

A stylized landscape illustration featuring a large orange sun in the top left, blue clouds, green rolling hills, a windmill, a barn, a suspension bridge, power lines, and various buildings. The bottom of the image is a blue wavy band.

# Building Resilience Together

An Assessment of  
Needs and Next Steps  
in Greater Philadelphia



**The Delaware Valley Regional Planning Commission (DVRPC)** is the federally designated Metropolitan Planning Organization for the Greater Philadelphia region, established by an Interstate Compact between the Commonwealth of Pennsylvania and the State of New Jersey. Members include Bucks, Chester, Delaware, Montgomery, and Philadelphia counties, plus the City of Chester, in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer counties, plus the cities of Camden and Trenton, in New Jersey.

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## PROJECT TEAM

- **Delaware Valley Regional Planning Commission (DVRPC)**
- **Buro Happold**
- **Interface Studio**

## THANK YOU TO INTERVIEW PARTICIPANTS

The project team would like to thank the representatives of counties, states, municipalities, nonprofits, academic institutions, and peer MPOs who participated in the conversations that helped inform this document. For a full list of interview participants, see the Appendix.

# Introduction

While Greater Philadelphia has long faced impacts from severe weather, increasing extremes are exposing the region to new threats and new vulnerabilities.

More severe and more frequent storms, heavier downpours, storm surge, and rising temperatures are leading to increased flooding, water-quality impairments, erosion, diminished air quality, heat-related stress, and chronic and acute impacts to infrastructure, personal property, and public health.

**The impacts are complex, widespread, and cut across political and geographic boundaries. However, the impacts of these hazards are experienced differently in different places.** Factors such as socioeconomics, limited access to resources, and development patterns render some communities more vulnerable to and less able to prepare for and recover from extreme weather events. **To deliver the most meaningful benefits, responses to these challenges will need to be locally specific, sensitive to the needs of our most vulnerable communities, and implementable at scale.**

**The Delaware Valley Regional Planning Commission (DVRPC) undertook this assessment to better understand what local governments, state agencies, academic institutions, nonprofits, and community-based organizations (CBOs) need to respond to the challenges posed by weather-related hazards in the Greater Philadelphia region.** As the Metropolitan Planning Organization (MPO) for the nine-county Greater Philadelphia region, which includes Bucks, Chester, Delaware, Montgomery, and Philadelphia counties in Pennsylvania and Burlington, Camden, Gloucester, and Mercer counties in New Jersey (see Figure 1), DVRPC builds consensus for a shared regional vision; enables data-based, community-centered solutions; and helps put plans into action. While transportation planning is a core function, DVRPC also works across various areas to improve quality of life in the region, including promoting livable communities and preserving natural resources.

Through this work, DVRPC and actors throughout the region can better use their resources to help promote, support, and scale-up solutions to flooding and extreme weather. **This summary document is organized into the following sections:**

- **Approach:** Details on the process taken in the research and outreach phases of this project.
- **Needs and Actions:** Summary of key regional resilience needs paired with priority high-level actions for DVRPC and its partners to take.
- **Conclusion:** How DVRPC and the region can use this Needs Assessment to inform its resilience programs.



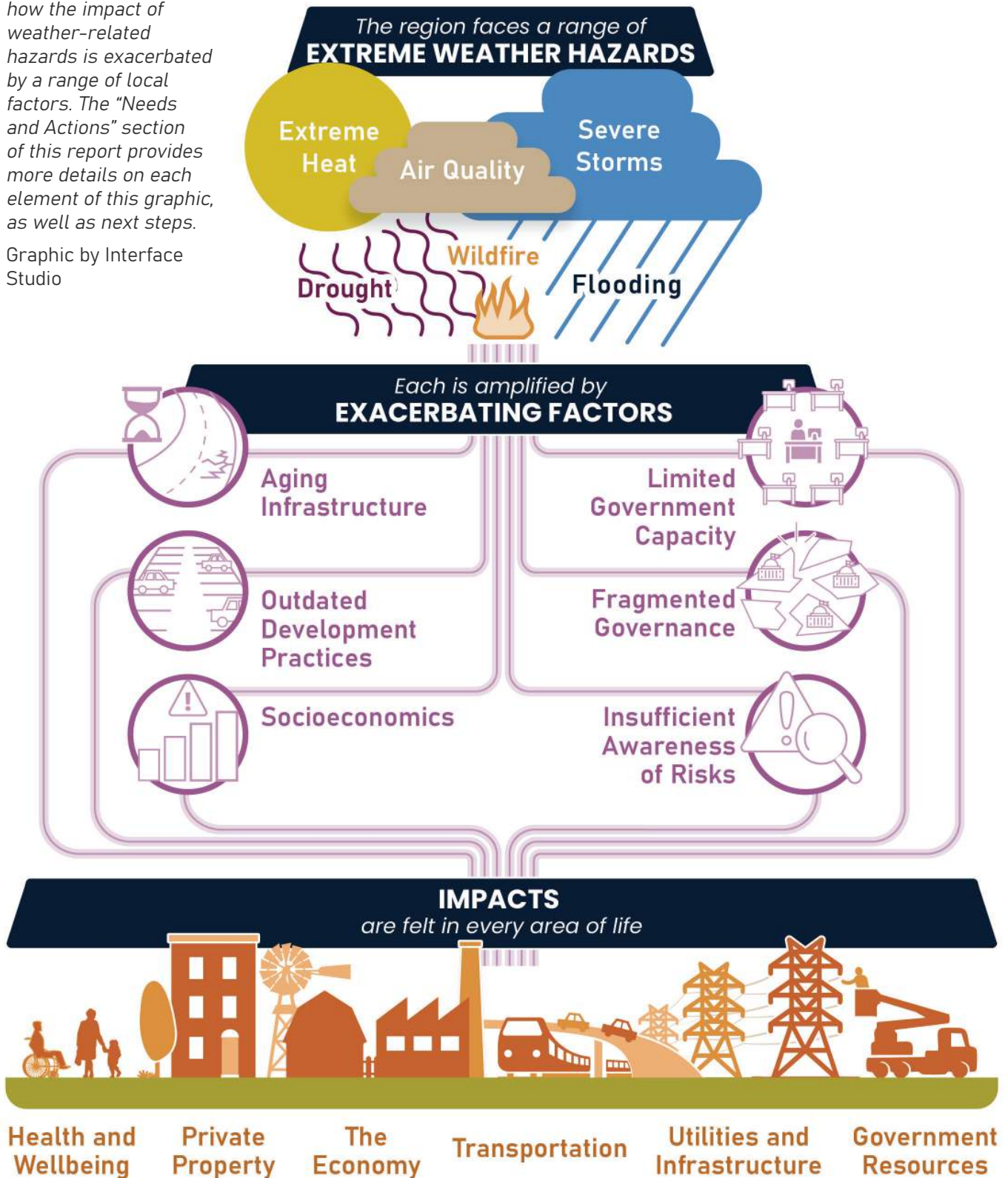
**FIGURE 1: DVRPC REGION**

*The DVRPC region encompasses the nine counties of Greater Philadelphia in Pennsylvania and New Jersey.*

**FIGURE 2: SEVERE WEATHER HAZARDS, EXACERBATING FACTORS, AND IMPACTS**

This graphic illustrates how the impact of weather-related hazards is exacerbated by a range of local factors. The “Needs and Actions” section of this report provides more details on each element of this graphic, as well as next steps.

Graphic by Interface Studio



# Approach

Resilience is the ability to prepare for, withstand, and bounce back from hazards and stressors. This document utilized a landscape assessment and extensive partner engagement to understand existing resilience resources, identify resilience needs, and develop recommended actions to address resilience gaps across the region.

## Landscape Assessment

The team compiled a database of existing partners and available resources related to resilience initiatives, plans, and policies in the DVRPC region. The Landscape Assessment provided the basis for questions in the stakeholder engagement portion of the project.

## Stakeholder Engagement

### Interviews

The project team conducted interviews in two phases. Discussion topics varied by stakeholder but generally covered severe weather hazards, resources, challenges, needs, and opportunities for DVRPC support. See the Appendix for a full list of interview participants.

**Phase 1** involved virtual interviews with representatives from 17 DVRPC partner organizations:

- **The nine counties in the DVRPC region**
- **The cities of Chester and Trenton**
- **Select state agencies**, including the NJ Department of Environmental Protection (NJDEP), the NJ Department of Transportation (NJDOT), and the PA Department of Transportation (PennDOT)
- **Academic institutions**, including Rutgers and Drexel universities
- **The non-governmental organization (NGO) Sustainable Jersey**

**Phase 2** sought to expand the conversation beyond DVRPC's core partners to include:

- **Three municipalities** recommended by Phase I interviewees: Abington, PA; Norristown, PA; and Rutledge, PA
- **Three community organizations** engaged in significant resilience work: Camden Community Partnership; Center for Environmental Transformation (Camden, NJ); Brandywine Conservancy
- **Three peer regional planning organizations** that have been engaged in resilience work: Atlanta Regional Commission, Baltimore Metropolitan Council; Metro Washington Council of Governments

### DVRPC Staff Listening Session

To complement external engagement, the project team also held a listening session with DVRPC staff to identify additional resilience needs and opportunities.

**FIGURE 3: THE CYCLE OF RESILIENCE ACTION**

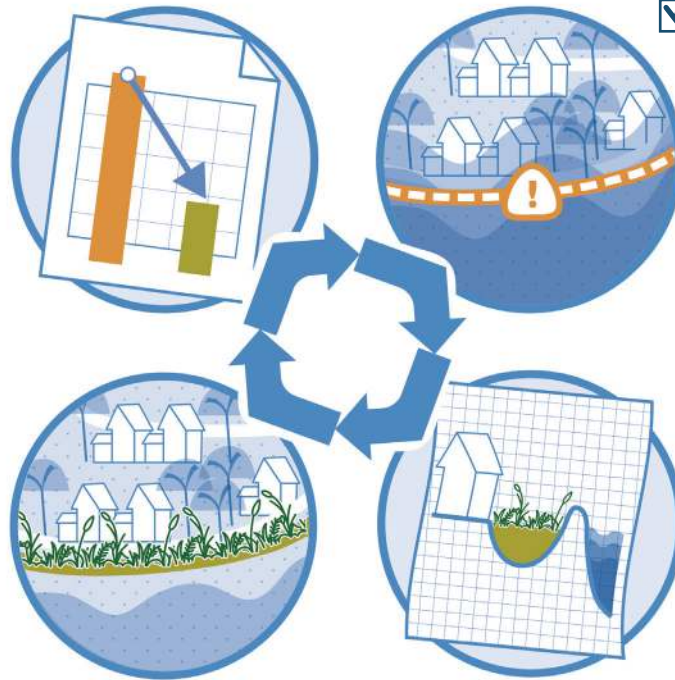
Resilience actions take place across four key steps. Different actors specialize in different stages of the process, and there are both positive actions and roadblocks in each area.

Graphic by Interface Studio

## Evaluating Impact

✓ There is an increasing amount of literature and guidance on proper metrics for tracking the success of resilience work

✗ Counties and municipalities have little capacity to track progress long-term



## Risk Assessment

✓ Data on heat is widely available

✓ Some cities and counties are producing advanced pluvial flooding analysis

✗ Pluvial flooding models are rare and difficult to produce

## Implementation

✓ High profile projects in major cities are increasing the visibility of resilience work

✓ There has historically been resources available for transportation work, and DOTs are increasingly embedding resilience into their practice

✗ There are limited resources for project implementation

✗ Municipalities are often small and under resourced, but they are also often the primary entity with the power to regulate land use, provide emergency services, and maintain local infrastructure systems

## Planning

✓ Many partners say there are resources available for planning, especially in New Jersey, where state mandates and strong technical assistance encourage action

✓ Grant funding has made it possible for some New Jersey cities to hire chief resilience officers

✗ Resilience is not embedded in most cities planning processes

✗ There is little incentive for most municipalities to plan in collaboration with their neighbors

# Needs and Actions

**This section is organized around six major themes** that arose throughout the project:

- **Flooding**
- **Extreme Heat, Drought, Wildfire, and Air Quality**
- **Social Vulnerability**
- **Built Environment**
- **Funding, Capacity and Local Governance**
- **Regional Planning**




Each theme section contains information on context, needs, and key high-level actions. Actions are organized under the following headings:

- **Regional Actions:** These will need to be implemented by various partners across the region. Regardless of who ultimately leads these actions, successful implementation will require intermediate steps such as data collection and analysis, planning and outreach, tool and policy development, and funding, as well as participation by one or more federal, state, county, local, nonprofit, academic, and community partners. **DVRPC can play an important role in advancing many “Regional Actions” by coordinating and convening partners, providing technical assistance, identifying funding opportunities, and promoting best practices.**
- **DVRPC Actions:** These are actions that DVRPC is best positioned to lead, funding permitted. Many of these actions are contained in the “Regional Planning” subsection.

**FIGURE 4: KEY ACTORS AND THEIR ROLES IN THE RESILIENCE SPHERE**

This table displays the main actors who participate in supporting resilience in the Greater Philadelphia region, as well as their roles. Some key takeaways:

- Local municipalities are a key implementing body for non-transportation resilience projects in the DVRPC region.
- There are a wide range of actors who participate in planning resilience actions.
- Non-profits and academic institutions can also play a key role in providing technical assistance and research.
- Many actors can play a role in providing funding for resilience work.

	Funds	Regulates	Plans	Implements Projects	Technical Assistance & Consulting	Research & Best Practices
<b>Legend:</b>						
<b>Federal Government</b>	●	●	◐	◐	◐	◐
<b>DVRPC</b>	●	○	●	○	●	●
<b>State DEP</b>	●	●	●	○	○	●
<b>State DOT</b>	●	●	●	●	○	○
<b>Counties</b>	●	○	●	◐	○	○
<b>Municipalities</b>	●	●	●	●	○	○
<b>Non-Profits</b>	○	○	○	◐	●	●
<b>Academic Institutions</b>	○	○	○	○	●	●

# Flooding

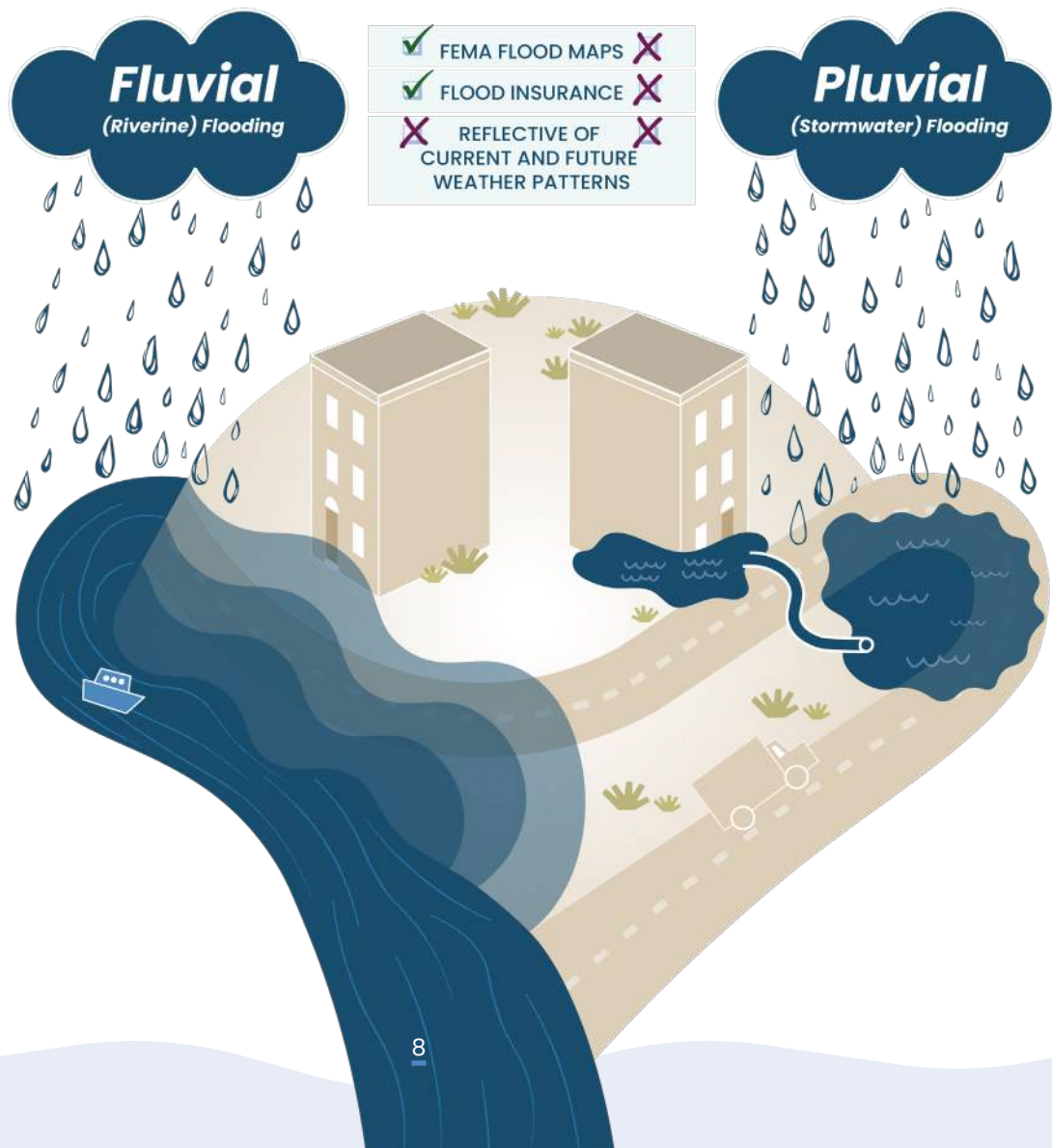
## Context

During stakeholder interviews, county and municipal officials consistently identified flooding, particularly riverine (fluvial) and stormwater (pluvial) flooding, as their most significant resilience concern.

- **Riverine/fluvial flooding** occurs when streams, creeks, and rivers overflow their banks. The Federal Emergency Management Agency (FEMA) produces Flood Insurance Rate Maps (FIRMs) for the entire country that indicate areas at risk from fluvial flooding; however, they are based on historical data and do not reflect changes in precipitation and development patterns, both of which are increasing the risk of flooding.
- **Stormwater/pluvial flooding** occurs when the volume of runoff exceeds the capacity of the stormwater system, resulting in localized flooding. It can be hard to predict because it can occur far from rivers or streams and may result when storm drains and culverts are blocked, clogged, or overwhelmed. Maps and models assessing the risk of stormwater flooding are currently limited, and when available, often lack the detailed stormwater drainage information needed to make this type of mapping most effective.

**FIGURE 5: FLUVIAL AND PLUVIAL FLOODING**

Graphic by Interface Studio



## Needs and Actions

### 1. Conduct flood risk modeling and mapping to inform decision-making.

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#### REGIONAL ACTIONS

- Develop enhanced riverine flood risk models and maps that reflect current and future weather and development patterns
- Develop pluvial flood models at regional and/or subregional scales
- Digitize stormwater infrastructure data

#### DVRPC ACTIONS

- Develop enhanced riverine and/or pluvial flood models to support a comprehensive transportation asset vulnerability assessment

#### *What Is Already Happening?*

- ★ **Drexel University** created a pluvial flood model for the City of Camden, NJ.
- ★ **The Watershed Institute** is collaborating with the **Mercer County Planning Department** on similar efforts.

### 2. Install real-time water-level monitoring systems.

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Real-time flood monitoring systems improve emergency response efforts and provide post-event data to enhance flood risk assessments and modeling.

#### REGIONAL ACTIONS

- Expand the use of real-time water-level monitoring systems across the region

#### *What Is Already Happening?*

- ★ **The Delaware County Planning Department** installed a flood monitoring gauge along the Darby Creek at the Ridley Marina in late 2025 and has plans to install additional gauges throughout the county.
- ★ **Philadelphia's Office of Emergency Management** installed four real-time flood monitoring gauges in 2025 along waterbodies near the Eastwick neighborhood, with plans to ultimately install 15 gauges across the city.

### 3. Track and document localized flooding events.

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Information and data on the extent, timing, causes, and impacts of localized flooding events can inform state and regional resilience planning efforts. This data can also help identify low-cost, targeted opportunities to address flooding impacts.

#### REGIONAL ACTIONS

- Comprehensively track flooding events with details on causes, extents, timing, and damages to communities and the built environment
- Use citizen science tools, such as location-tagged observations and photos, to document flooding events

#### DVRPC ACTIONS

- Create a centralized hub to store and provide access to flooding event data recorded by planning partners

#### *What Is Already Happening?*

- ★ **PennDOT** operates a statewide sensor network that provides real-time data to inform road and bridge closures during flooding events.
- ★ **PennDOT created the PennDOT Connects program**, which promotes collaborative transportation planning efforts between the agency, DVRPC, and municipalities.<sup>1</sup> DVRPC is a key player in this program, providing a first round of interdisciplinary review for PennDOT projects before they are brought before local communities.

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1 "PennDOT Connects," Commonwealth of Pennsylvania, accessed July 11, 2025, <https://www.pa.gov/agencies/PennDOT/research-planning-and-innovation/PennDOT-connects.html>

# Extreme Heat, Drought, Wildfire, and Air Quality

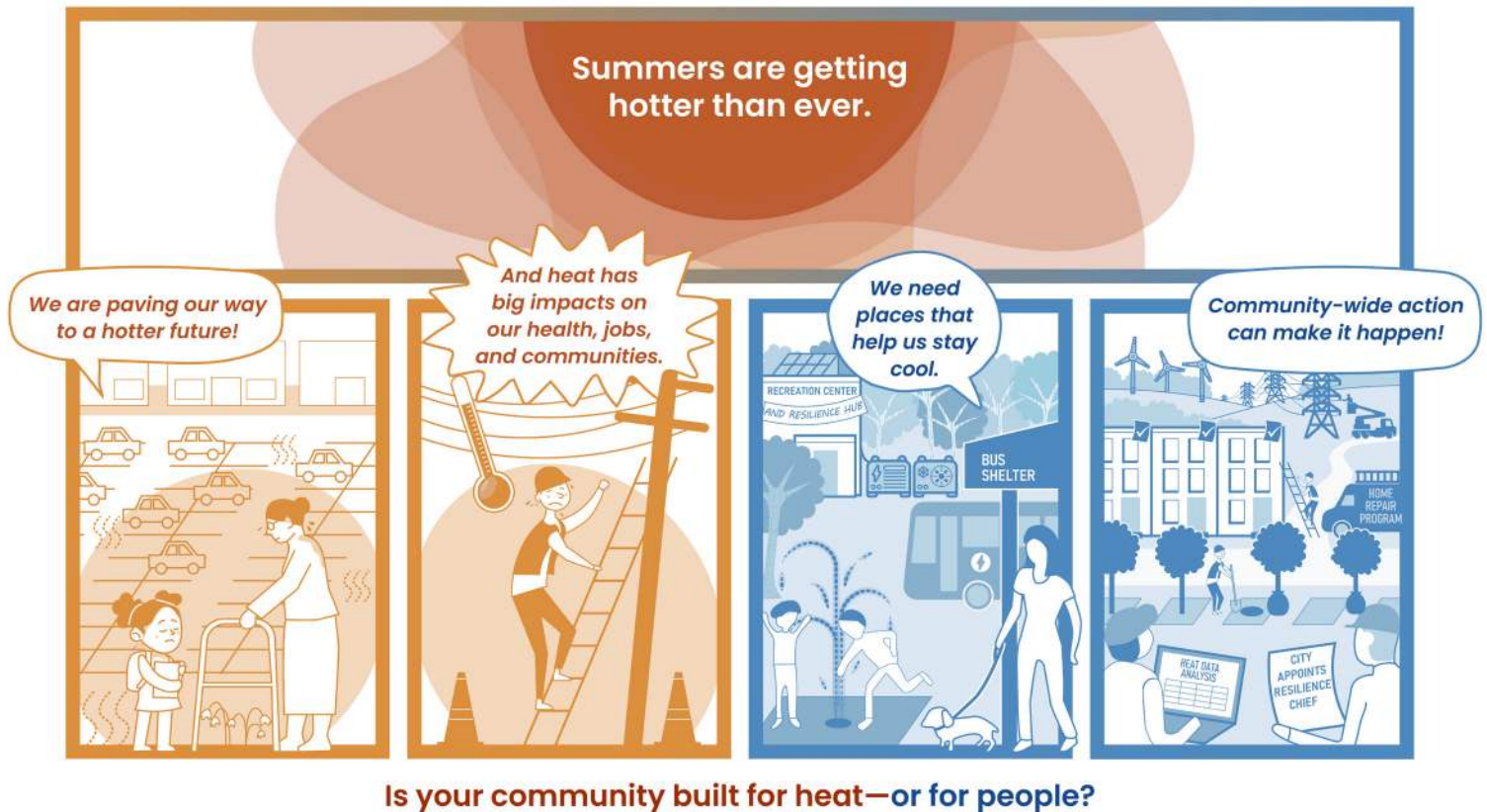
## Context

**Extreme heat is a high-priority issue for the region**, especially in the City of Philadelphia, which suffers disproportionately from the urban heat island (UHI) effect and is home to a high number of low-income, disabled, and elderly residents, and others who are less able to adapt to these conditions. Partners reported that extreme heat events are becoming more frequent and severe, and projections show that this trend is likely to continue.

**In addition to its direct impacts on public health and infrastructure, extreme heat is closely linked to other hazards** such as drought, wildfire, and poor air quality. These connections were emphasized during partner interviews, especially those conducted in fall 2024, when the DVRPC region experienced record low rainfall, warmer than normal temperatures, and several wildfires, including the Bethany Run wildfire, Big Rusty wildfire, and Pheasant Run wildfire.<sup>2,3</sup>

**FIGURE 6: THE IMPACTS OF AND SOLUTIONS TO EXTREME HEAT**

Graphic by Interface Studio



2 "Over 800 acres burning in uncontrolled wildfires throughout the state this week," Fox29 Philadelphia, effective November 8, 2024, <https://www.fox29.com/news/homes-evacuated-second-wildfire-burns-new-jersey-week>

3 "Big Rusty Wildfire: Cres make progress battling large fire in Burlington County," Fox29 Philadelphia, effective November 19, 2024, <https://www.fox29.com/news/large-wildfire-burlington-county>

## Needs and Actions

### 4. Address extreme heat in urban areas.

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Extreme heat has direct, and sometimes severe, impacts on public health and personal well-being. Urban areas with concentrated development and less tree canopy are, on average, hotter than the surrounding landscape due to the UHI effect, exacerbating these negative consequences.<sup>4</sup>

#### REGIONAL ACTIONS

- Coordinate heat awareness and risk communication across agencies
- Install cool pavements and cool roofs
- Increase urban tree canopy; prioritize communities most affected by the UHI effect

### 5. Mitigate heat impacts on walking, biking, and transit use.

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Heat has a disproportionate impact on mobility for households without a vehicle. Hotter temperatures make it less safe and less comfortable to walk, roll, bicycle, or wait for transit on unshaded summer streets. These challenges highlight the need to incorporate shading into transportation infrastructure design standards.

#### REGIONAL ACTIONS

- Install cool pavements
- Increase urban street tree planting
- Improve existing and install new bus shelters to increase shading and improve ventilation, and update bus shelter design guidelines accordingly

#### DVRPC ACTIONS

- Identify and encourage the incorporation of resilient design elements, such as natural stormwater infrastructure, cool pavements, and features that provide shade, in the planning, design, and approval phases of federally-funded transportation projects supported by DVRPC.

### 6. Expand access to home indoor cooling options as well as cool public spaces.

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Indoor and outdoor spaces that allow individuals to escape the heat and cool down are critical for ameliorating the acute impacts from heat stress. Overall, air conditioning in private homes has the greatest impact for individuals, but historically public programs have not had sufficient resources to fully address this need for low-income households that cannot afford it. The provision of community-based indoor cooling resources (libraries, community rooms, senior centers, etc.) and outdoor cooling resources (pools, spraygrounds, deeply shaded parks, etc.) are also critical—and often more achievable—public-sector strategies for providing heat relief.

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<sup>4</sup> “What are Heat Islands?” U.S. EPA, last modified September 2, 2025, <https://www.epa.gov/heatislands/what-are-heat-islands>

## REGIONAL ACTIONS

- Conduct studies on air conditioning access
- Develop affordable electrified cooling solutions in heat-vulnerable communities
- Explore policy measures to ensure access to indoor cooling such as maximum indoor air temperature standards in rental housing or care facilities
- Expand network of local indoor and outdoor cooling sites, and provide support to operators
- Facilitate and coordinate “whole-home repair” and weatherization programs that include low- or no-cost subsidies to low-income residents (also see “Understand and Address Home Heating and Cooling Burden”)

### *What Is Already Happening?*

- ★ **DVRPC is currently exploring ways to help partner organizations establish a regional whole-home repair/weatherization assistance program** in the four collar counties surrounding the City of Philadelphia, which could serve as a model for future regional resilience efforts. Supported by the National Laboratory of the Rockies (NLR), this initiative aims to assist low- and middle-income households with improving building envelope performance, thereby increasing the affordability and efficiency of heating and cooling systems.
- ★ During periods of extreme heat, the **Philadelphia’s Office of Emergency Management may declare a Heat Health Emergency**. During such declarations, the City’s network of cooling centers stay open later, a special helpline number is open for calls, mobile heat health teams may be dispatched, residential utility shutoffs are stopped, and “cooling SEPTA buses” are deployed to provide immediate heat relief for individuals without access to air conditioning.

## **7. Plan and prepare for drought and heat in agricultural areas.**

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Drought- and heat-related impacts to agriculture include changes in the length of the growing season; extreme heat stress; and warmer and drier conditions mid-season that reduce yields and increase irrigation demands. In Burlington County, for example, cranberry farmers were forced to pipe in water to fill their bogs during the summer of 2024 at a significant cost.

## REGIONAL ACTIONS

- Conduct agricultural vulnerability assessments to identify crops adversely affected by extreme heat
- Promote research and adoption of heat tolerant, drought tolerant, and resilient plant varieties
- Provide shade to reduce heat stress on livestock

## 8. Prepare for and improve outdoor air quality.

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Extreme heat encourages the formation of ground-level ozone and increases the formation of particulate matter through wildfires (smoke), droughts (dust), and stagnant air conditions. Parts of the DVRPC region do not attain National Ambient Air Quality Standards (NAAQS) under the Clean Air Act for ozone and fine particulate matter. Higher temperatures, dry conditions, and wildfire impacts will make it more challenging to bring these areas into attainment.

### REGIONAL ACTIONS

- Strengthen air quality education, alert, and outreach programs such as DVRPC's Air Quality Partnership and Ozone Action programs and NJDEP's Air Quality Flag Program
- Electrify medium- and heavy-duty vehicles to lessen tailpipe emissions
- Promote rail-based freight transportation, when feasible

### DVRPC ACTIONS

- Continue planning for and investing in transit and active transportation infrastructure to expand access to alternatives to driving

## 9. Protect outdoor workers.

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Rising temperatures place outdoor workers, especially those with physically demanding jobs, at greater risk of heat-related illnesses, such as heat stroke and exhaustion.<sup>5</sup>

### REGIONAL ACTIONS

- Develop workplace standards to protect workers in extreme heat conditions
- Coordinate outreach and education programs to improve heat safety practices in the agricultural and other outdoor labor sectors

### DVRPC ACTIONS

- Educate local governments on extreme heat risks to outdoor workers, such as public works staff and police officers, and provide guidance on protective measures

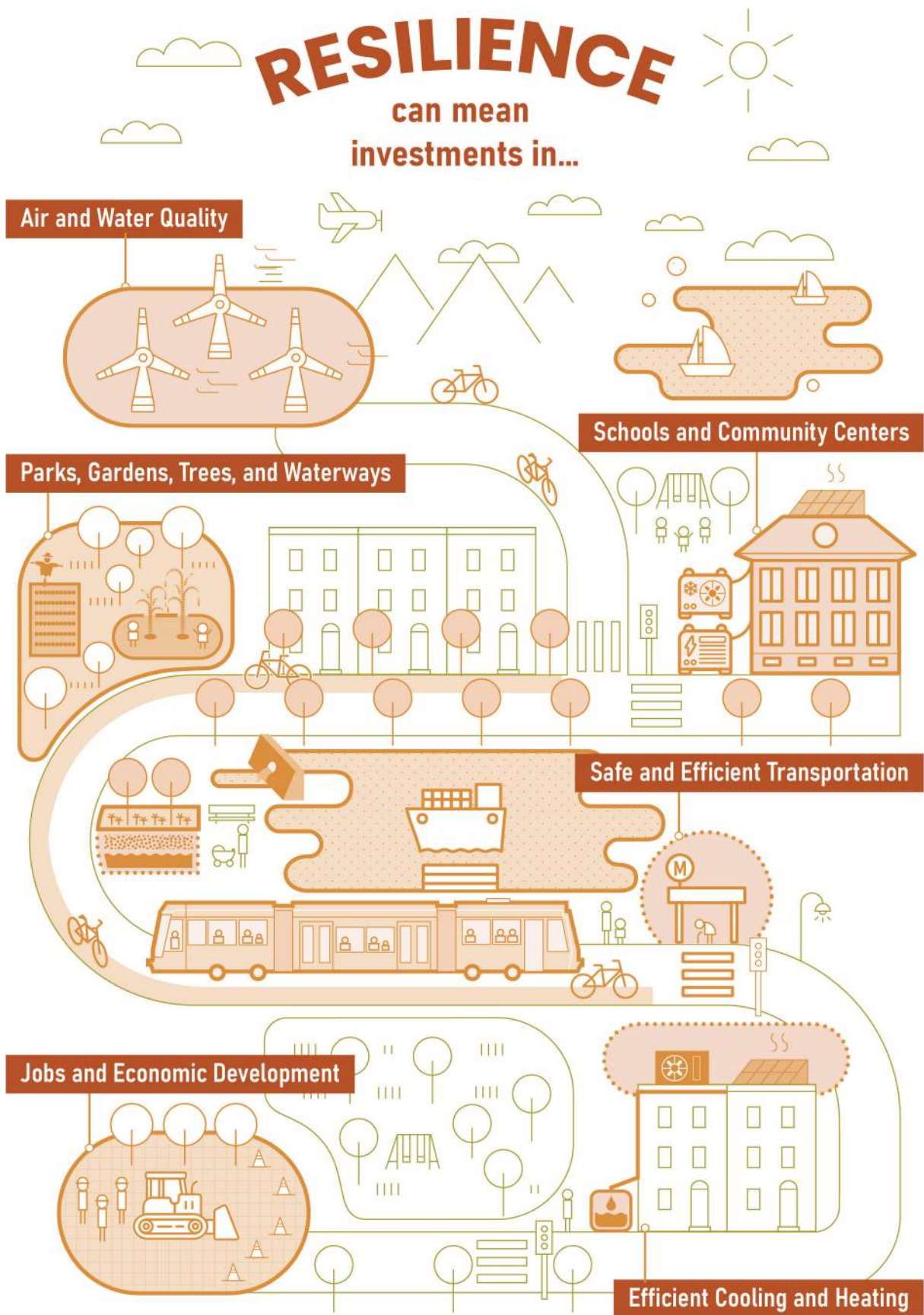
### *What Is Already Happening?*

- ★ **DVRPC's Air Quality Conformity Program works to ensure that projects and programs in the Transportation Improvement Program (TIP) and Long-Range Plan do not cumulatively harm air quality. DVRPC also administers the Air Quality Partnership, a coalition of private companies, government agencies, and non-profit organizations dedicated to raising awareness of air quality in the Delaware Valley and promoting actions that people and organizations can take to reduce air pollution.**

5 "At Risk: Outdoor and Indoor Workers," NIHHS, accessed July 11, 2025, <https://heat.gov/who-is-most-at-risk-to-extreme-heat/at-risk-outdoor-and-indoor-workers/>

**FIGURE 7: THE WIDE-RANGING BENEFITS OF RESILIENCE INVESTMENTS**

Graphic by Interface Studio



# Social Vulnerability

## Context

**Severe weather-related hazards pose greater risks for socially vulnerable communities.** “Social vulnerability” is a term used to describe individuals or communities that have lower income, lower educational attainment, disabilities, poor quality housing, and health conditions, as well as children and the elderly. Social vulnerability is not a reflection of individual weaknesses, but rather a collection of factors that makes it more difficult to respond to and recover from adverse impacts. Areas of high social vulnerability also often intersect with areas that experience high environmental burdens, such as exposure to heavy freight traffic and industrial activities, as well as higher environmental risks, such as increased exposure to flooding. These same areas often lack tree canopy and significant green space, which are critical for mitigating air pollution and extreme heat.

## Needs and Actions

### 10. Build trust with communities.

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A legacy of public- and private-sector decisions that result in negative impacts has led many socially vulnerable communities to distrust public programs and initiatives. Building trust with communities is, therefore, essential for advancing resilience and will require transparency, sustained effort and resources, and the use of clear, accessible language that connects quality-of-life concerns to resilience.

#### REGIONAL ACTIONS

- Deepen relationships with organizations representing communities, including low-income communities, to better engage them in resilience planning

#### *What Is Already Happening?*

- ★ **DVRPC’s Public Participation Task Force** is a 40-member advisory group that strives to represent the racial, ethnic, gender, educational and economic differences in the region. Members help shape transportation, community and environmental planning and decision-making by sharing their lived experiences.
- ★ **DVRPC’s Supporting Communities Program** supports community public engagement and planning efforts, and works directly with local governments to help them fund and deliver infrastructure projects.
- ★ **In Philadelphia’s Eastwick neighborhood**, multiple City departments have led sustained, community-centered engagement to build trust and develop meaningful, collaborative solutions to address repeated flooding episodes and strengthen resilience.

## 11. Understand and address home heating and cooling burden.

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Home heating and cooling burden, or the percentage of household income spent on home heating and cooling bills, is considered high when it exceeds six percent.<sup>6</sup> This burden is most often experienced by renters, lower income households, and older adults. Households with high home heating and cooling burden are less likely to have or be able to use air cooling systems, increasing their risks from extreme heat.

Resources like weatherization assistance programs help income-eligible households implement upgrades to reduce heating and cooling costs. However, households may be denied participation due to the need for upfront structural repairs. One method for overcoming these barriers is the development of "whole-home repair" programs, which coordinate both home heating and cooling system upgrades and necessary home repairs.<sup>7</sup>

### REGIONAL ACTIONS

- Plan for and implement actions to promote affordable and reliable home heating and cooling solutions

### DVRPC ACTIONS

- Continue analyzing the extent of home heating and cooling burden, as well as how electrification and efficiency initiatives may impact home heating and cooling burden in the future
- Promote and coordinate regional "whole-home repair" and weatherization programs that provide assistance to low-income residents

### *What Is Already Happening?*

- ★ **Philadelphia City government developed a Home Heating and Cooling Assistance Strategy in 2024, a roadmap to provide access to affordable and reliable home heating and cooling. The strategy aims to ensure that all Philadelphians can participate in and benefit from changes to the city's natural gas and electric utility systems.**
- ★ **Philadelphia's Built to Last (BTL) program** bundles home repair programs into a single application and assessment, so programs can be sequenced appropriately, reducing funding denials and increasing access to support.

6 Dreihobl, A., L. Ross, and R. Ayala, "How High Are Household Home Heating and Cooling Burdens?" Washington, D.C.: ACEEE, 2020, <https://www.aceee.org/research-report/u2006>

7 "Built to Last: An Initiative to Restore Safe, Healthy, and Affordable Homes," PEA, effective May, 2022, <https://pea.org/wp-content/uploads/2022/10/10-2022-PEA-Built-to-Last-summary.pdf>

# Built Environment

## Context

**Much of the region's built environment was designed with historic, not future, weather patterns in mind.** The built environment encompasses the human-made infrastructure, buildings, and spaces that shape where people live, move, and access essential services. Understanding the risks severe weather-related hazards, such as flooding and extreme heat, pose to transportation infrastructure, utility systems, and housing is essential to developing strategies to increase resilience.

## Needs and Actions

### 12. Upgrade vulnerable infrastructure networks.

All infrastructure is potentially at risk from extreme weather events, but aging infrastructure with a backlog of maintenance needs are particularly at risk. The Greater Philadelphia region has some of the oldest infrastructure in the country and a long history of deferred maintenance. Transportation, stormwater systems, and the electric grid are particularly vulnerable.

#### REGIONAL ACTIONS

- Comprehensively track the causes, extents, and timing of damages to infrastructure systems from severe weather events.
- Create risk-based riverine and pluvial flood models to better assess transportation-related vulnerabilities
- Upgrade stormwater infrastructure systems to minimize or eliminate combined sewer overflows

#### DVRPC ACTIONS

- Develop a regional Transportation Resilience Improvement Plan (TRIP) to systematically evaluate transportation vulnerabilities and establish a list of priority resilience projects

### *What Is Already Happening?*

- ★ **PennDOT's Road Closure Reporting System (RCRS)** records the location, timing, and causes of road closures on state-owned roads.
- ★ **DVRPC** solicited proposals from consultant firms in winter 2026 to support flood modeling and other technical tasks for the development of a regional TRIP.

### 13. Consider resilience in economic development strategies.

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Economic development activities can be at odds with strategies to build resilient communities. Balancing economic growth with resilience requires intentional planning, including clear siting policies and design standards that support development while reducing long-term environmental risks.

#### REGIONAL ACTIONS

- Promote best practices in the siting and design of commercial and residential development
- Encourage land use and zoning policies that deter development in high-risk areas and minimize impervious surface coverage

#### *What Is Already Happening?*

- ★ **DVRPC's Comprehensive Economic Development Strategy (CEDS)** stresses the need to prevent future development from encroaching into ecologically sensitive areas, and the need to relocate at-risk structures.

### 14. Improve the resilience of the housing stock.

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Housing resilience includes three broad goals: 1) create a housing stock that is resilient to hazards in order to minimize disruptions to housing supply and promote natural affordability; 2) prevent damage to housing that makes it more susceptible to future stressors and/or creates sub-standard living conditions; and 3) provide affordable housing that includes adequate air conditioning, ventilation, and quality construction resilient to the impact of severe storms. Resilient affordable housing is particularly important since low-income homeowners and renters have fewer resources to repair damage or relocate following extreme weather events.

#### REGIONAL ACTIONS

- Adopt zoning and building standards that strengthen the resilience of new and existing homes
- Create and expand "whole-home repair" programs that include low- or no-cost subsidies to low-income residents
- Ensure that affordable housing construction is resilient to extreme heat through techniques such as better insulation, passive design techniques, central air conditioning, and modern construction standards

### 15. Address administrative barriers to implementation.

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Partners in both Pennsylvania and New Jersey cited burdensome permitting processes as a major barrier to implementing resilience projects.

#### REGIONAL ACTIONS

- Streamline federal and state permitting requirements for projects primarily aimed at improving resilience

# Funding, Capacity, and Local Governance

## Context

**Almost every county interviewed said that limited funding, staffing, and authority are major barriers to advancing resilience locally.** Funding at the county level is always a challenge since counties (with the exception of Philadelphia) do not have the authority to levy income, wage, or general sales taxes. Even when resources are available, the power to adopt and enforce land use regulations lies with municipalities, not counties. Unfortunately, as multiple interviewees emphasized, municipalities face many of the same challenges as counties, including limited funding, staffing capacity, and statutory limitations.

**Adding to these challenges is a reliance on federal funding for resilience work.** Programs like the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT) and the Building Resilient Infrastructure and Communities (BRIC) program, which are administered by the Federal Highway Administration (FHWA) and FEMA respectively, have historically supported resilient planning and infrastructure investments. Recent changes to these programs and other federal funding sources limits the ability of local actors to implement resilience projects.

## Needs and Actions

### 16. Provide greater access to funding.

Many local governments reported that they lack the capacity to identify funding opportunities, build competitive grant applications, or manage complex state and federal reporting requirements. In addition, some counties and municipalities observed that while some funding has been available for planning work, resources for implementation remain scarce. The current lack of federal funding will place additional pressure on local governments to cultivate and seek alternative funding sources.

#### DVRPC ACTIONS

- Increase awareness of key federal and state resilience funding opportunities through DVRPC's website, publications, and outreach materials.

#### *What Is Already Happening?*

- ★ NJDEP is developing a **directory of resilience funding opportunities** to support municipalities in New Jersey.

## 17. Educate local leadership about resilience.

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Partners noted that some local leaders do not have a strong sense of urgency around resilience. Additionally, partners observed that local leadership often lacks an understanding of resilience as a distinct concept from an over-reliance on finite resources or pollution reduction. This can pose challenges to prioritizing resilience initiatives within local agendas.

### REGIONAL ACTIONS

- Cultivate local resilience champions

### DVRPC ACTIONS

- Develop best practice resources that strengthen institutional understanding of resilience and outline actionable approaches and policy interventions tailored to the region's communities
- Host workshops and webinars to foster peer learning and build connections around local action

### *What Is Already Happening?*

- ★ DVRPC published "**Municipal Management of Extreme Heat**" to provide municipalities with data, tools, and guidance as part of its Municipal Implementation Tool series.

### *Examples From Elsewhere*

- ★ **Baltimore Metropolitan Council (BMC)** produced an Adaptation Toolkit and other resources to help local public works and transportation departments prepare for extreme weather events. One guide outlined actions local governments can take to implement resilience strategies, including recommendations for interjurisdictional coordination.

## 18. Facilitate and conduct municipal and multi-municipal resilience planning.

At the municipal level, effective resilience planning requires communication and cooperation among multiple departments such as planning, engineering, public safety, and public works. Such coordination requires strong leadership from municipal managers and decision-makers to overcome the natural tendency towards departmental silos.

Cooperation and joint efforts among multiple municipalities, while requiring intentionality, time, and effort, can also strengthen each municipality's work to build resilience, as well as create economies of scale.

### REGIONAL ACTIONS

- Conduct comprehensive extreme weather-related hazard vulnerability assessments to inform local planning and policy decisions
- Conduct multi-municipal resilience planning to address shared hazards and coordinate regional responses

### DVRPC ACTIONS

- Provide data, technical assistance, and/or funding to help municipalities conduct comprehensive extreme weather-related hazard vulnerability assessments
- Facilitate dialogue between municipalities to help identify opportunities for multi-municipal cooperation

### *What Is Already Happening?*

- ★ **New Jersey's Municipal Land Use Law** requires municipalities to incorporate a hazard vulnerability assessment into all future updates of their Master Plan. The assessment must rely on the most recent natural hazard projections and best available science provided by NJDEP.
- ★ NJ Future published a **Model Hazard Vulnerability Assessment** for municipalities in 2023.
- ★ **The City of Camden, NJ, with funding from NJDEP**, plans to hire a Chief Resilience Officer to ensure that resilience efforts receive sustained, cross-departmental attention within city government.
- ★ **Resilient NJ**, an initiative of NJDEP, funds and supports regional resilience planning projects in New Jersey.
- ★ **The Camden County Municipal Utility Authority** is working with neighboring Pennsauken Township to divert stormwater away from the Cramer Hill neighborhood of the City of Camden.

# Regional Planning

## Context

While local and municipal-scale resilience efforts are essential, some resilience measures are more effective when planned and implemented at a regional scale. Actions in one community will often have consequences, both negative and positive, in neighboring or distant communities. A regional approach to resilience allows for a more holistic understanding of benefits and burdens of actions at a wider geographic scale.

## Needs and Actions

### **19. Improve the resilience of the region's transportation infrastructure.**

A Transportation Resilience Improvement Plan (TRIP), or Resilience Improvement Plan (RIP), is a strategic document that outlines how a transportation system will be made more resilient to withstand and recover from disruptions caused by extreme weather-related hazards. While both PennDOT and NJDOT are developing statewide resilience assessments, a regional TRIP would identify vulnerabilities and risks specific to the DVRPC region and facilitate deeper engagement with DVRPC's state, county, and local planning partners. This effort would also produce a regionally-prioritized list of transportation resilience projects.

#### **DVRPC ACTIONS**

- Continue on-going efforts to create a regional TRIP to systematically and quantitatively evaluate the vulnerability of the region's transportation assets and establish a list of priority resilience projects

#### ***What Is Already Happening?***

- ★ **DVRPC** was awarded funding from NJDOT and PennDOT in October 2025 to prepare a TRIP for the Greater Philadelphia region and is currently preparing to kick-off the project in spring 2026.

#### ***Examples From Elsewhere***

- ★ **Metropolitan Washington Council of Governments (MWCOC)** prepared a TRIP that includes a regional vulnerability assessment, priority projects, and implementation roles. It also identified key gaps in pluvial flood data and is addressing them through crowd-sourced and third-party data collection.

## 20. Integrate resilience across DVRPC programs and operations.

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To lead by example and amplify its regional impact, DVRPC should embed resilience considerations into its internal planning, evaluation, and project support processes.

### DVRPC ACTIONS

- Incorporate resilience actions into DVRPC plans and studies focused on transportation, housing, and utilities
  - Incorporate heat mitigation strategies into transportation planning and design projects
  - Integrate proven tools and frameworks into DVRPC's own planning processes and guidance materials
- Establish an agency-wide working group that meets periodically to provide a structured forum for cross-departmental collaboration on resilience-related initiatives
- Further integrate resilience metrics into DVRPC's Long-Range Plan and Transportation Improvement Program project evaluation process

### *Examples From Elsewhere*

- ★ **Atlanta Regional Commission (ARC)** hosts bi-weekly interdepartmental meetings to integrate resilience into agency operations and build staff capacity for regional collaboration.

## 21. Facilitate Communication Between Local Governments, PennDOT, and NJDOT.

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State DOTs can benefit from local knowledge when planning and prioritizing resilience investments. DVRPC can serve as a bridge to ensure that information about local vulnerabilities and extreme weather-related impacts is shared effectively.

### DVRPC ACTIONS

- Support county and municipal efforts to track and document local vulnerabilities and extreme weather-related impacts. Help gather and share this information with the state DOTs
- Continue to support the PennDOT Connects process, incorporating information on local extreme weather impacts and resilience-related recommendations, where appropriate

## 22. Identify, explore, and build support for resilience programs that can benefit from regional-scale implementation.

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Regional-scale programs and initiatives are effective ways for an organization like DVRPC to promote resilience. They can help streamline implementation, reduce administrative burden, and improve the efficiency of resilience efforts.

### DVRPC ACTIONS:

- Explore opportunities to develop or support shared programs, such as regional procurement frameworks, or shared technical services that make it easier for municipalities to participate in resilience initiatives and scale solutions across the region

### *What Is Already Happening?*

- ★ **DVRPC established a Municipal Exchange Forum** to bring together municipal officials from across the region to discuss shared challenges, innovative strategies, and collaborative opportunities to create more livable, resilient communities.

## 23. Develop best practice guidance.

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Local governments may be unfamiliar with many of the strategies for increasing resilience or uncertain about how to implement them.

### DVRPC ACTIONS

- Develop best practice resources, workshops, and webinars that share actionable approaches and policy interventions tailored to the region's needs. Potential topics:
  - The National Flood Insurance Program (NFIP)
  - FEMA's Community Rating System
  - Resilience Metrics / Project Evaluation
  - Stormwater Billing Initiatives
  - Municipal land use tools such as riparian buffer ordinances, buyout programs, and other tools to prevent development in high-risk areas
- Disseminate and promote high-quality resilience tools and resources developed by external partners
- Compile case studies of successful resilience projects that highlight practical strategies for overcoming funding, political, and technical barriers

## 24. Communicate the economic impacts of extreme weather.

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While the potential risks of extreme weather-related hazards are generally understood, quantifying the local economic impacts of extreme weather events can be a powerful communication tool to drive action. Flooded infrastructure, disruptions to the transportation system, higher utility bills, and public health impacts all carry significant financial consequences. Quantifying these costs could help build a broader coalition around the need for proactive resilience investments.

### DVRPC ACTIONS

- Lead or fund economic impact assessments to quantify the potential economic impacts of extreme weather events
- Lead or fund economic analyses to quantify the costs and benefits of resilience measures

### *Examples From Elsewhere*

- ★ **Researchers at Rutgers University** conducted a statewide economic assessment of the impacts of extreme weather for New York State in 2014.
- ★ **Broward County** in Florida conducted a cost-benefit analysis for a suite of resilience actions proposed in the *Resilient Broward* plan.

# Conclusion

There are significant opportunities to advance resilience in the Greater Philadelphia region by thinking regionally and working collaboratively across agencies, sectors, and jurisdictions. The actions outlined in this document can guide the region's efforts to address the challenges posed by extreme weather events. The actions highlighted in this report provide a framework for further integrating resilience priorities into DVRPC's programs and operations, as well as for launching new efforts to strengthen resilience across the region. Through this and other planning processes, DVRPC will continue to engage with partners around resilience issues to provide support, technical assistance, coordination, and resources. Together, Greater Philadelphia can build a future that is not only more resilient, but also more prosperous, more competitive, and ready to meet the challenges ahead.

# Appendix

## Interview Participants

### 1. Phase I Interviews

City of Philadelphia	Abby Sullivsusan - Chief Resilience Officer, OOS Julia Rockwell - Manager, Water Resources Adaptation Program, PWD Noah Palau - Hazard Mitigation Program Manager, OEM
Bucks County	Cassandra Goodmansen - Environmental Planner, Planning Commission Evan Stone - Executive Director (former), Planning Commission Matthew Walters - Senior Planner, Planning Commission
Delaware County	Becca Yurkovich - County Planner, Delaware County Gina Burritt - Director, Delaware County Planning Department Larry Bak - Deputy Director, Emergency Management
Chester County	Rachael Griffith - Director, Chester County Planning Commission Chris Christensen - Planning Coordinator, Dept. of Emergency Services
City of Chester	Paul Fritz - Planning and Zoning Director, Planning Department Susan J Dennis - Member, Planning Commission John-Paul Shirley - Fire Captain, Chester Fire Department Lisa Gaffney - Executive Director, Riverfront Alliance of Delaware County
Montgomery County	Jon Leshar - Environmental Planning Asst. Manager, Planning Commission Joe Anna Haelig - Community Resilience Coordinator, Div. of Emergency Mgmt.
Drexel University	Franco Montalto - Director, Urban Change Research Network, Dept. of Civil, Architectural and Environmental Engineering
PennDOT	Nick Vivian - Hydrology and Hydraulics Unit Manager, Bureau of Project Delivery Dan Szekeres - Project Manager, Michael Baker, Jr. Inc.
Gloucester County	Bill Flemming - Assistant County Engineer and County Planner, Planning Division, Public Works Nick Cressman - Senior Planner, Planning Division, Public Works
Burlington County	Tom Stanuikynas - Supervising Planner, Department of Public Works Mary Pat Robbie - Director, Department of Resource Conservation Kristen Carr - Deputy Coordinator, Emergency Management
Mercer County	Andrew Loyd - Principal Planner, Planning Department
City of Trenton	Lisa Serieysslol - Senior Transportation Planner, Division of Planning
Camden Community Partnership	Joe Myers - Chief Operating Officer

Camden County	Ilene Lampitt - Director of Planning and Permits, Planning Department, Public Works Chris Costa - Coordinator, Office of Emergency Mgmt., Dept. of Public Safety Sangeeta Doshi - Member, Camden Air Quality Committee, Cherry Hill Twp. Sean Mohen - Executive Director, TriCounty Alliance Chris Waldron - Director, Office of Shared Services
Rutgers University	Lucas Markson - NJ Resilience Resource Center Lisa Auermuller - Director, Megalopolitan Coastal Transformation Hub Marjorie Kaplan - Sr. Associate Dir., Rutgers
Sustainable Jersey	Tanya Rohrbach - Program Manager, Policy and Planning Anne Heasley - Program Manager, Policy and Planning
NJDOT	Pamela Garrett - Director, Division of Environmental Resources John Riggi - Environmental Specialist, Division of Environmental Resources
NJDEP	Rebecca Hill - Principal Environmental Specialist, Office of Resilience Meghan Leavey - Lead Planner, Office of Resilience

## 2. Phase II Interviews

Abington, PA	Kimberley Hamm - Director, Community Development Kevin Van Horn - Zoning Officer, Fire and Code Services Ashley McIlvaine - Assistant Township Manager
Norristown, PA	Leonard Lightner - Municipal Administrator Jayne Musonye - Director of Planning and Municipal Development Leah Remolde - Executive Assistant to the Administrator
Rutledge, PA	Joe Healy - Planning Commissioner Sean Sheehan - Chair, Planning Commission
Center for Environmental Transformation (Camden City)	Jon Compton - Executive Director
Brandywine Conservancy	Grant DeCosta - Director of Community Services
Baltimore Metropolitan Council	Eileen Singleton - Principal Transportation Engineer Ana Marshall - Senior Environmental Planner
Metropolitan Washington Council of Governments	Katherine Rainone - Transportation Resilience Planner
Atlanta Regional Commission	John Phillipsborn - Resilience Manager

# BUILDING RESILIENCE TOGETHER: AN ASSESSMENT OF NEEDS AND NEXT STEPS IN GREATER PHILADELPHIA

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**Abstract:**

This document summarizes a comprehensive resilience needs assessment conducted for Greater Philadelphia. It presents a high-level description of actions needed to improve the resilience of people, communities, businesses, institutions, and infrastructure systems to the impacts of extreme weather. The assessment was based on a thorough review and evaluation of relevant partner initiatives, as well as 26 detailed one-one-one organizational interviews. DVRPC undertook this assessment to better understand what local governments, state agencies, academic institutions, nonprofits, and community-based organizations need to respond to the challenges of severe weather-related hazards. Needs and actions are organized around six major themes: flooding; extreme heat, drought, wildfire and air quality; social vulnerability; the built environment; funding, capacity, and local governance; and regional planning. Actions are described as either “regional actions” or “DVRPC actions” to be led by either one or more regional partners or DVRPC accordingly.

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**DVRPC Project Team:**

Chris Linn, *Manager, Office of Resilience and Environment*

Amy Verbofsky, *Manager, Healthy and Resilient Communities*

**DVRPC Staff Contact and Consultant Team**

Chris Linn, *Manager, Office of Resilience and Environment*

Email: [clinn@dvrpc.org](mailto:clinn@dvrpc.org)

Buro Happold

Interface Studio



190 N Independence Mall West, 8th Floor

Philadelphia, PA 19106-1520

215.592.1800

[www.dvrpc.org](http://www.dvrpc.org)



## Mission

As the Metropolitan Planning Organization (MPO) for Greater Philadelphia, the Delaware Valley Regional Planning Commission (DVRPC) builds consensus for a shared regional vision; enables data-based, community-centered solutions; and helps put plans into action.

## Vision

A Greater Philadelphia region that provides:

- A safe, modern, multimodal **transportation** network for all
- An innovative and connected **economy** with opportunity and shared prosperity
- Healthy, walkable, and vibrant **communities**
- A preserved and restored natural **environment** with thriving ecological systems
- Clean, reliable, and affordable **infrastructure and utility services** resilient to the effects of extreme weather



190 N Independence Mall West  
8th Floor  
Philadelphia, PA 19106-1520  
215-592-1800  
[www.dvrpc.org](http://www.dvrpc.org)

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