Delaware River Basin Commission

Advisory Council on Climate Change

Abby Sullivan, Chief Resilience Officer

August 27, 2025

THE CITY OF PHILADELPHIA
OFFICE OF
SUSTAINABILITY

Acknowledgements

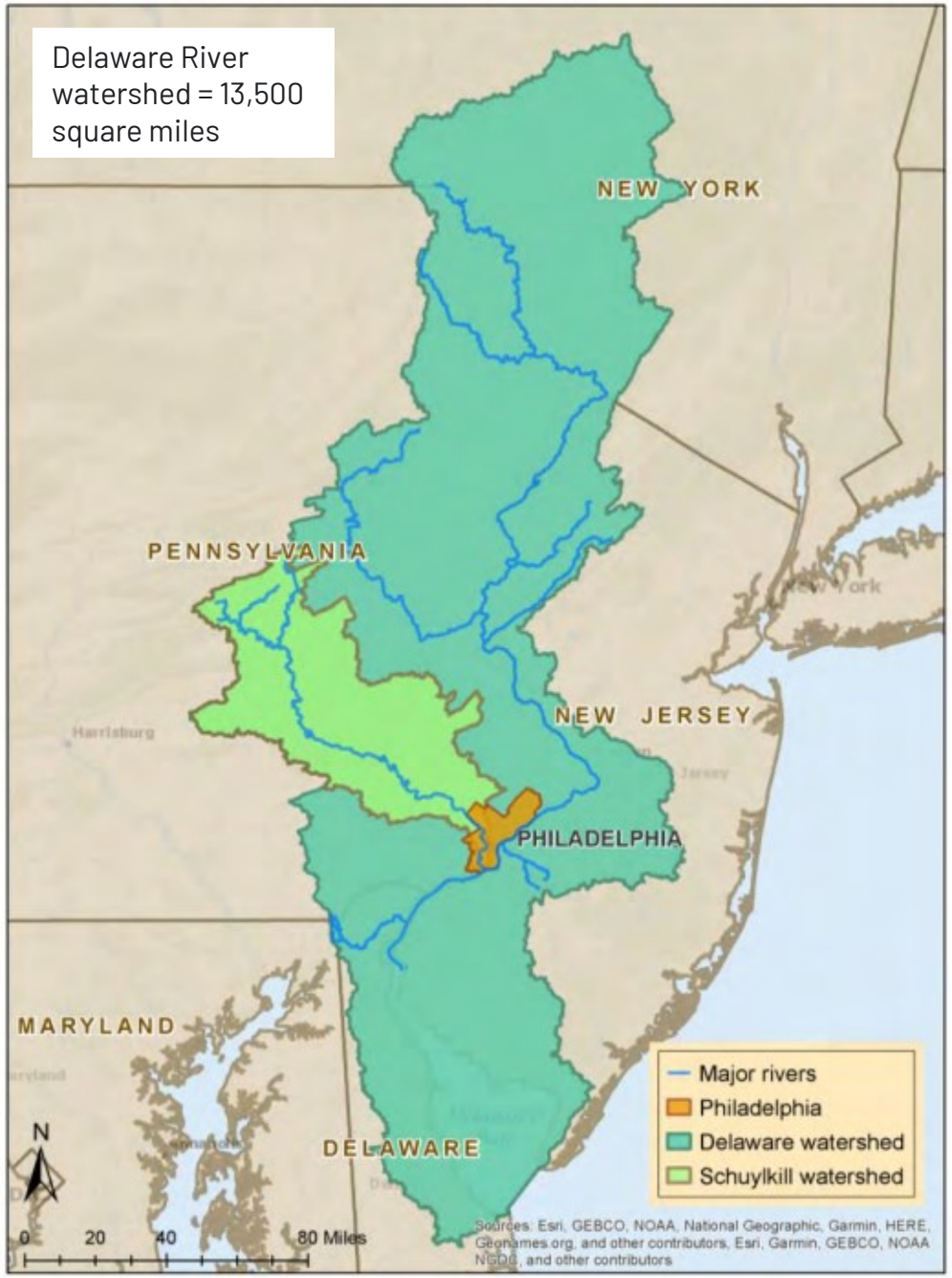
Division of Climate Resilience

- Korin Tangtrakul
- Taylor Quinland
- Joseph Sullivan
- Jordan Pares-Kane
- Andrew Dodd
- Jalayna Antoine

Why is Philadelphia Vulnerable?

Geography & climate zone

- Bottom of two large watersheds
- Vulnerable to multiple kinds of flooding
- Land is sinking while seas are rising
- Storms (thunderstorms, hurricanes, Nor'easters)
- Hot, humid summers and cold winters
- Coastal plain with historic wetlands

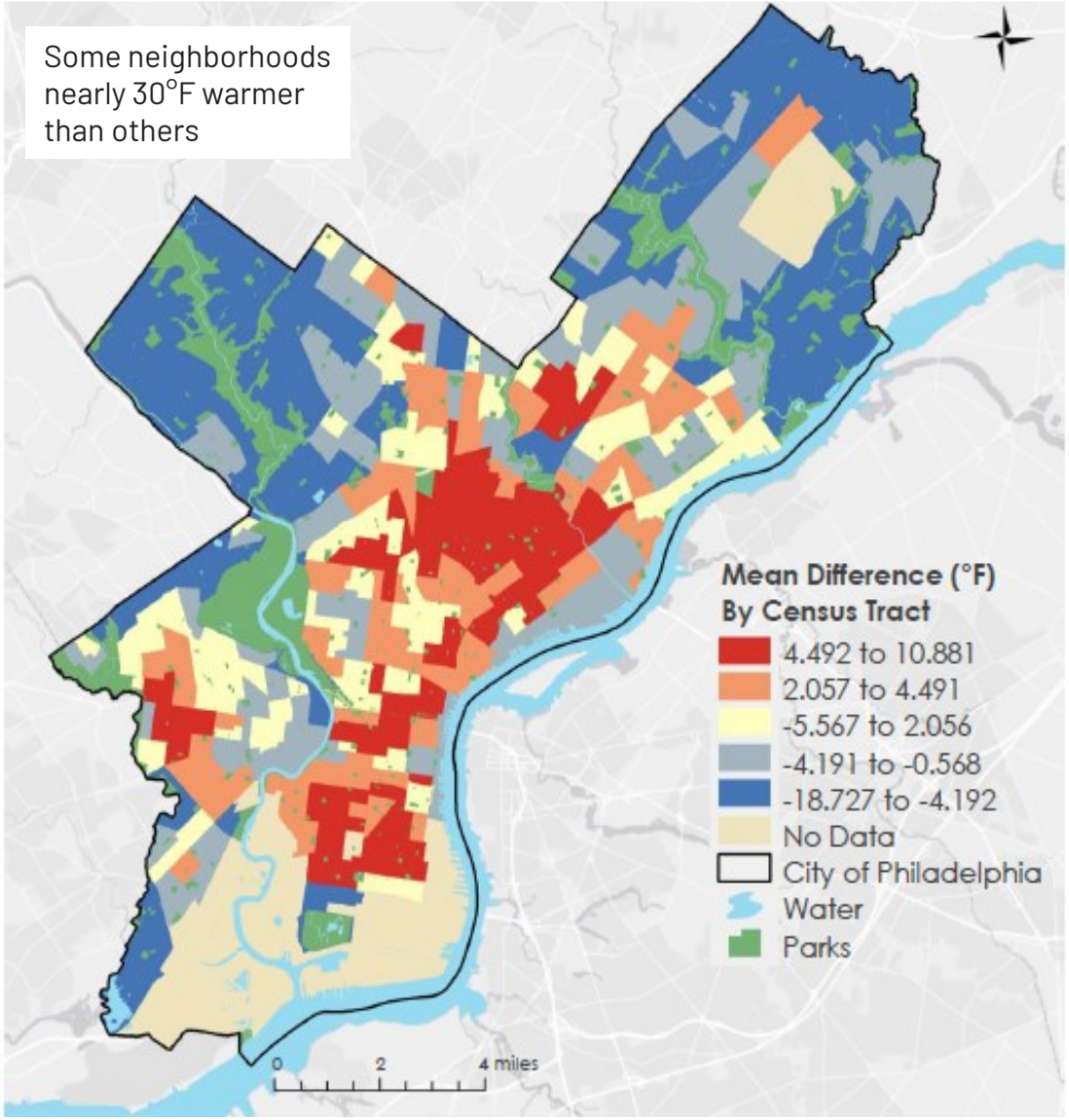


Why is Philadelphia Vulnerable?

Urban Development

- Urban heat islands – dense built environment and low canopy cover
- Impervious surface
- Capped over our rivers and creeks
- Combined sewer systems
- Allow development in vulnerable locations
- Old infrastructure

Daytime Land Surface Temperature

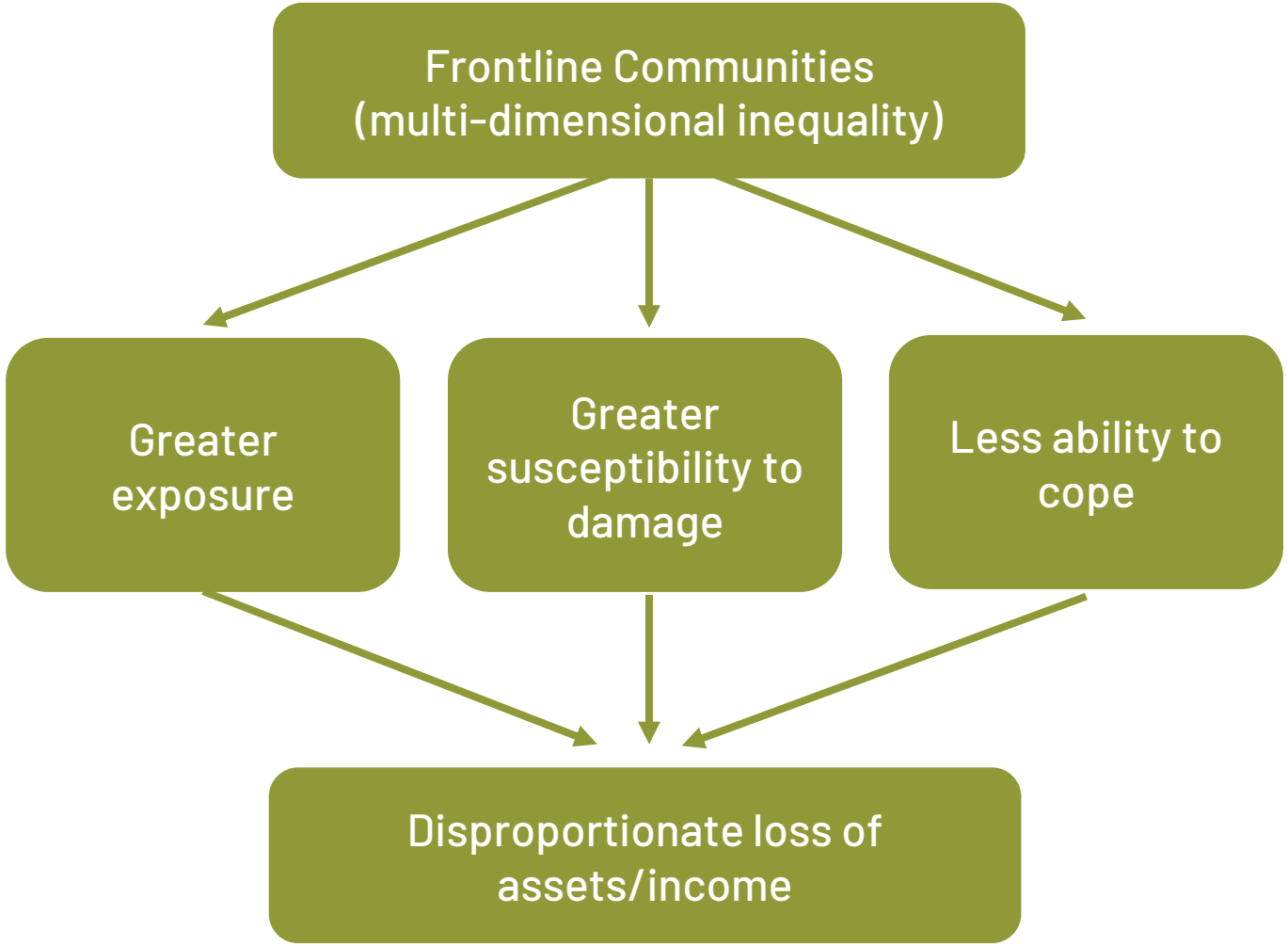


Source: City of Philadelphia, NASA DEVELOP

Why is Philadelphia Vulnerable?

Social Vulnerability

- Urban Renewal
- Racist housing policies
- High rates of poverty
- Frontline populations "First and worst"
  - Communities of color
  - Low-income
  - Indigenous
  - Young and Elderly



Source: Islam & Winkel (2017) UN Dept. of Economic and Social Affairs

The Cost of Climate Change

Hurricane Ida

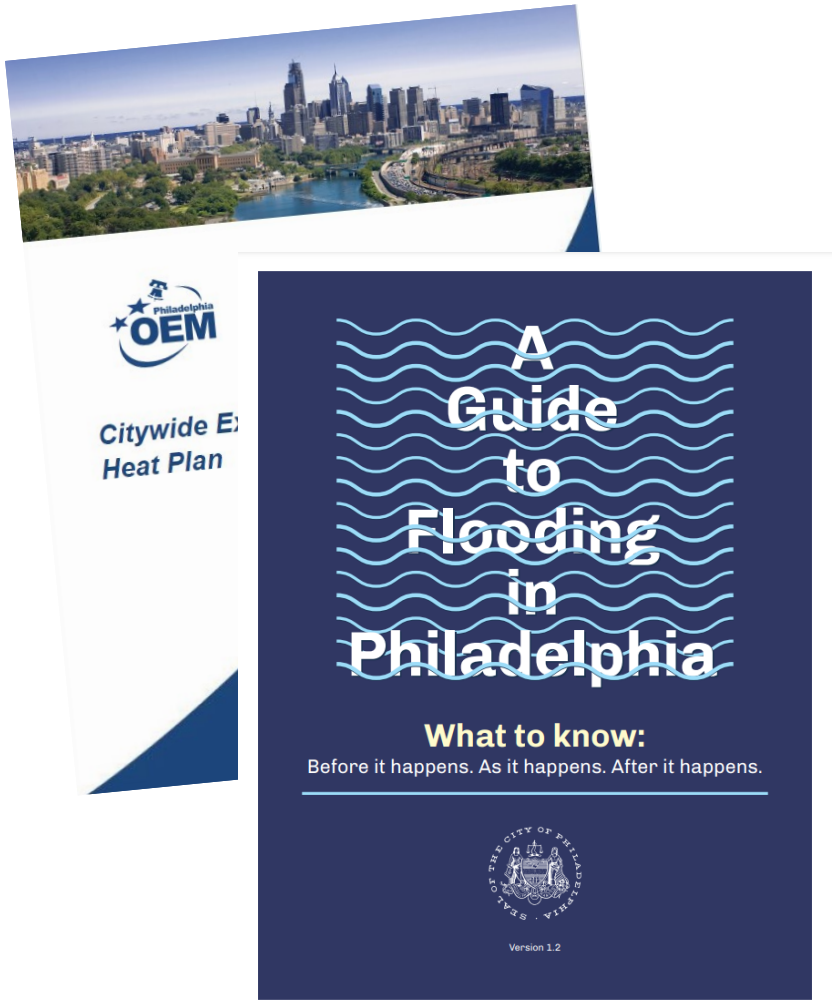
- $1,313,723,000 in damages
- $12,000,000 in verified losses to Philadelphia businesses
- 55,000 households applied for FEMA assistance in Philadelphia
- 11,000 properties had FEMA-verified losses
- 1,100 residents evacuated
- 29 residents rescued by boat
- 2 shelters opened for displaced residents

Credit: Matt Rourke/AP

Changing flood frequency and intensity

Flows from Hurricane Ida on the Schuylkill		
FEMA outdated flow data (1964 - 2002)	*Based on current flow data from the last 20 years (2000-2021)*	*End-of-century projections using a high emissions scenario*
~65-year event	**~30-year event**	**~6-year event**
1.5% chance of occurring in any given year	*3.3% chance of occurring in any given year*	*16.7% chance of occurring in any year*
32% chance of occurring over a 25-year period	*57% chance of occurring over a 25-year period*	*99% chance of occurring over a 25-year period*

What is the City doing to build Resilience?



Because climate change is a cross-cutting issue, many departments work together to build resilience.

- Environmental Justice and Climate Resilience Committee
- Flood Risk Management Task Force
- Excessive Heat Steering Committee
- Hazard Mitigation Plan (HMP) Steering Committee
- Plan alignment (Comprehensive Plan and HMP)

Philadelphia OEM

City of Philadelphia

2022 All-Hazard Mitigation Plan

PHILADELPHIA WATER DEPARTMENT

Climate-Resilient Planning and Design Guidance

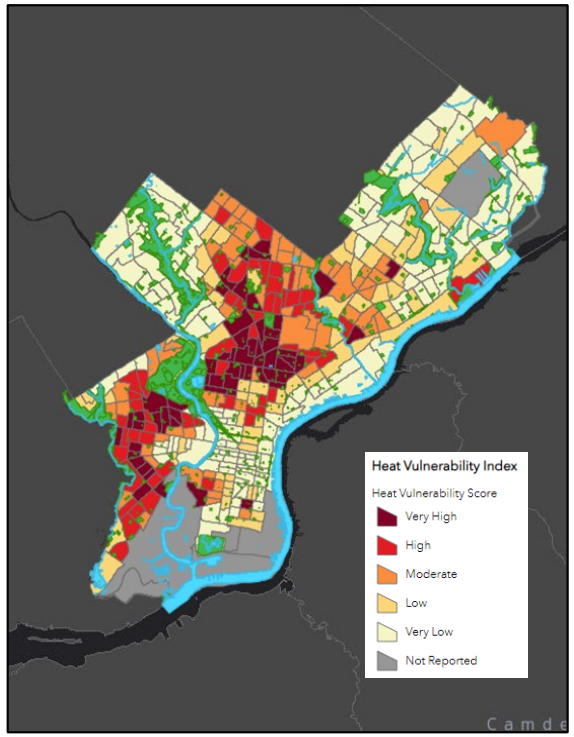
Building Our Future Today

Version 1.0

January 2022

Green City, Clean Waters

Department of Public Health



FIND YOUR PATH

PHILADELPHIA PARKS & RECREATION

Division of Climate Resilience

Climate Services and Citywide Resilience Planning

Clean Water Act Compliance

Flood Resilience Program

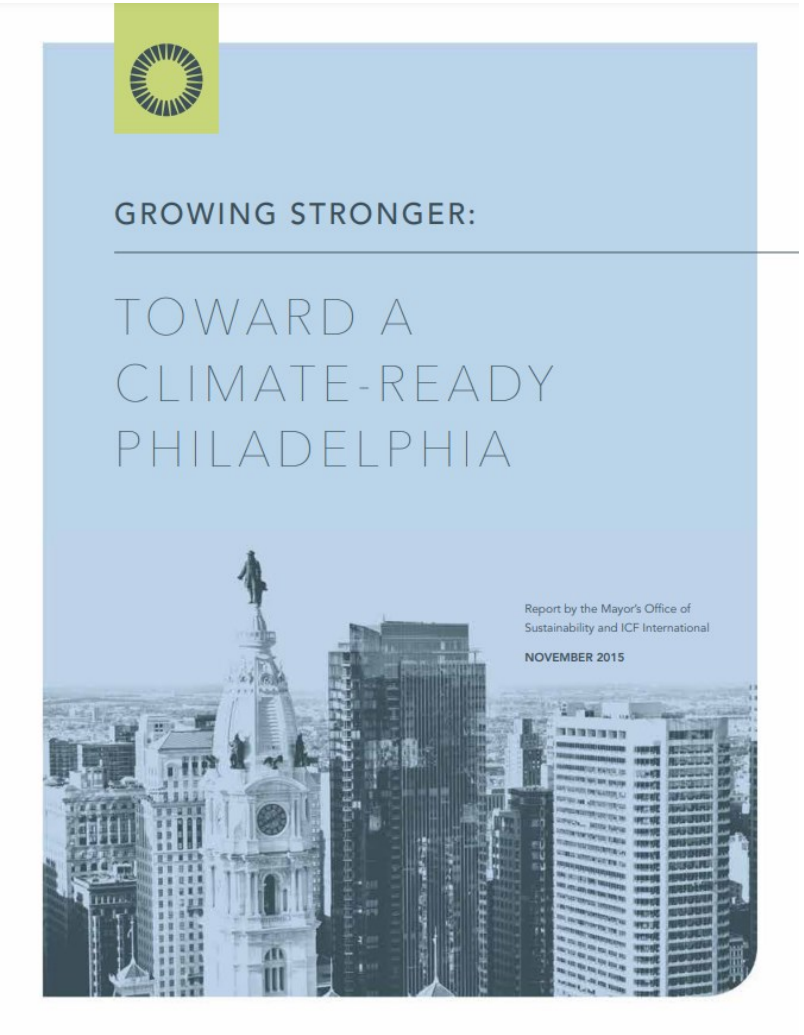
Heat Resilience Program

Place-based Initiatives

Eastwick (flooding)

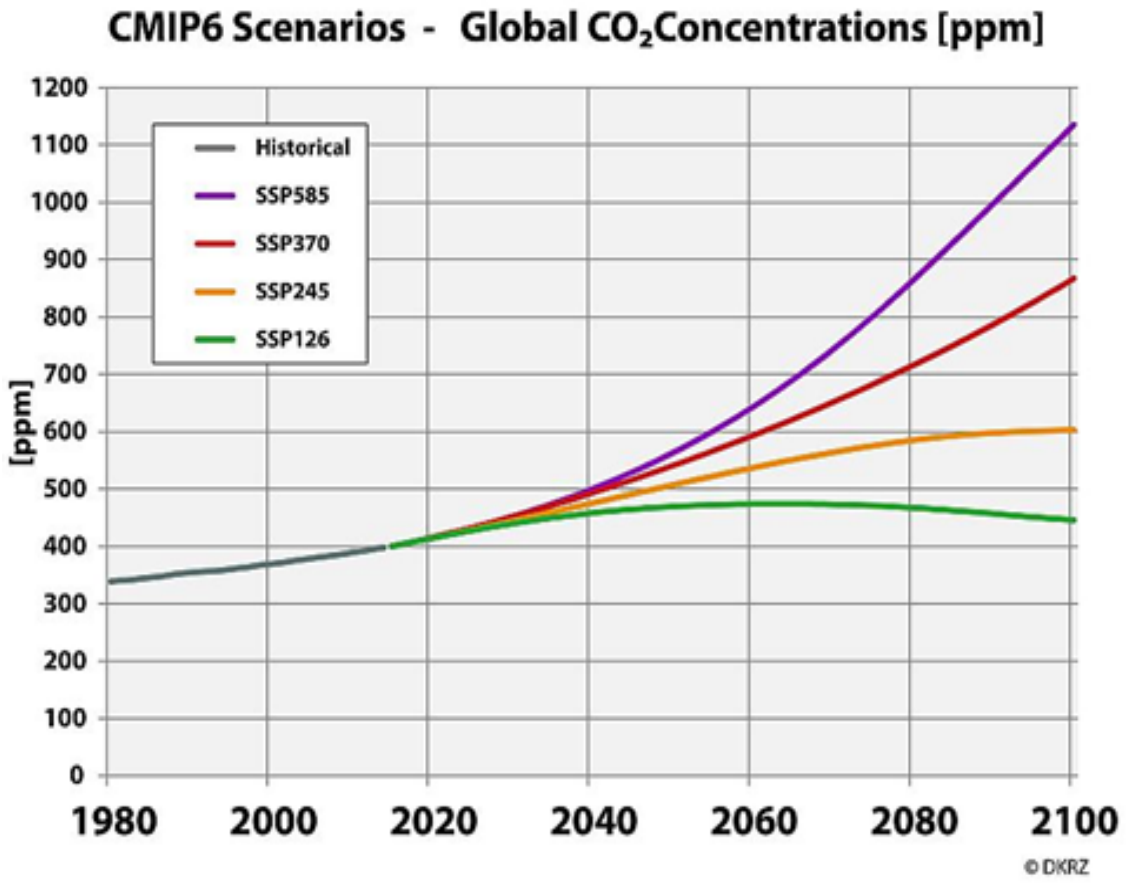
Strawberry Mansion (heat)

Citywide Resilience Planning



- **Climate science update & application guidance**
- **Citywide Climate Vulnerability Assessment**
  - Heat vulnerability assessment
  - Flood vulnerability assessment
- **Updated Resilience Plan**
  - Extensive stakeholder engagement (procedural equity)
  - Inclusive public engagement process
  - Aligned and coordinated with HMP and Comp plan

Climate Science Update & Application Guidance



Multiple sources

- CMIP6 downscaled climate projections
- IPCC Sea Level Rise Scenarios
- Philadelphia Water Department
- Literature review

Other risk information

- National Hurricane Center
- First Street Foundation
- Research partnerships

Updated Projections

Climate Change is increasing the frequency and intensity of extreme events. We face a "hotter, wetter future"

Precipitation	Baseline	2050	2080
Annual Precipitation (Inches)	~47	49 to 50	50 to 51

Temperature	Baseline	2050	2080
Days per Year w Temperature Above 95°F (Days)	~5	16 to 20	23 to 37

**Ranges shown are for SSP2-4.5 and SSP3-7.0, which OOS uses as a realistic high-end projection; for critical projects with a long useful lifespan, low adaptive capacity, and high sensitivity to climate change, your department may consider a more conservative scenario.(e.g., SSP5-8.5)*

Global Climate Model (GCM) projections indicate that precipitation will increase 5-12% by the 2050s and 8-16% by 2100.

However, it is known that GCMs underestimate extreme precipitation projections. According to a peer-reviewed method developed by PWD and their consultants, they found that:

The most extreme precipitation events are likely to increase

- **30-40% by 2100** (moderate emissions scenario)
- **40-59% by 2100** (high emissions scenario)

Annual Variables

		SSP2-4.5														
		2030					2050					2080				
Variable	Baseline	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
Hottest Temperature of the Year (°F)	97.4	98.8	99.2	99.9	100.7	102.0	99.3	100.1	101.6	102.7	103.5	100.6	101.2	103.0	104.3	104.8
Number of Days per Year with Daily Maximum Temperature Above 95°F (Days)	5.2	8.3	10.2	11.6	13.9	18.6	12.0	14.8	16.2	23.1	27.9	13.9	18.5	22.8	32.7	39.4
Number of Days per Year with Daily Maximum Temperature Above 100°F (Days)	0.3	0.9	1.1	1.7	2.4	3.9	1.4	2.0	3.2	5.5	8.0	2.6	3.9	5.7	8.5	12.8
Number of Days per Year with Daily Maximum Temperature Above 105°F (Days)	0.0	0.0	0.0	0.1	0.2	0.4	0.1	0.1	0.3	0.6	0.9	0.2	0.3	0.7	1.1	2.1
Number of Days per Year with Daily Minimum Temperature Below 32°F (Days)	97.8	73.4	76.2	79.3	83.1	84.1	64.1	67.7	69.7	74.9	76.7	53.2	57.9	60.7	66.7	70.5
Total Precipitation (Inches)	47.2	45.2	47.2	48.4	49.9	50.3	45.0	47.2	48.8	50.8	51.3	46.9	48.2	50.3	51.7	53.4

Application Guidance
Risk Tolerance & Adaptive Management Approaches

SSP2-4.5			
Variable	Baseline	Near-term (2030s) Likey (50th)	Near-term (2030s) High (90th)
Hottest Temperature of the Year (°F)	97.4	99.9	101.3
Number of Days per Year with Daily Maximum Temperature Above 95°F (Days)	5.2	11.6	15.1
Number of Days per Year with Daily Maximum Temperature Above 100°F (Days)	0.3	1.7	3.1
Number of Days per Year with Daily Maximum Temperature Above 105°F (Days)	0	0.1	0.4
Number of Days per Year with Daily Minimum Temperature Below 32°F (Days)	93.3	75	80.2
Total Precipitation (Inches)	46.9	47.9	50.1

SSP3-7.0			
Variable	Baseline	Near-term (2030s) Likey (50th)	Near-term (2030s) High (90th)
Hottest Temperature of the Year (°F)	97.4	100	102.3
Number of Days per Year with Daily Maximum Temperature Above 95°F (Days)	5.2	12.3	18.1
Number of Days per Year with Daily Maximum Temperature Above 100°F (Days)	0.3	2	3.9
Number of Days per Year with Daily Maximum Temperature Above 105°F (Days)	0	0.2	0.5
Number of Days per Year with Daily Minimum Temperature Below 32°F (Days)	93.3	76.5	81.5
Total Precipitation (Inches)	46.9	47.3	50.1

Lower (current trajectory)

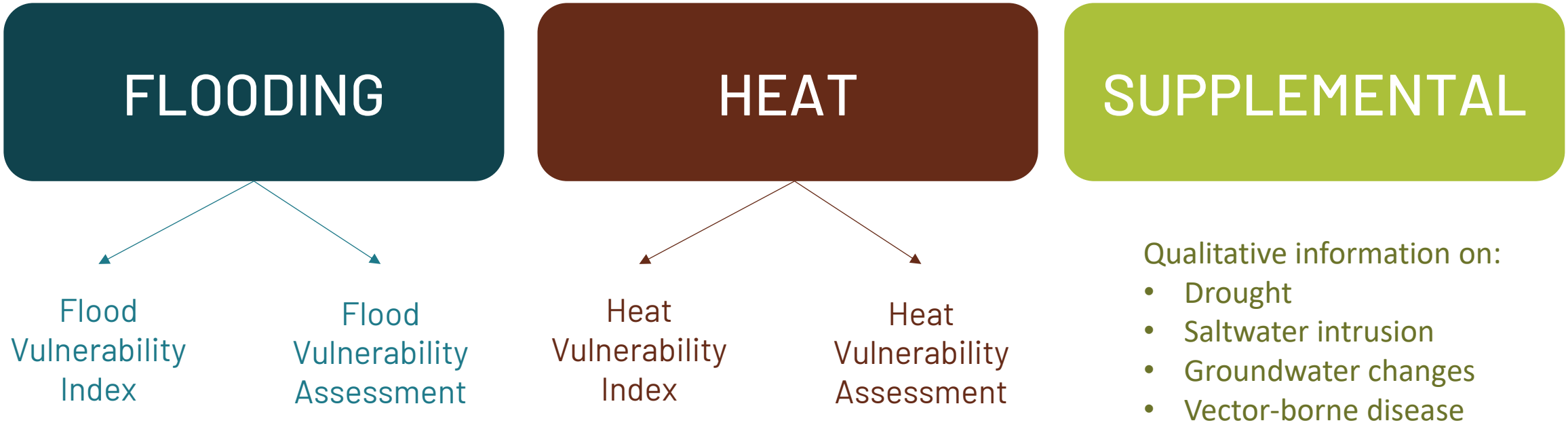
Moderate

Moderately High

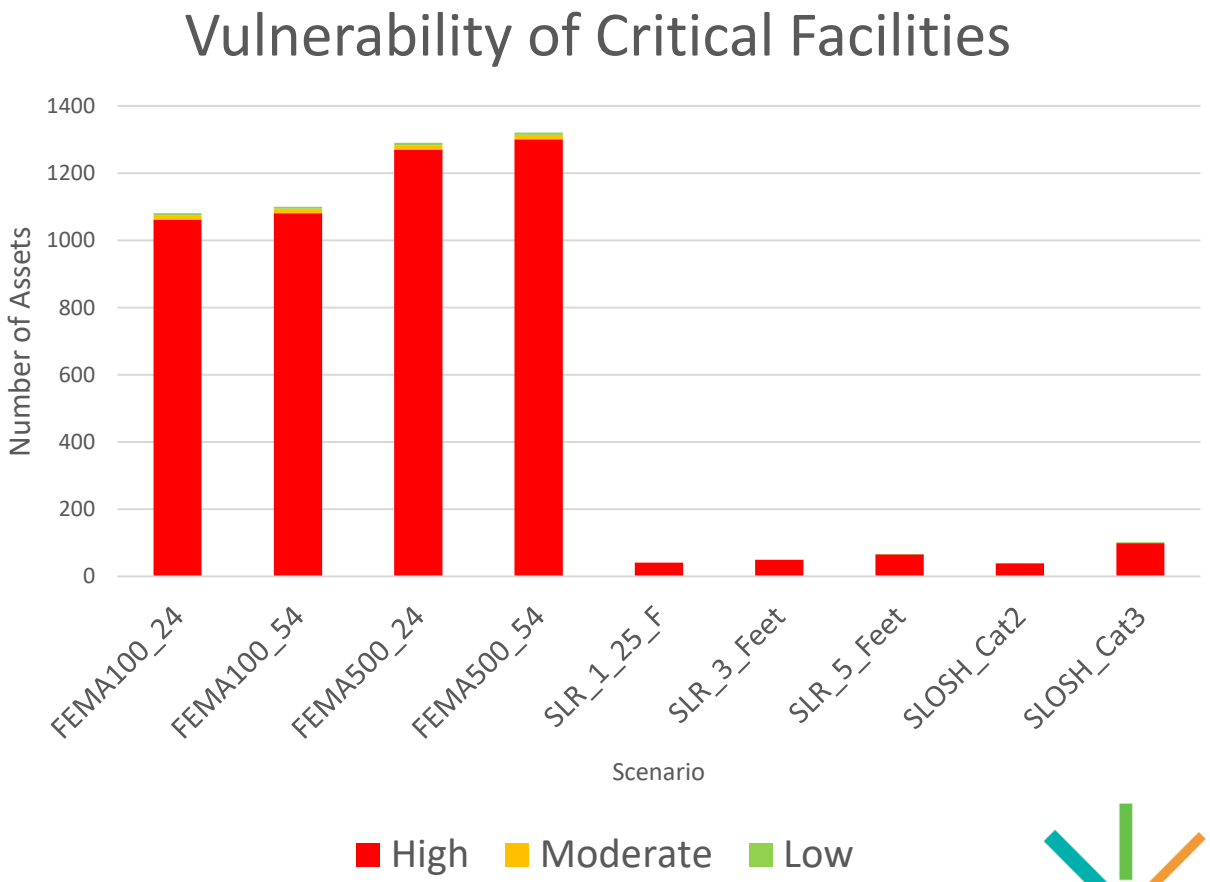
High

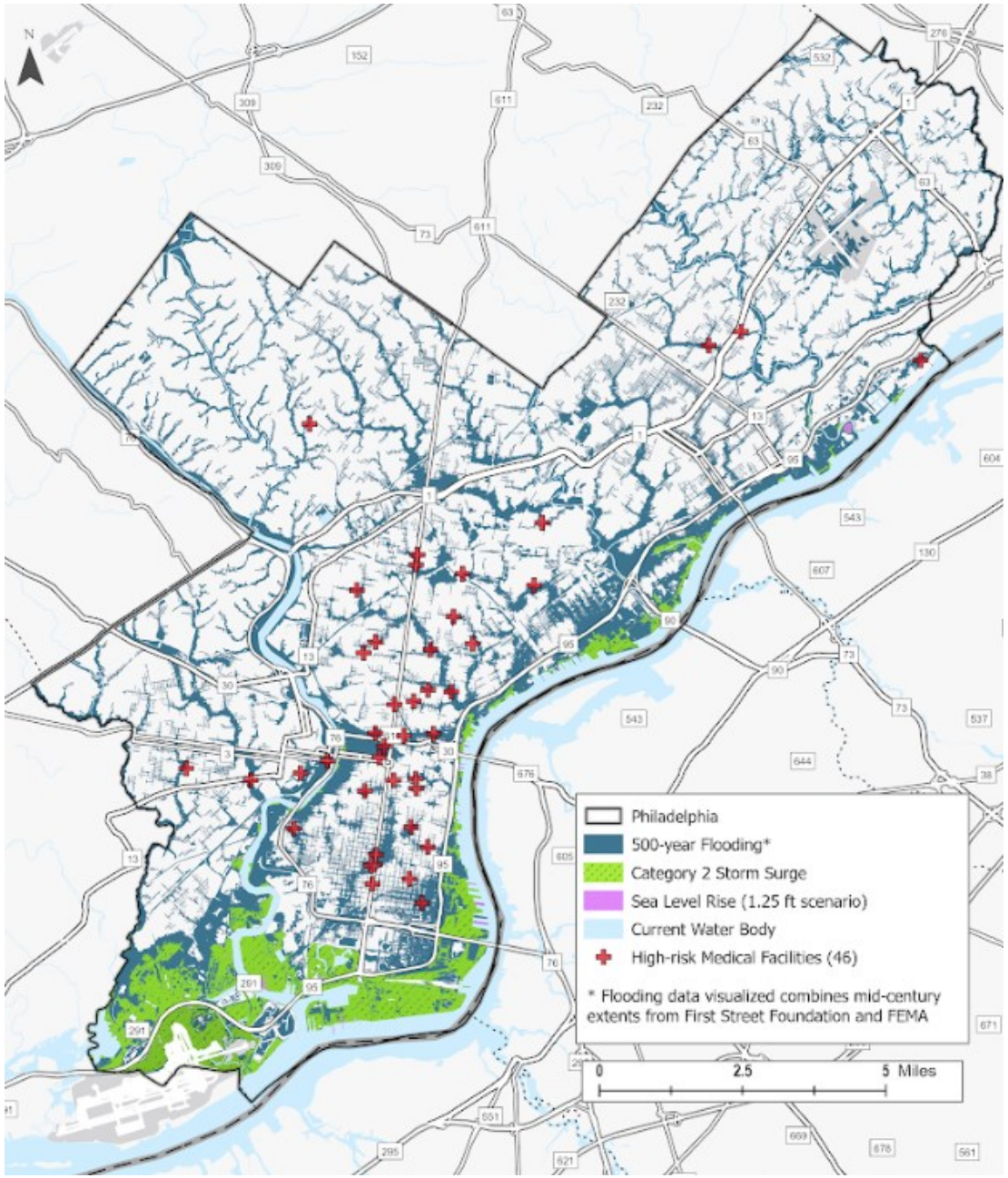
Vulnerability Assessment

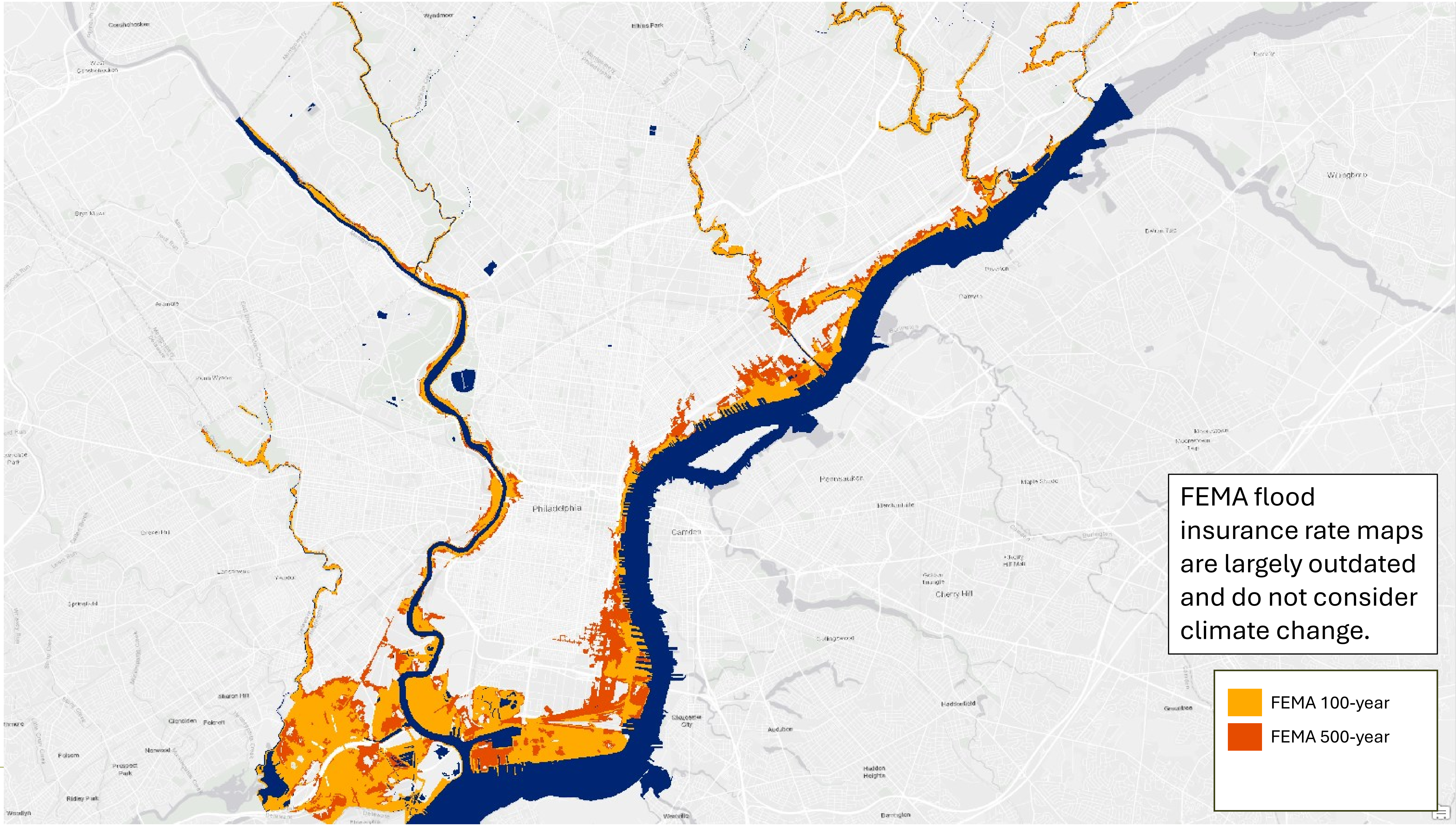
We are updating the high-level citywide climate vulnerability assessments



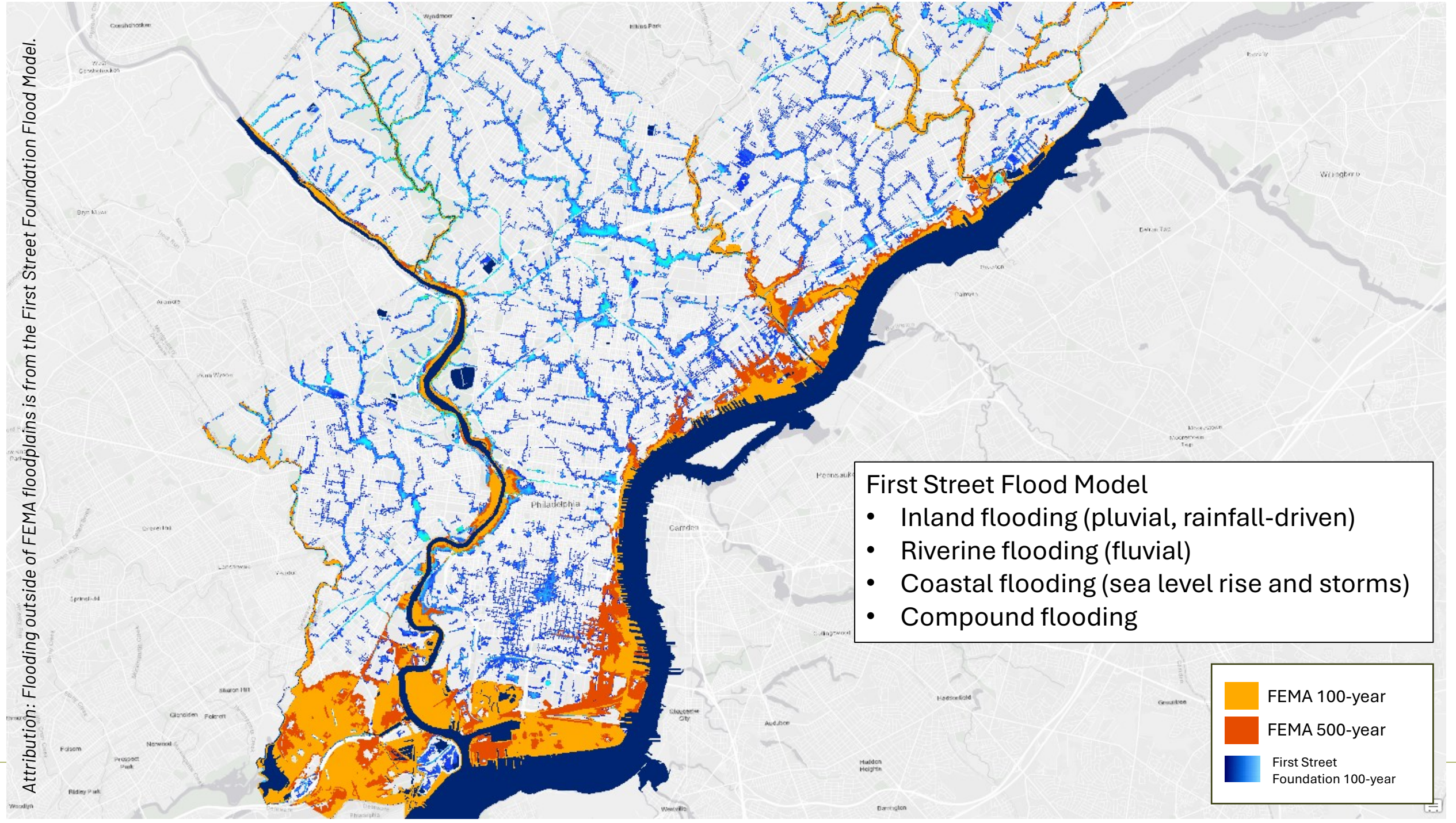
Flood Vulnerability Assessment



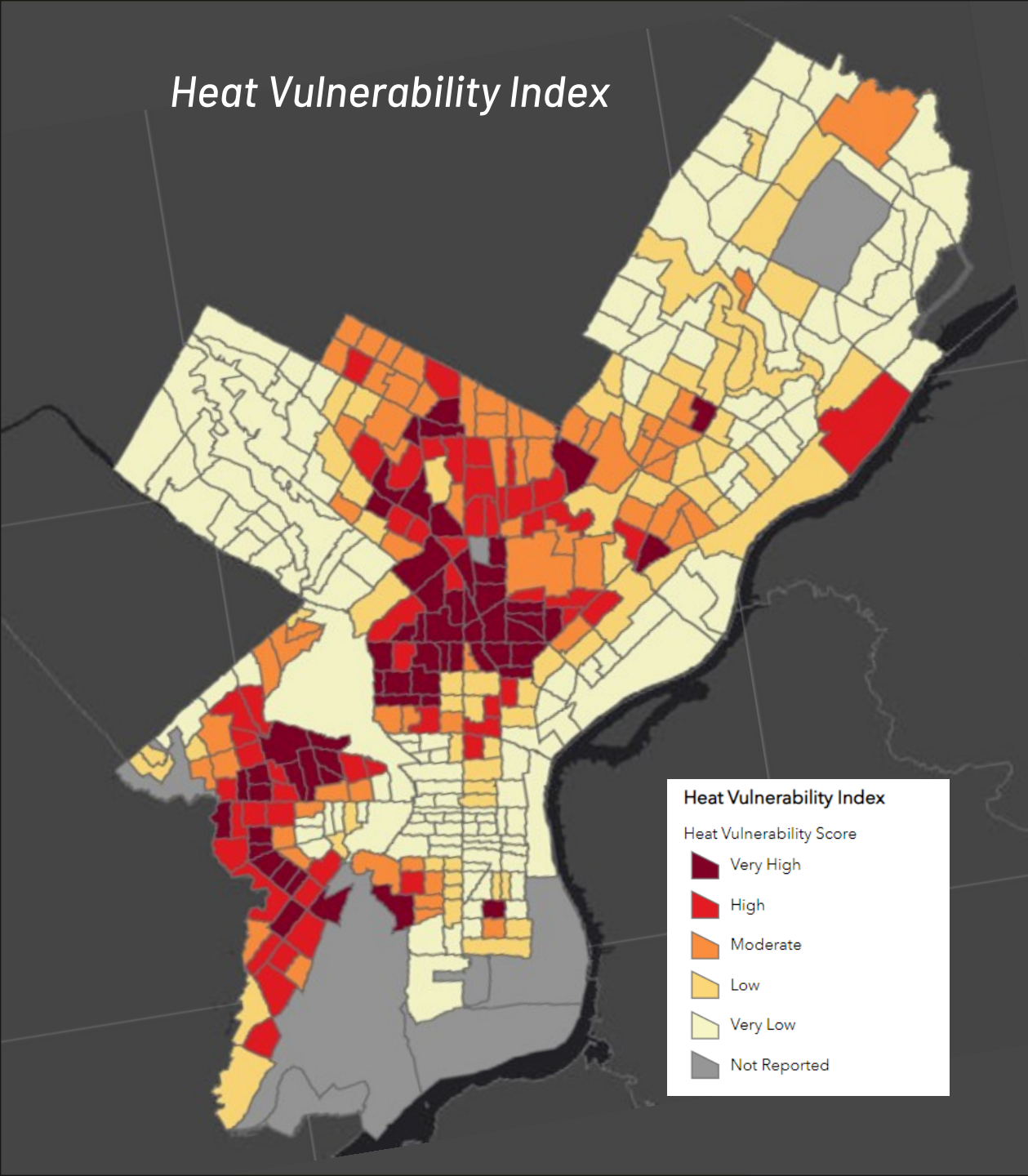




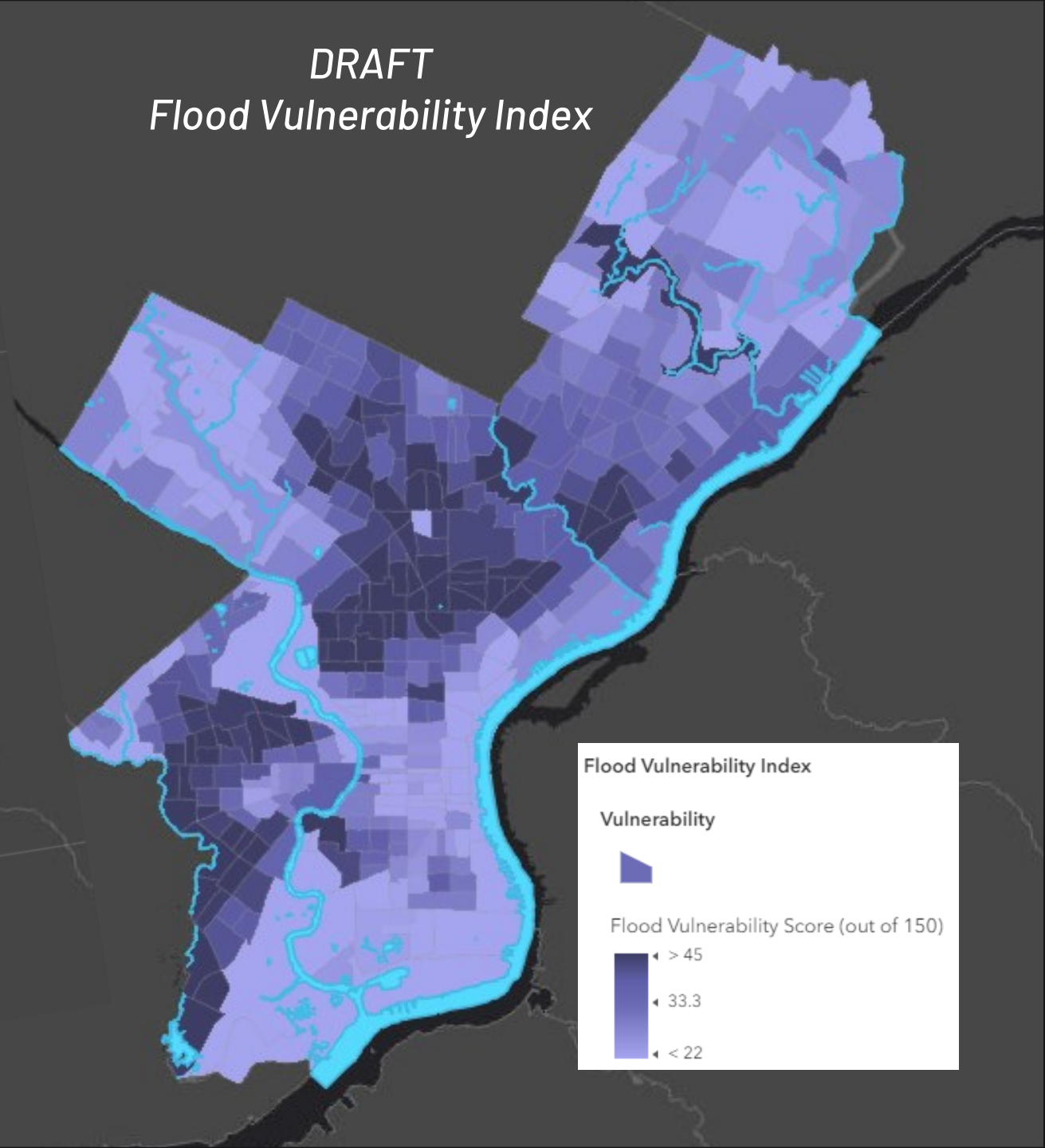
FEMA flood insurance rate maps are largely outdated and do not consider climate change.


Attribution: Flooding outside of FEMA floodplains is from the First Street Foundation Flood Model.
First Street Flood Model
• Inland flooding (pluvial, rainfall-driven)
• Riverine flooding (fluvial)
• Coastal flooding (sea level rise and storms)
• Compound flooding
FEMA 100-year
FEMA 500-year
First Street Foundation 100-year
Philadelphia
Camden

Heat Vulnerability Index



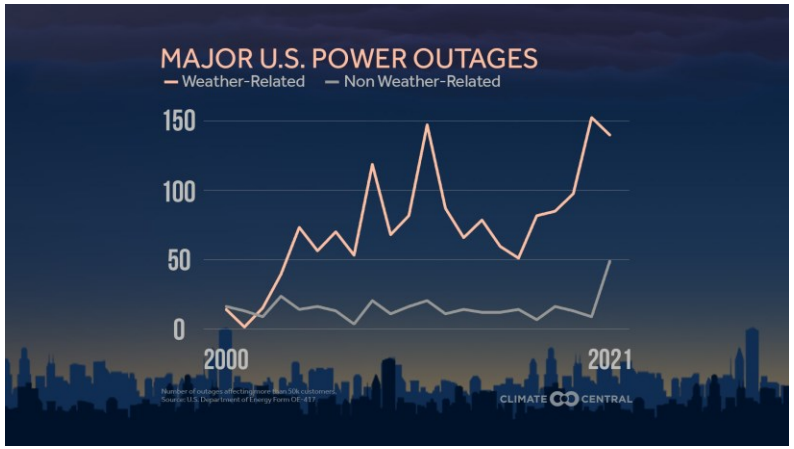
DRAFT
Flood Vulnerability Index



Heat Vulnerability Assessment

Air conditioning Survey

Grid Vulnerability



Air quality assessment

Cooling Strategies and PECO Program Participation

34% of respondents used a **cooling center** in the past 5 years.

Over the past five years, 52% of respondents have **used a public building** as a place to cool down.

37% of respondents received LIHEAP **heating assistance.**

20% received **cooling assistance** through a LIHEAP grant or free AC unit.

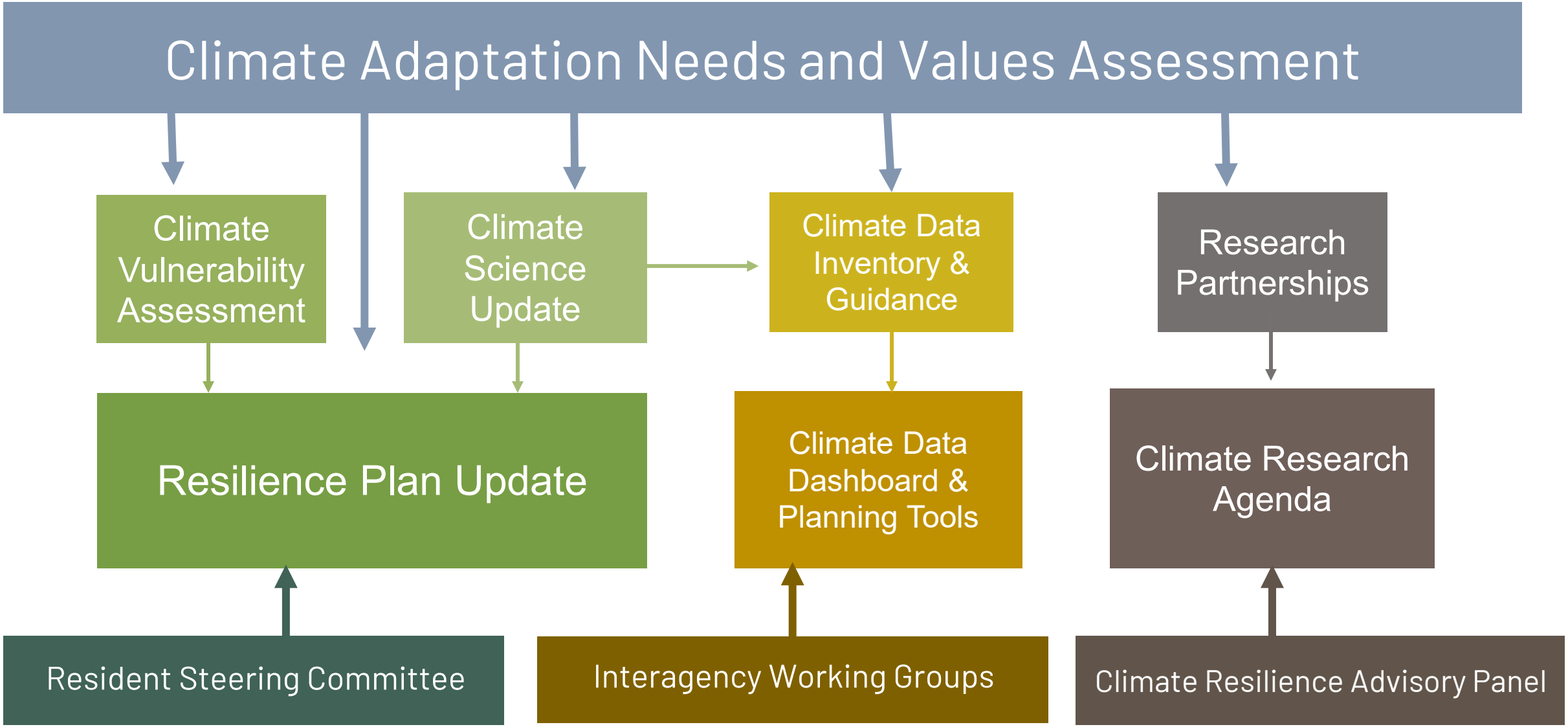
[COOLING1]: Have you used a cooling center, for any purpose, in the past 5 years? *N* = 863
[COOLING2]: Have you gone to a public building to cool down in the past 5 years (e.g., movie theater, malls, public transit hubs, or places of worship)? *N* = 863
[PECO1]: Have you ever received a Low-Income Home Energy Assistance Program (LIHEAP) grant for heating assistance? *N* = 863
[PECO2]: Have you ever received a grant or free air conditioner from LIHEAP (Low-Income Home Energy Assistance Program) for cooling assistance? *N* = 863

Resilience Plan Update

- Citywide plan
- Internal and External stakeholder engagement
- Citywide survey
- Resident steering committee
- Climate Resilience Partner program that directly supports 18 CBOs
- 18 in-person and virtual community engagement opportunities
  - Deeper engagement in 6 frontline communities
- Youth Engagement:
  - Youth Climate Council and Art Competition
- Cost of doing nothing assessment
- Planning tool development

WILLIAM PENN FOUNDATION

Stakeholder Engagement

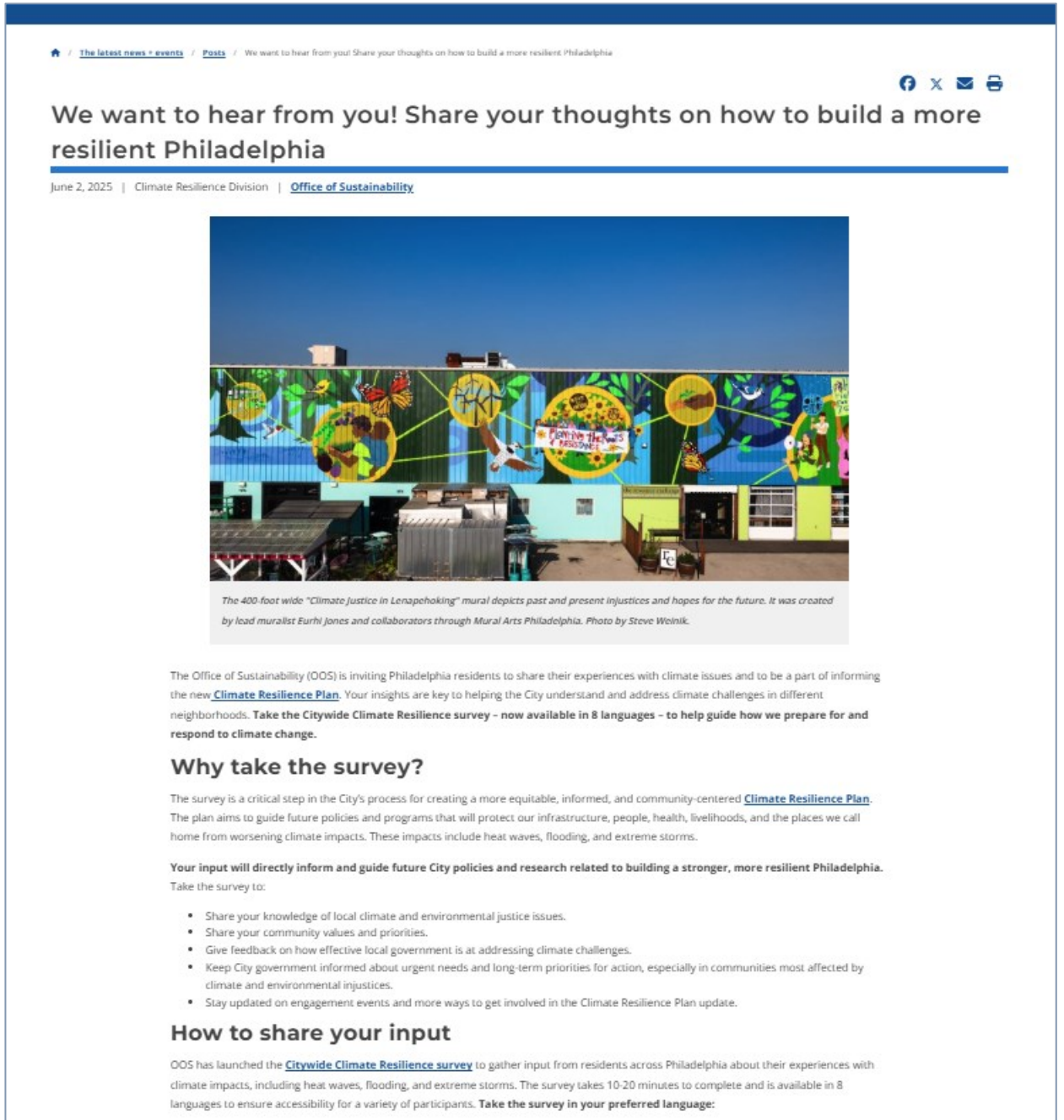


Resilience Survey

Survey now translated into:

- English
- Spanish
- Simplified Chinese
- Portuguese
- Haitian Creole
- French
- Russian
- Arabic

Blog post with links:
https://www.phila.gov/2025-06-02-we-want-to-hear-from-you-share-your-thoughts-on-how-to-build-a-more-resilient-philadelphia/



The latest news + events / Posts / We want to hear from you! Share your thoughts on how to build a more resilient Philadelphia

We want to hear from you! Share your thoughts on how to build a more resilient Philadelphia

June 2, 2025 | Climate Resilience Division | Office of Sustainability

The 400-foot wide "Climate Justice in Lenapehoking" mural depicts past and present injustices and hopes for the future. It was created by lead muralist Eurhi Jones and collaborators through Mural Arts Philadelphia. Photo by Steve Weinik.

The Office of Sustainability (OOS) is inviting Philadelphia residents to share their experiences with climate issues and to be a part of informing the new Climate Resilience Plan. Your insights are key to helping the City understand and address climate challenges in different neighborhoods. **Take the Citywide Climate Resilience survey – now available in 8 languages – to help guide how we prepare for and respond to climate change.**

Why take the survey?

The survey is a critical step in the City's process for creating a more equitable, informed, and community-centered Climate Resilience Plan. The plan aims to guide future policies and programs that will protect our infrastructure, people, health, livelihoods, and the places we call home from worsening climate impacts. These impacts include heat waves, flooding, and extreme storms.

Your input will directly inform and guide future City policies and research related to building a stronger, more resilient Philadelphia. Take the survey to:

- Share your knowledge of local climate and environmental justice issues.
- Share your community values and priorities.
- Give feedback on how effective local government is at addressing climate challenges.
- Keep City government informed about urgent needs and long-term priorities for action, especially in communities most affected by climate and environmental injustices.
- Stay updated on engagement events and more ways to get involved in the Climate Resilience Plan update.

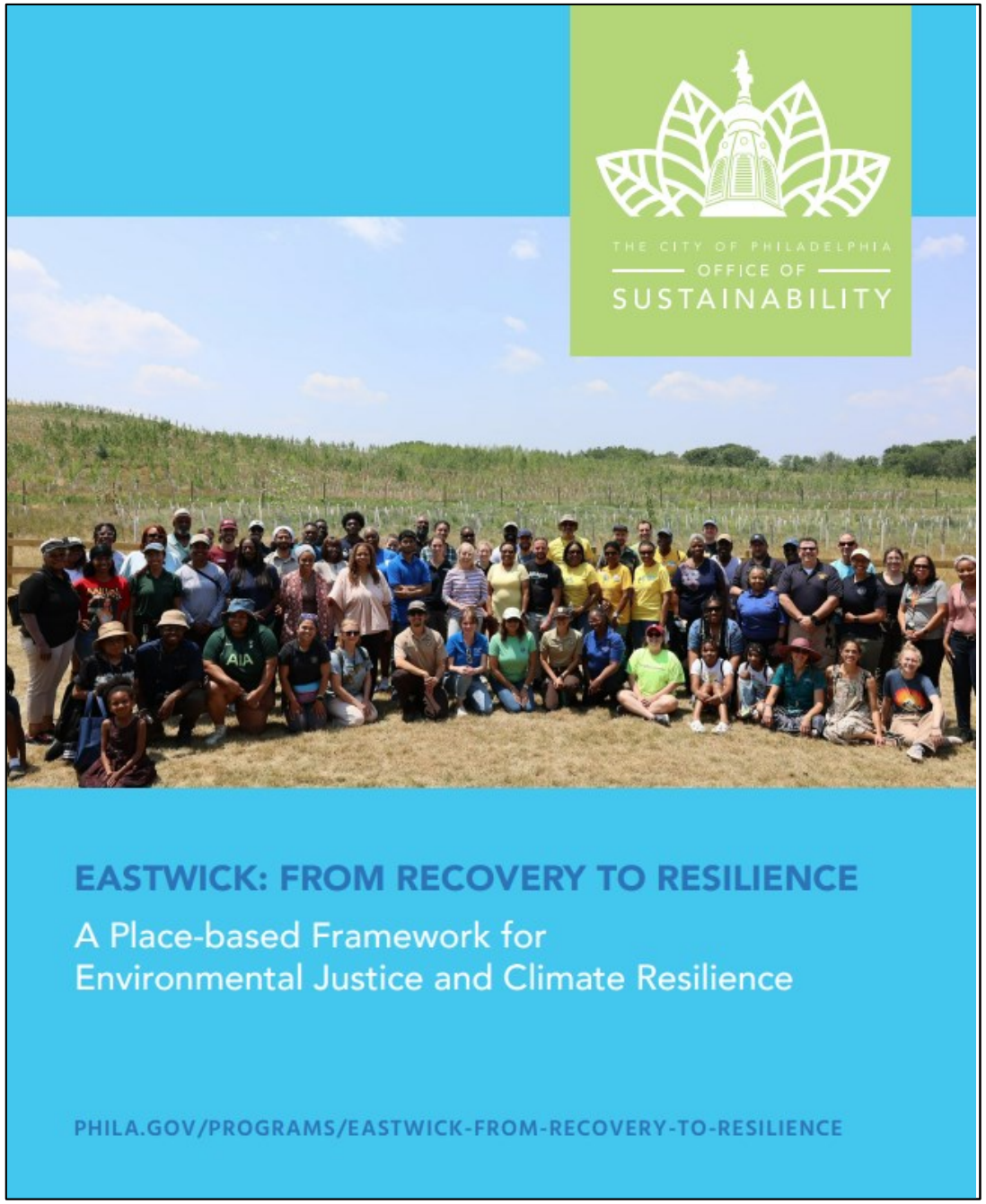
How to share your input

OOS has launched the Citywide Climate Resilience survey to gather input from residents across Philadelphia about their experiences with climate impacts, including heat waves, flooding, and extreme storms. The survey takes 10-20 minutes to complete and is available in 8 languages to ensure accessibility for a variety of participants. **Take the survey in your preferred language:**

Place-Based Program

Eastwick from Recovery to Resilience

- A place-based, whole of government approach
- Over $4M raised for this initiative
- Funding to develop a flood resilience strategy
- Working with partners at all levels and scales
    - USACE, EPA, FEMA & other federal partners
    - Other city departments
    - John Heinz Wildlife Refuge
    - Flood Mitigation Council of Eastwick
    - Eastwick United and Eastwick Friends & Neighbors Coalition
- Modeling coordination
- Innovative insurance solutions



Eastwick

Hurricane Floyd, 1999
Source: Interface Studios

Tropical Storm Isaias, 2020
Source: CBS News

Place-Based Program

Strawberry Mansion

- Building on Beat the Heat Hunting Park
- Cool Roof Pilot
- Partnerships
  - Strawberry Mansion CDC
  - Strawberry Mansion Neighborhood Action Center (NAC)
  - Discovery Center
  - Philadelphia libraries, and recreation centers
  - Interagency coordination

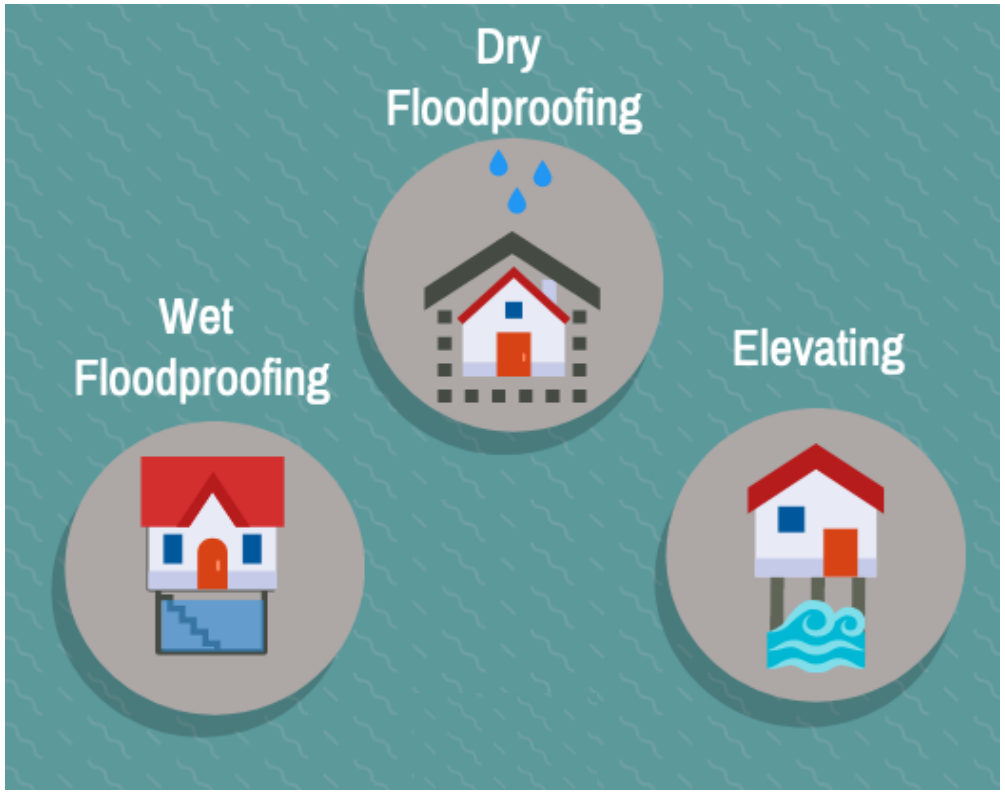
Flood Resilience and Compliance Strategy

- Floodplain Manager Duties
- Flood Risk Management Task Force
  - Updating floodplain regulations
  - Risk information
  - Community Rating System
- Flood Mitigation Programming
  - Property-level program
- CDBG-Disaster Recovery Coordination
- Clean Waters Task Force

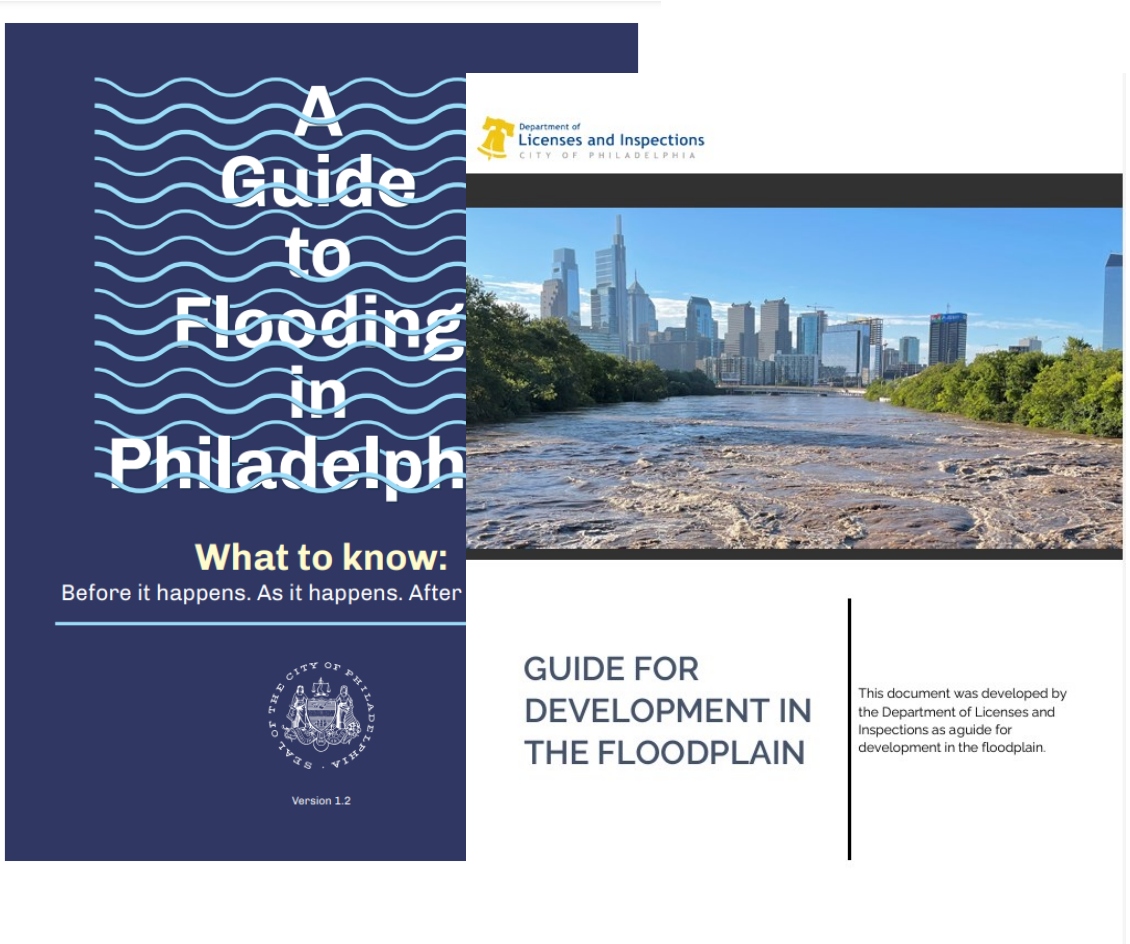

Credit: Matt Rourke / AP Photo

Flood Resilience and Compliance Strategy

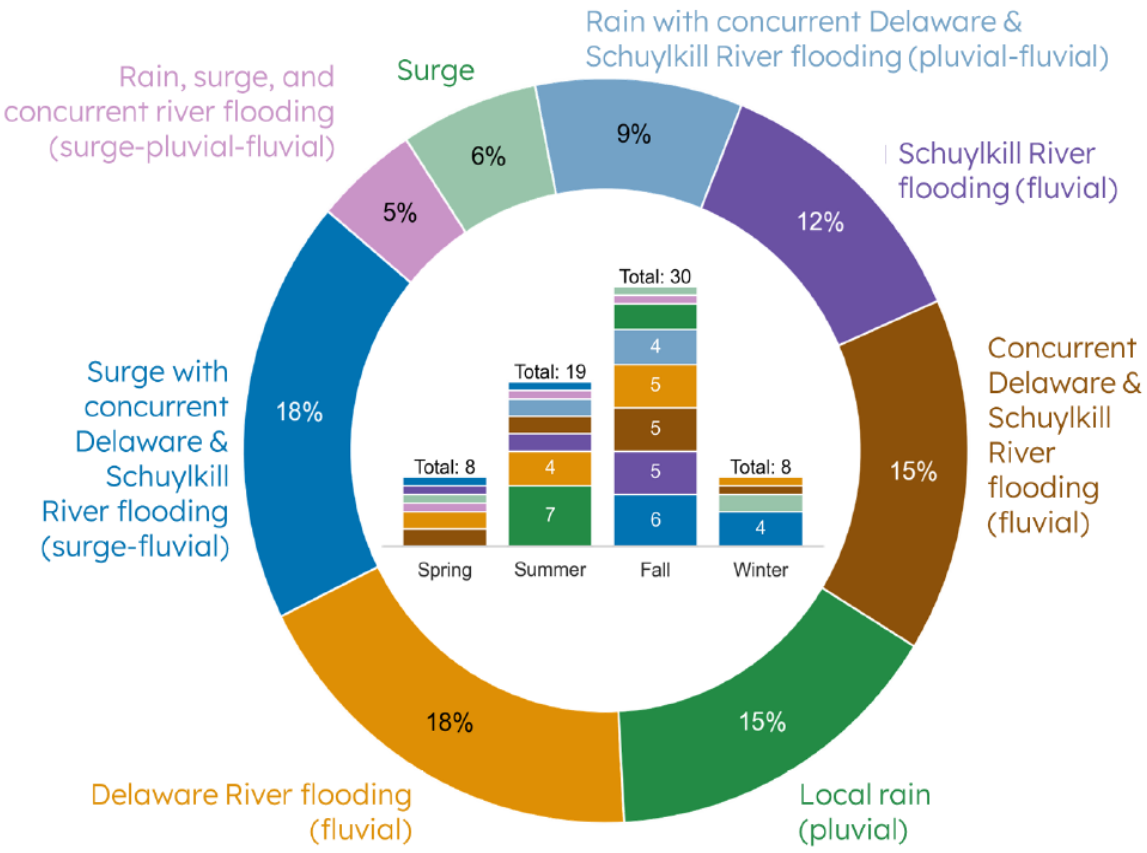
Property-level flood mitigation program pilot



Risk communication & Development Review



Research Partnerships



Primary Drivers of Flooding in Philadelphia

Source: PNLL Integrated Coastal Flood Modeling project

- MACH – Megalopolitan Coastal Transformation hub led by Rutgers University
  - Research on coastal hazards & solutions
- Local Universities (Drexel, Upenn, Temple, Jefferson)
- Department of Energy – Regional Digital Testbed project

Municipal Resilience & Climate Services

- Capital planning
- Infrastructure resilience
- Policy Development
- Departmental support
- Planning tools & resources

Paving the Way to Cooler Streets in Hunting Park

June 5, 2024 | Office of Sustainability, Department of Streets | Office of Sustainability

THANK YOU

Abby Sullivan

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THE CITY OF PHILADELPHIA
OFFICE OF
SUSTAINABILITY