610-865-7186,  
610-865-7187, 610-317-0808, 570-897-9078  
(all filter into same communications center)

**Other important contacts**

|                     |
|---------------------|
| Doctor              |
| Pharmacist          |
| Insurance           |
| Veterinarian/Kennel |
|                     |



For each family member -

|                               |
|-------------------------------|
| Name                          |
| Date of birth                 |
| Telephone number              |
| Work/school address           |
| Important medical information |

|                               |
|-------------------------------|
| Name                          |
| Date of birth                 |
| Telephone number              |
| Work/school address           |
| Important medical information |

|                               |
|-------------------------------|
| Name                          |
| Date of birth                 |
| Telephone number              |
| Work/school address           |
| Important medical information |

|                               |
|-------------------------------|
| Name                          |
| Date of birth                 |
| Telephone number              |
| Work/school address           |
| Important medical information |

# Additional Resources

Communities resilient to extreme weather events and other environmental hazards make informed decisions to anticipate, prepare for, respond to, and recover from significant environmental hazards and stresses, with minimum damage to social well-being, the economy, and the environment.

## Here are some of the resources recommended by NOAA to educate and inspire people to increase community resilience:

- NOAA Mid-Atlantic River Forecast Center Office, Staff, and Products
- NOAA National Weather Service Weather Forecast Office Philadelphia/Mt. Holly Office, Staff, and Products
- Science on a Sphere®
- National Integrated Heat Health Information System
- NOAA Climate.gov
- NOAA Digital Coast
- NOAA National Centers for Environmental Information (NCEI)
- NOAA National Centers for Environmental Prediction
- NOAA National Hurricane Center
- NOAA National Operational Hydrologic Remote Sensing Center
- NOAA Regional Integrated Sciences and Assessments (RISA) Program - Consortium for Climate Risk in the Urban Northeast NOAA Weather.gov
- NOAA Weather-Ready Nation
- U.S. Climate Resilience Toolkit
- U.S. Drought Portal
- U.S. Global Change Research Program (USGCRP)
- U.S. National Climate Assessment
- Center for Climate Preparedness and Community Resilience (Antioch University New England)
- Climate Interpreter - [climateinterpreter.org](http://climateinterpreter.org)
- Climate Literacy & Energy Awareness Network (CLEAN Data.gov)
- Federal Emergency Management Agency (FEMA)
- FEMA Community Resilience Indicators
- FEMA National Flood Insurance Program's Community Rating System
- FEMA State Hazard Mitigation Officers: A state's Hazard Mitigation Officer serves as the responsible individual for all matters related to hazard mitigation and adaptation.
- National Disaster Preparedness Training Center
- National Drought Mitigation Center
- National Institute of Standards and Technology (NIST) Community Resilience Center of Excellence
- NIST Community Resilience Program
- Ready.gov
- 100 Resilient Cities



