

TRANSPORTATION RESILIENCE IN THE REGION: WHAT'S NEXT?

Transportation Resiliency Planning Webinar #1

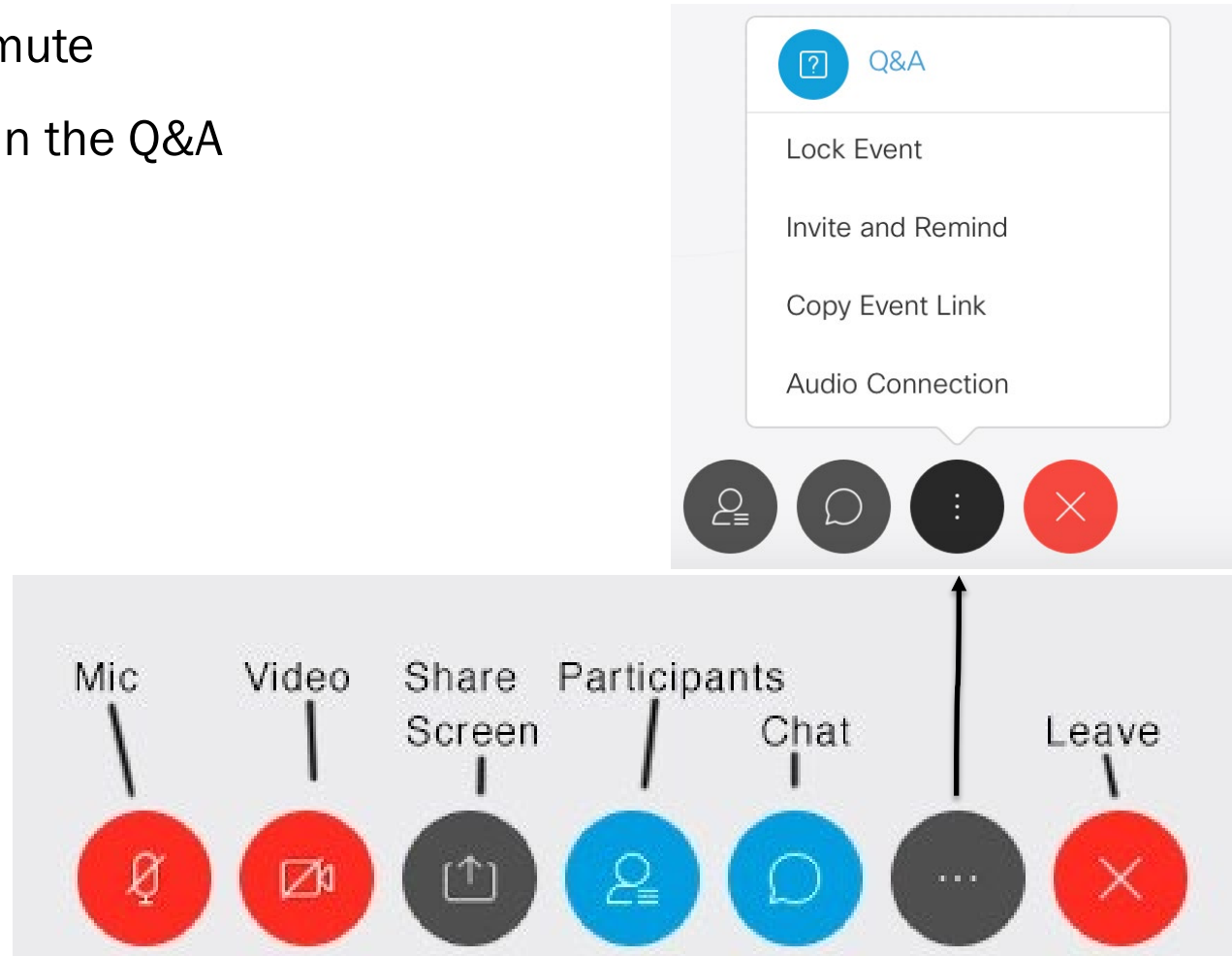
April 8, 2022



National Capital Region
Transportation Planning Board

WebEx Logistics

- Please stay on mute
- Type questions in the Q&A



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What
organization
are you from?

What is your
role?



Project Team



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AICP Credit

American Institute of Certified Planners (AICP)
Certification Maintenance (CM) Credit Number:

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Agenda

Introduction - 15 minutes

Background – 10 minutes

Resilience requirements and opportunities – 15 minutes

Climate change in the region– 35 minutes

- MWCOG
- WMATA
- City of Alexandria
- Montgomery County

Q&A – 10 minutes

Wrap-Up – 5 minutes



Transportation Resiliency Planning Webinar Series Schedule

Webinar 1

- Transportation Resilience in the Region: What's Next?

Webinar 2

- Get Started: Climate Vulnerability Assessments

Webinar 3

- Break Down Barriers: Integrate Climate Resilience into Planning and Programming

Webinar 4

- Break Down Barriers: Integrate Climate Resilience into Project Development & Design



Session 1 Goals and Objectives

Goal: Provide an overview of transportation resilience in the region and set the stage for the rest of the series

Objectives

- Define key terms
- Understand COG/TPB resilience and equity work to date as well as available resources
- Understand climate impacts in the region
- Understand how traditionally marginalized populations may be particularly vulnerable to climate impacts
- Understand federal resilience requirements and funding opportunities



Natural Hazard and Climate Resilience: Background



Vulnerability and Resilience Defined

- **Vulnerability** is the degree to which a system **is susceptible to, or unable to cope with adverse effects** of natural hazards
- **Resilience** is the ability **to anticipate, prepare for, and adapt** to changing conditions and **withstand, respond to, and recover** rapidly from disruptions from natural hazards



Figure 1. Damage to Hunter Mill Road in Fairfax County from Tropical Storm Lee (2011). Source: [Flicker/VDOT](#)

Natural Hazards to Transportation

- **Extreme heat:**
 - Train rails expand, risking derailments
 - Concrete roads crack and asphalt buckles
 - Bridge joints expand
- **Extreme winter conditions:**
 - Road surfaces crack and potholes form
 - Systems operations power loss
 - Roads close due to obstructions
- **Extreme precipitation and flooding:**
 - Erosion can cause catastrophic collapse of any transportation infrastructure
 - Roads close due to flood or obstructions

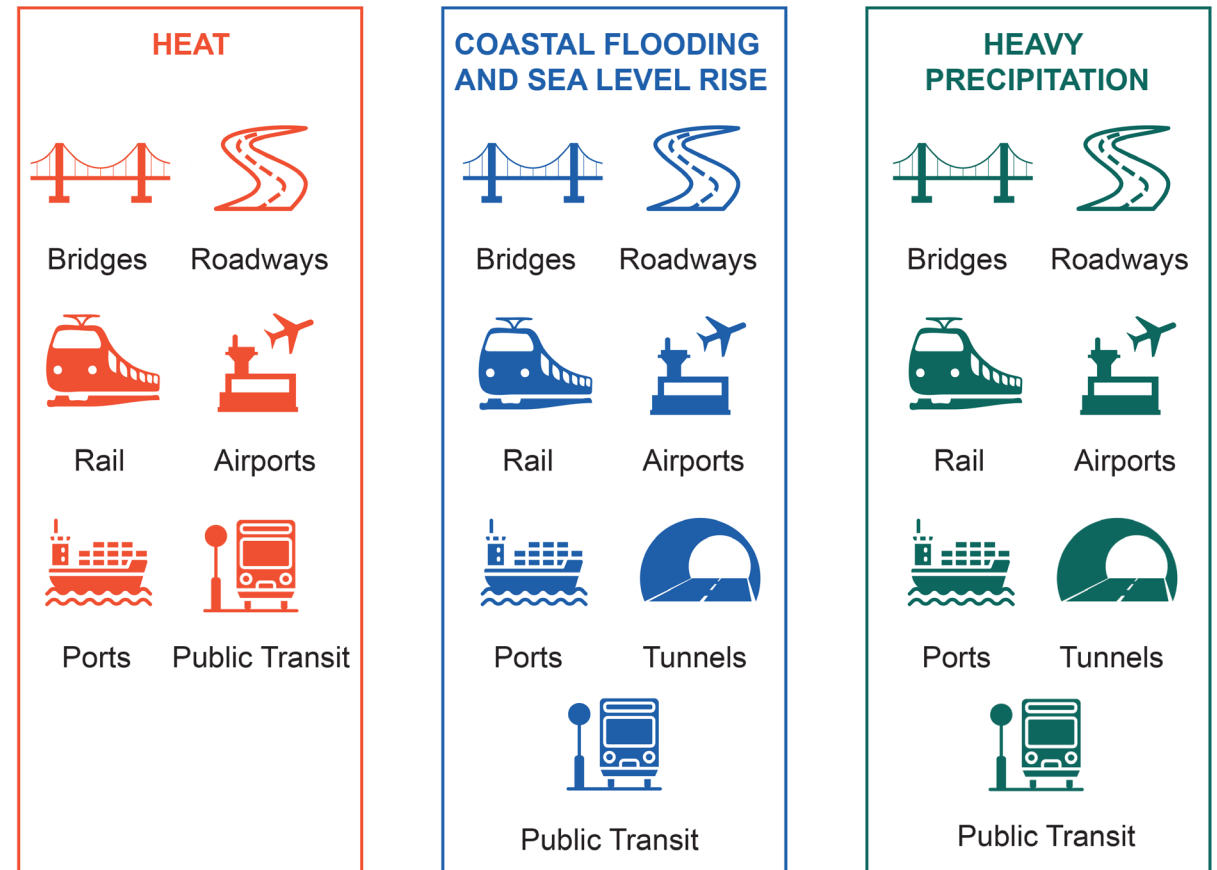


Figure: Fourth National Climate Assessment, Transportation Chapter



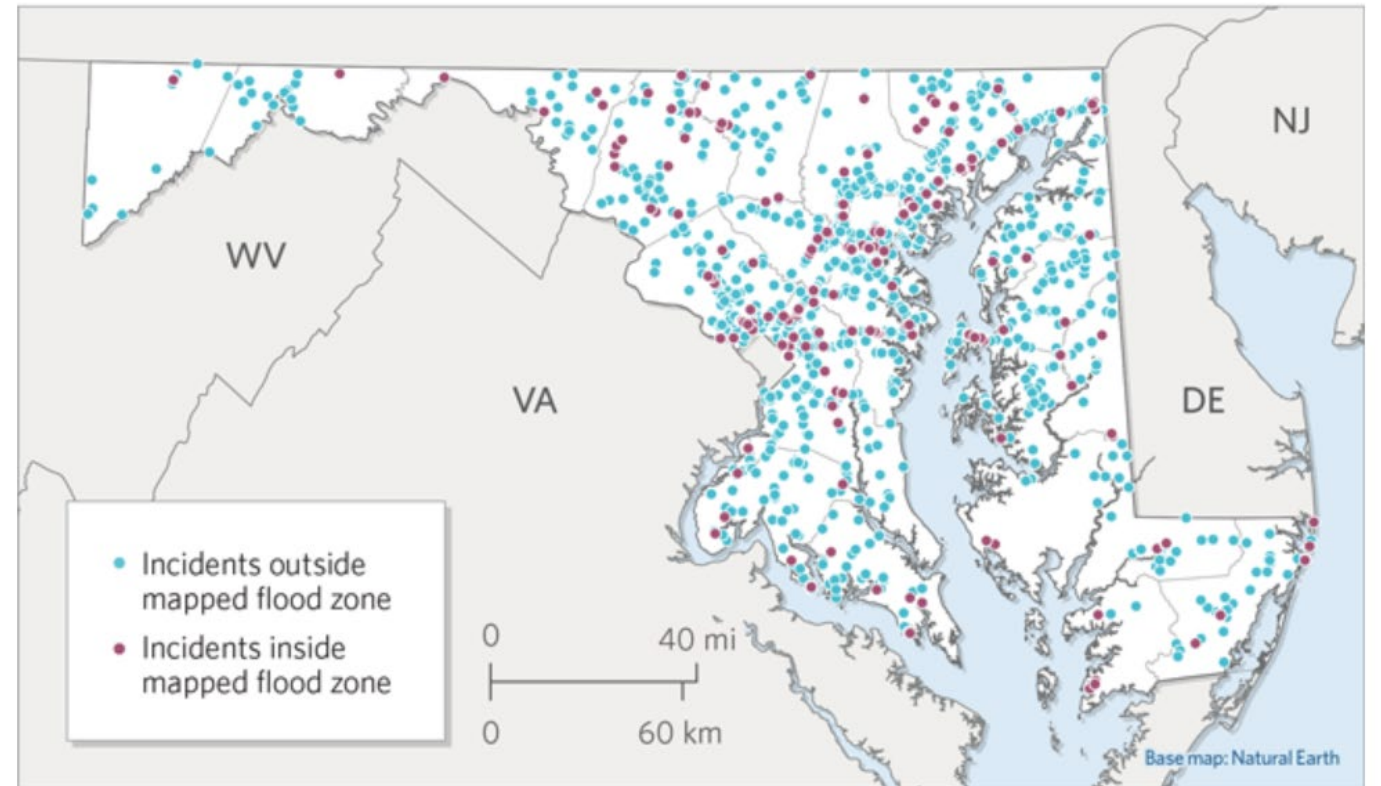
Flooding the road network: Maryland example

~1,582 hours per year
of traffic disruptions

\$15 million
in user delay

78% of flooded roads were
outside FEMA flood zones

Flooding of state-maintained roadways, 2006-20



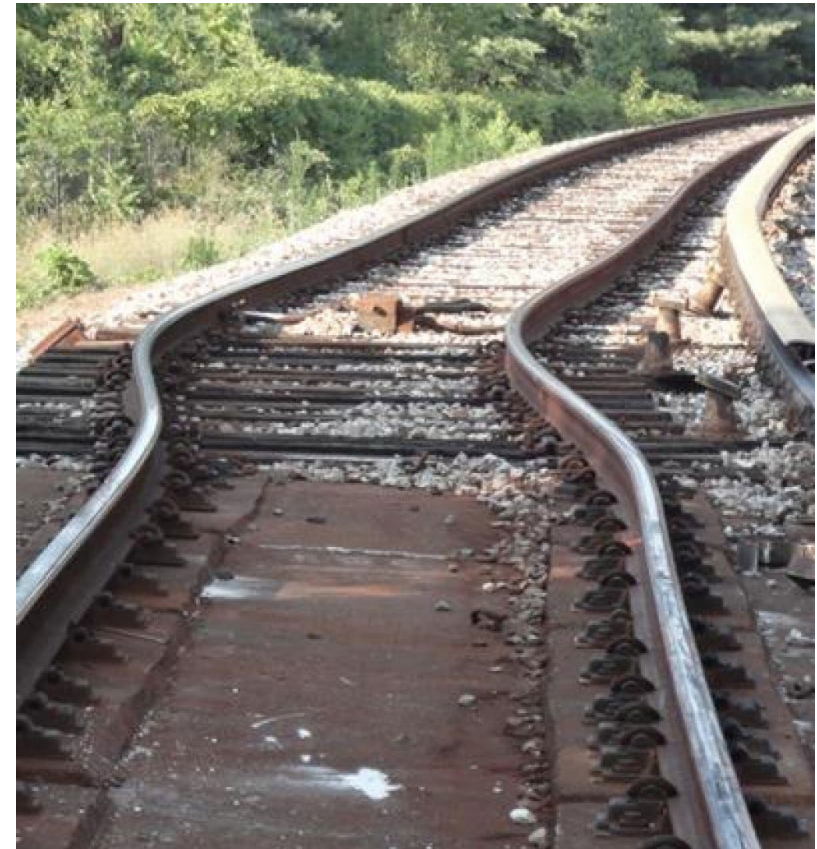
Source: ICF analysis of Maryland Department of Transportation data

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Natural Hazards and Climate Change

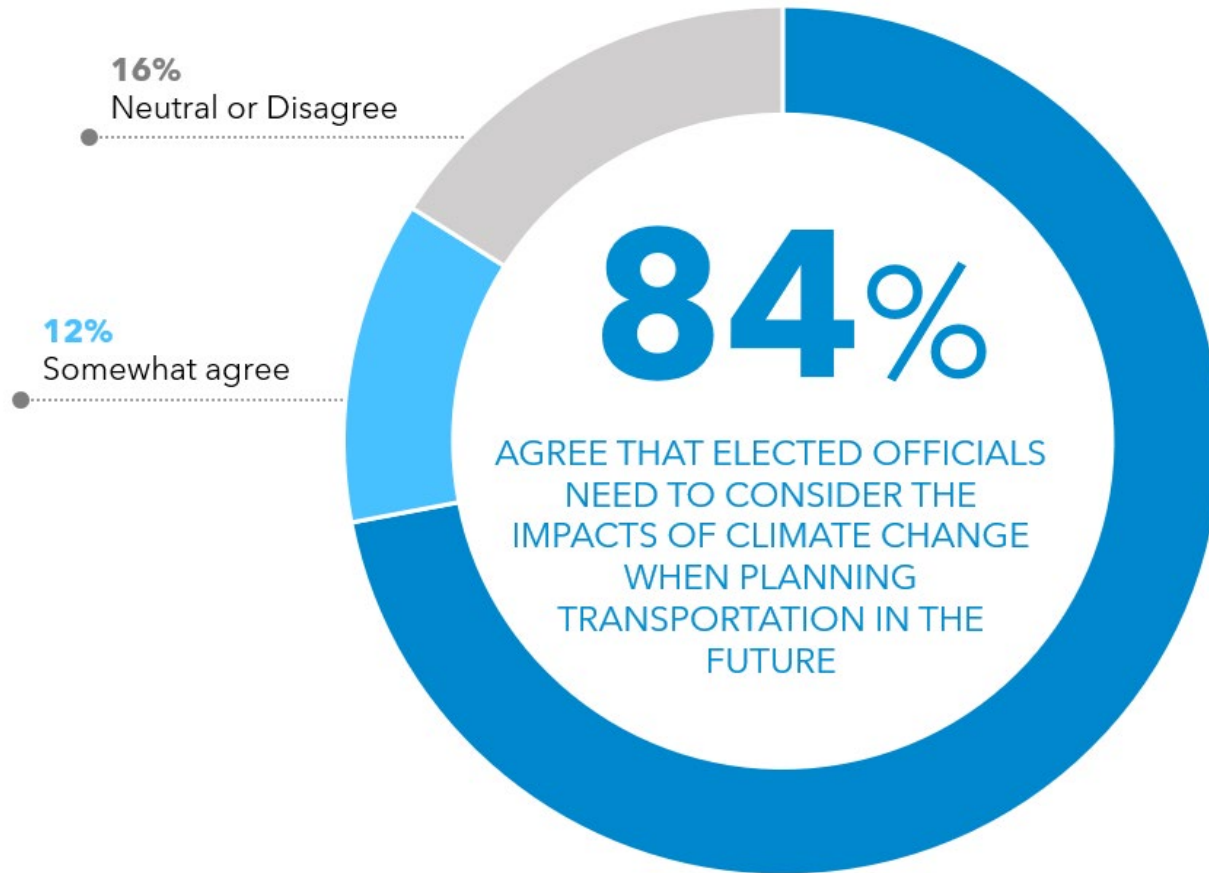
- Climate change is accelerating over time and will continue over the design life of infrastructure
- Impacts to the transportation system have ripple effects on communities and the economy
- Some of these impacts disproportionately affect vulnerable populations



Source: [Washington Post](#), WMATA



Climate Change and the Voices of the Region



Write-in ideas:

Add transit redundancy

Reduce impervious surfaces

Flood-proof Metro

Use nature-based solutions: green space, rain gardens, and trees



Resilience Strategies

Overall strategic direction

Organizational structure and coordination

Research and studies

Resilient project selection process

Resilience for existing infrastructure



Equity Considerations for Resilience Strategies

Vulnerability to natural hazards **varies among populations** and is often greater among historically marginalized populations who face:

- **Greater exposure to hazards**
- **Greater sensitivity to hazards effects**
- **Less capacity to adapt to the impacts**

Potentially vulnerable populations include:

- Low-income households
- Members of minority ethnic or racial groups
- Residents of sub-standard housing
- People with limited English proficiency
- Older adults
- Children
- People with chronic health problems
- People with disabilities



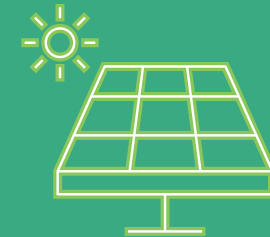
Equity Principles for Resilience Strategies

Principles

- Input from diverse voices.
- Identify vulnerabilities.
- Address vulnerabilities.
- Prioritize implementation for most vulnerable.

Example

- Solar panels and reserve batteries at bus stops
- Prioritize neighborhoods depending on public transportation



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What does
resilience mean
to you?



Resilience Requirements and Opportunities



Michael Neibauer, [Washington Business Journal](#)



Federal requirements for considering resilience

FAST Act and Title 23 regulations require resilience...

- As a **consideration factor** in the 3C transportation planning process
- **In consulting with other agencies** to develop long-range transportation plans and transportation improvement programs
- **Assessing capital investments** and other transportation strategies
- Inventory **facilities repeatedly damaged** in emergency events
- When developing Transportation **Assessment Management Plans**

Bipartisan Infrastructure Law (BIL): PROTECT Program

Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT)

- \$8.7 billion over five years
 - \$7.3 billion for State DOTs
 - \$1.4 billion across four competitive grant programs:

Planning grants

Resilience improvements

Community resilience and evacuation routes

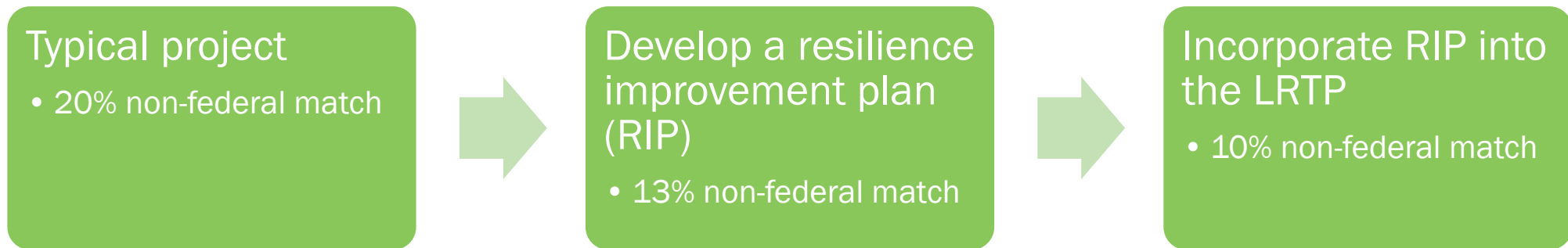
At-risk coastal infrastructure



Bipartisan Infrastructure Law: PROTECT Program

Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT)

- Provides opportunities to reduce non-federal match requirements for project construction



Bipartisan Infrastructure Law: Resilience Improvement Plans

Resilience Improvement Plans (RIP)

Some requirements include:

- Demonstrate a **systematic approach** to system resilience
- Include a **risk-based vulnerability assessment**
- Include an **investment plan** and list of **priority projects**

FEMA Building Resilient Infrastructure and Communities (BRIC)

- BRIC Program supports investments in **planning and infrastructure resilience**
- **~1 \$billion** available in FY2021; potentially higher for FY2022
- Eligible projects include:
 - Reconstruction or relocation of structures
 - Utility/infrastructure protection
 - Flood control and mitigation



Source: Claire CJS/Flickr

FEMA Flood Mitigation Assistance (FMA) Program

- Funding for projects that **reduce long term flood risk and damage to buildings** insured by the National Flood Insurance Program
- Projects include:
 - Wetlands restoration
 - Communication infrastructure upgrades for real-time monitoring
 - Nature based flood mitigation infrastructure



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Other state funding opportunities

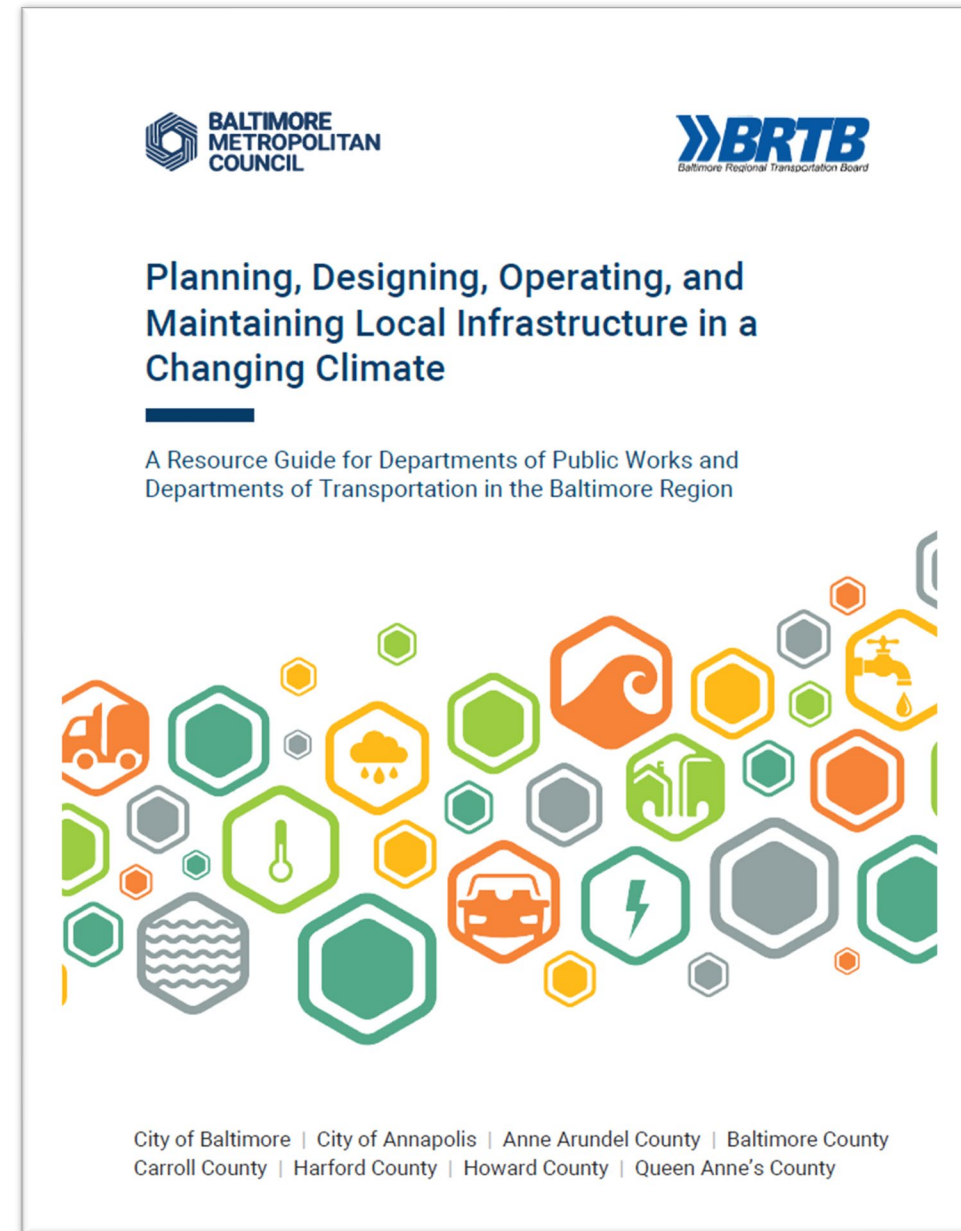
- Maryland Department of Natural Resources, Department of the Environment's Comprehensive Flood Management Grant Program
- Maryland Department of Natural Resources Chesapeake and Coastal Grants Gateway Program
- Virginia Coastal Zone Management Program



Photo of stream restoration funded by a Maryland Department of Natural Resources Flood Management Grant | Photo Credit: Maryland DNR



Additional funding information can be found in the **Baltimore Metropolitan Council** climate resource guide



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Have you used any of these funding sources?

Are we missing any funding sources?

What are you doing to prepare for the Bipartisan Infrastructure Law (BIL)?



Climate Change in the Region

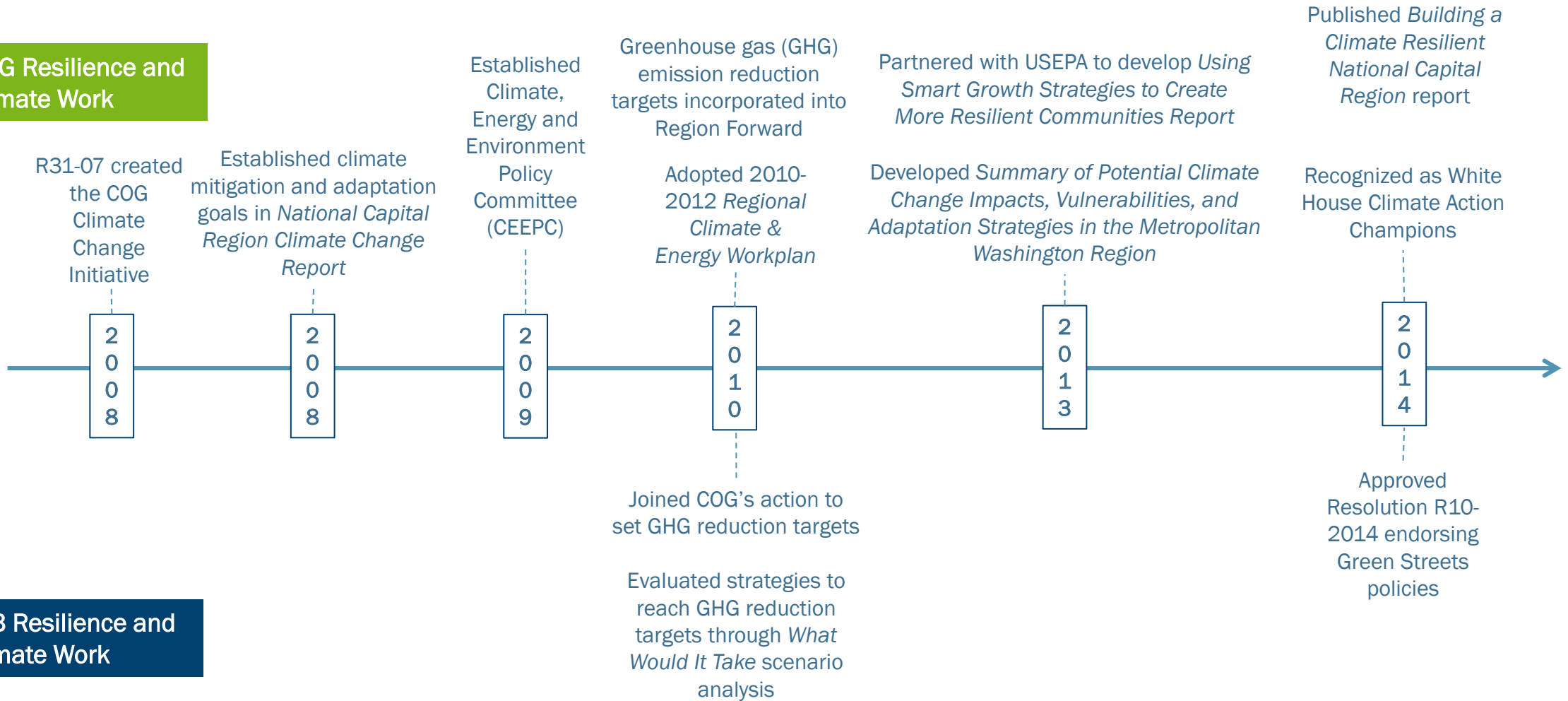


Climate Collaborative Guiding Principles

Principle	Description
1. Collective Action	We will continue to work together to leverage our impact and facilitate application at scale.
2. Effective Partnerships	We will continue to share best practices, learn together, and coordinate on implementation to advance regional transformation.
3. Lead by Example	We have a continued commitment to internal implementation of long-term solutions to reduce the climate impacts of our operations.
4. Integration	We understand climate action is inherently multidisciplinary and will promote cross-department coordination, including in areas such as equity, health, and economic development.
5. Flexibility	We understand the need for flexibility in how our public agencies and stakeholders across the DC, MD, and VA work to achieve regional GHG goals.
6. Transparency	We will continue to measure and report progress in a manner easily understandable by all.
7. Innovation	We support a just transition to a clean energy economy through the application of innovative technology, policies, and processes by public and private sectors.
8. Community Leadership	We will continue to educate, motivate, and empower action from our community's institutions, businesses, non-profits, and residents.
9. Inclusive Engagement	We commit to inclusive community engagement and equitable provision of climate and energy programs and services.
10. Advocacy	We will continue to support state and federal policies and programs that protect the human and environment health of our communities.

Resilience work in TPB region

COG Resilience and Climate Work



TPB Resilience and Climate Work



National Capital Region
Transportation Planning Board



Metropolitan Washington
Council of Governments

Resilience work in TPB region (continued)

COG Resilience and Climate Work

Updated Climate Energy and Environment Policy Committee Final 2013-2016 Action Plan Resource Guide

2015

Support local resilience planning, such as DC's [Climate Ready](#) and [100 Resilient Cities](#) initiatives (ongoing)

Developed *Metropolitan Washington 2030 Climate and Energy Action Plan*

2016

Published Environmental Justice Toolkit

2017

Named a Regional and Metro Scale Climate Leader by the Global Covenant of Mayors for Climate and Energy

2019

Developed and a *Metropolitan Washington 2030 Climate and Energy Action Plan*

2020

Met global standards for climate planning

2021

TPB Resilience and Climate Work

Identified types of projects, programs, and policies with the greatest potential to reduce GHGs of the transportation sector (TPB Multisector Working Group)

Published TPB Climate Change Mitigation Study of 2021

Developed TPB Resiliency Study



Climate Resilience Goals

In October 2020, per CEEPC's recommendation, the COG Board adopted (and TPB affirmed) the climate resilience goal of becoming a Climate Ready Region and making significant progress towards becoming a Climate Resilient Region by 2030.

Climate Ready Region:

To be Climate Ready by 2030, all local governments must assess current and future climate risks, and be actively integrating climate planning across government plans, operations, and communications.

Climate Resilient Region:

To fully be a Climate Resilient Region, the region must have the ability to adapt and absorb against disturbances caused by current and future, acute and chronic climate impacts and successfully maintain essential functions.

2030 Regional Climate and Energy Action Plan Elements

Element	Description
1. Greenhouse Gases	Summary of regional GHG inventory trends from 2005 – 2018, business-as-usual (BAU) GHG emission projections through 2030, and technical scenario showing what it will take for the region to reach GHG reductions of 50% below 2005 levels by 2030.
2. Climate Mitigation Strategy	Priority collaborative mitigation actions to move the region toward achieving the GHG emission reduction goal of 50% by 2030, below 2005 levels. Climate action areas include Planning, Equity, Clean Electricity, Zero Energy Buildings, Zero Emission Vehicles, Mode Shift and Travel Behavior, Zero Waste, and Sequestration.
3. Climate Risks and Vulnerabilities	Summary of the Regional Climate, Risk and Vulnerability Assessment (CRVA). Evaluates climate hazards: extreme heat, drought, lightning and thunderstorms, flash and riverine flooding, coastal flooding and extreme winter conditions.
4. Climate Resilience Strategy	CEEPC’s priority collaborative climate resilience actions to move the region toward achieving the goal of becoming a Climate-Ready Region and making significant progress to be a Climate Resilient Region by 2030. The action areas include Planning, Equity, and Resilient Infrastructure.

Climate Risk and Vulnerability Assessment Overview

Climate Risk Matrix

	Probability			
Consequence		Low (1)	Moderate (2)	High (3)
	High (3)	3	6	9
	Moderate (2)	2	4	6
	Low (1)	1	2	3

Risk Levels and Adaptive Capacity

Degree of Challenge

Hazard	Probability	Consequence	Risk
Extreme Heat	3	3	9
Drought	2	3	6
Flooding (Flash and Riverine)	3	3	9
Coastal Flooding	3	2	6
Lightning/Thunderstorm	3	2	6
Extreme Winter Conditions	2	3	6

Factor	Degree of Challenge
Infrastructure Conditions/Maintenance	High
Access to Basic Services	Moderate
Access to Healthcare	Moderate
Public Health	Moderate
Housing	Moderate
Poverty	Moderate
Community Engagement	Moderate
Environmental Conditions	Moderate
Economic Health	Low

Transportation Infrastructure Impacts

Figure 14: National Capital Region Vulnerabilities by Sector

		Climate Drivers			
	IMPACT	Heat	Precip. Variability	Severe Storms	Sea Level Rise
Transportation	a. More frequent travel disruptions (ex. downed trees, power outages)	X	X	X	X
	b. Change in infrastructure maintenance needs	X	X	X	X
	c. Possible increased road surface damage	X	X	X	X
	d. Increase in erosion around bridge footings and roads		X	X	X
	e. Increased rail delays (commute and delivery of goods)	X	X	X	X
	f. Increase in rail infrastructure deterioration from buckling and expansion	X			
	g. Change in replacement and maintenance needs for vehicle fleets	X	X	X	
	h. Increase in poor outdoor air quality days	X			
	i. More frequent street tree replacement and maintenance needs	X	X	X	



TPB & COG Board Resolutions: Social Equity

2020 Resolutions established equity as a fundamental value and integral part of all COG and TPB activities and acknowledged that inequitable impacts continue today.

Potentially vulnerable populations may include:

- People with low-income
- Minority
- Marginalized groups
- Women and girls
- Persons in sub-standard housing
- People with limited English proficiency
- Older adults
- Children
- People with chronic health problems
- People with disabilities

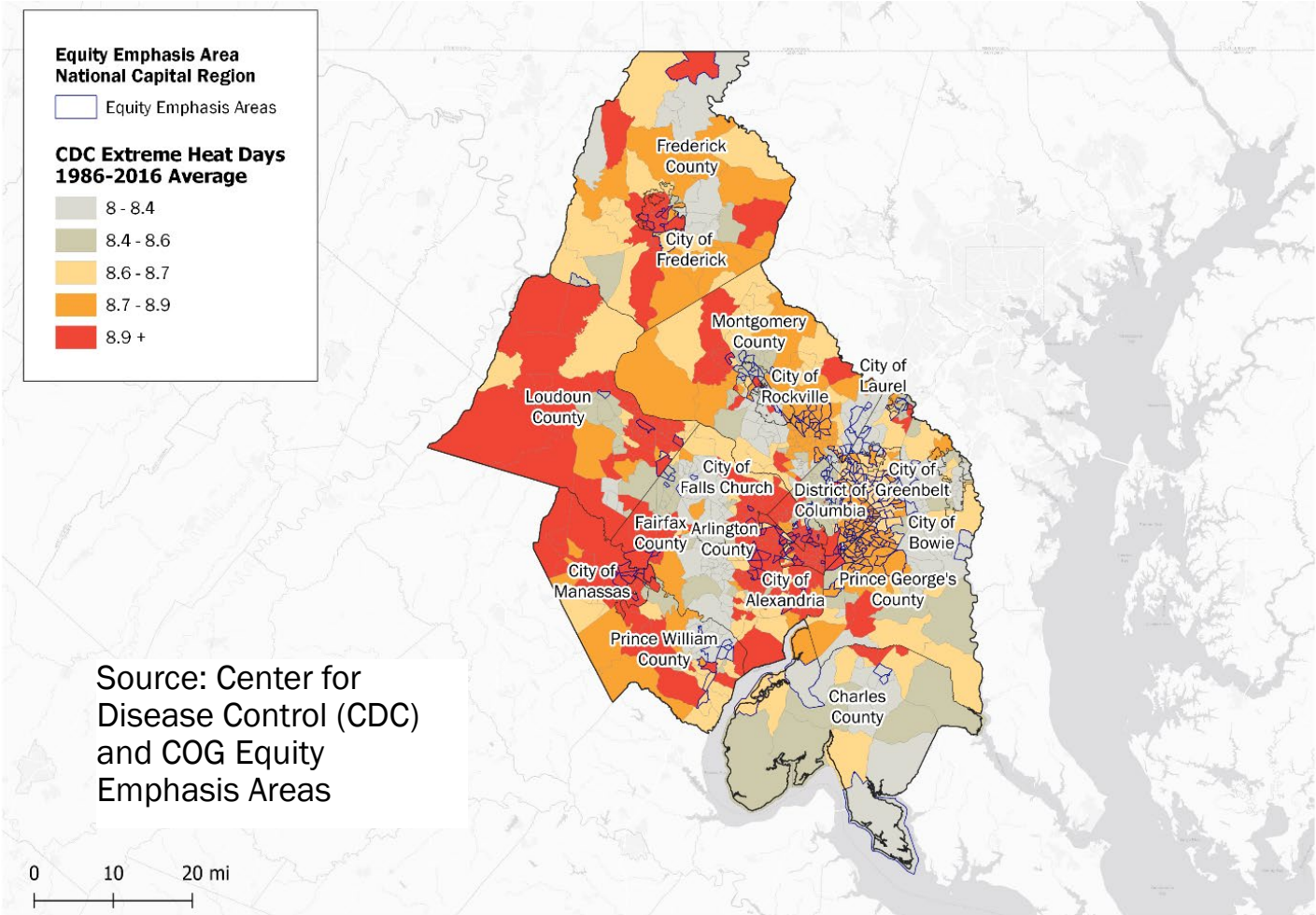


Leveraging Equity Emphasis Areas

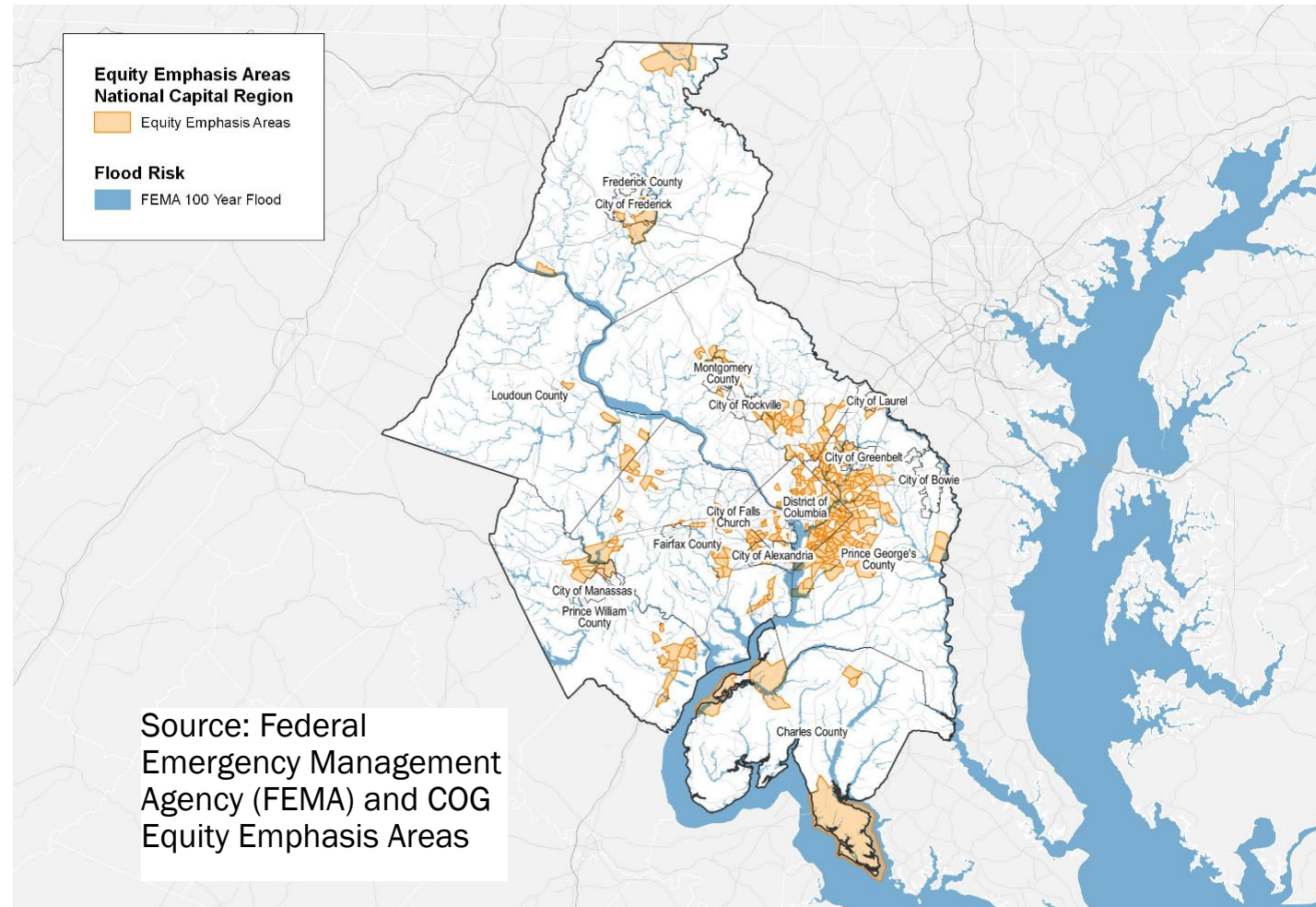
Equitable Access + Equitable Outcomes

1. EEA and climate risk mapping support our understanding of how to create Equitable Access
2. How we plan, identify actions and implement strategies can support equitable outcomes
 - Are we engaging EEA communities equitably in decisions that affect their community?
 - Are we supporting the needs that have been voiced by potentially vulnerable populations?
 - How can we ensure an equitable distribution of benefits from our plan's recommendations?

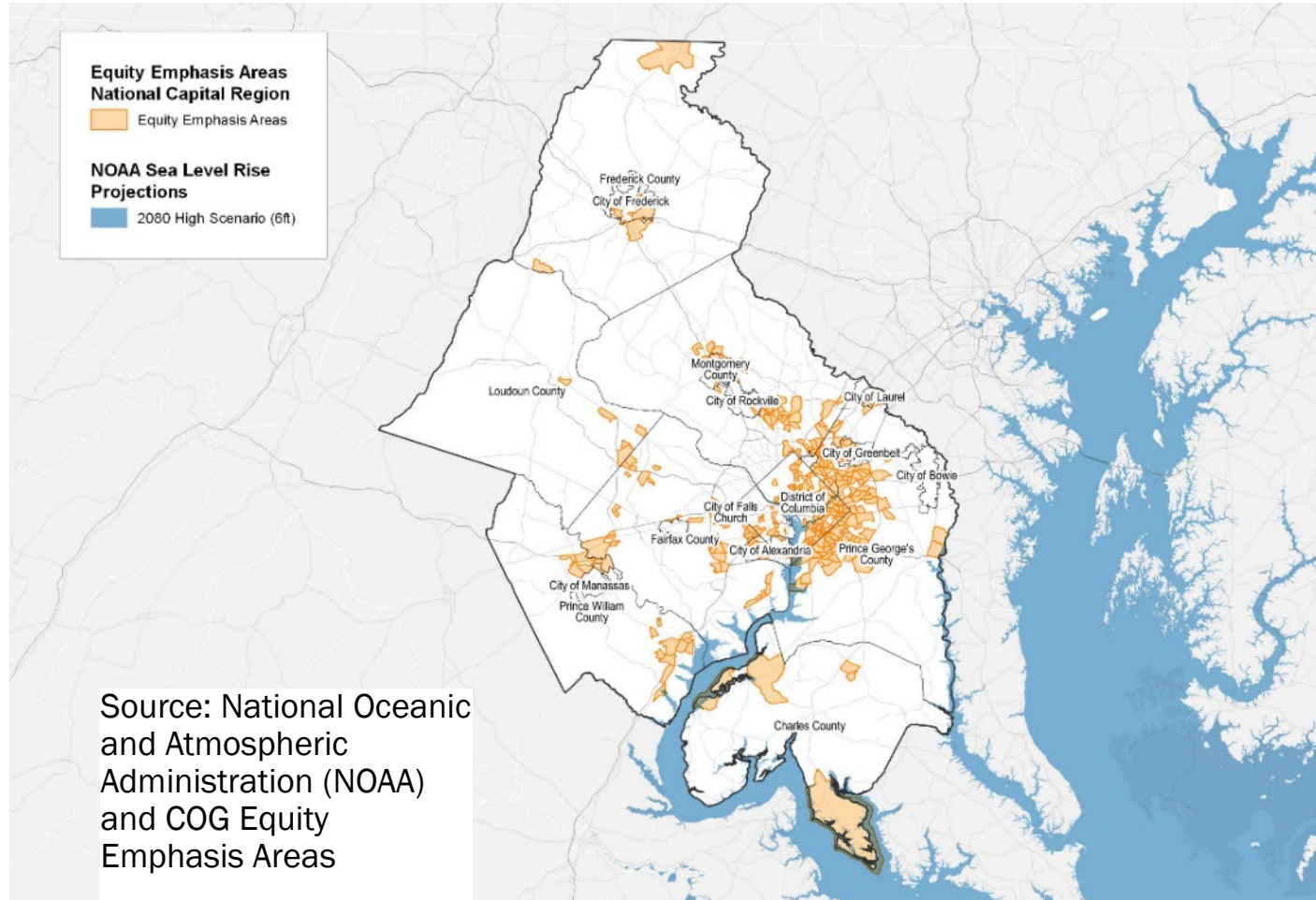
Extreme Heat



Flash/Riverine Flooding



Sea Level Rise



2030 Plan Resilience Strategy

Climate Action Area	Action ID	Priority Collaborative Action
Planning	PL - 2	Support Capacity Building for Climate Resilience Planning
	PL - 3	Develop Integrated Approach to Climate Resilience Planning
	PL - 4	Update Local Regional Plans to Address Climate Risks
Equity	EQ - 3	Support Engagement of the Public on Climate Risks, with a Particular Emphasis on Potentially Vulnerable Populations
	EQ - 4	Support Equitable Secure Energy Access
Resilient Infrastructure	RI - 1	Support Establishment of Resilience Hubs
	RI - 2	Improve the Resilience of Critical Infrastructure
	RI - 3	Implement Measures to Equitably Address Urban Heat Island
	RI - 4	Enhance Green Infrastructure Networks
	RI - 5	Implement Measures to Reduce Flood Risk

Transportation Approaches

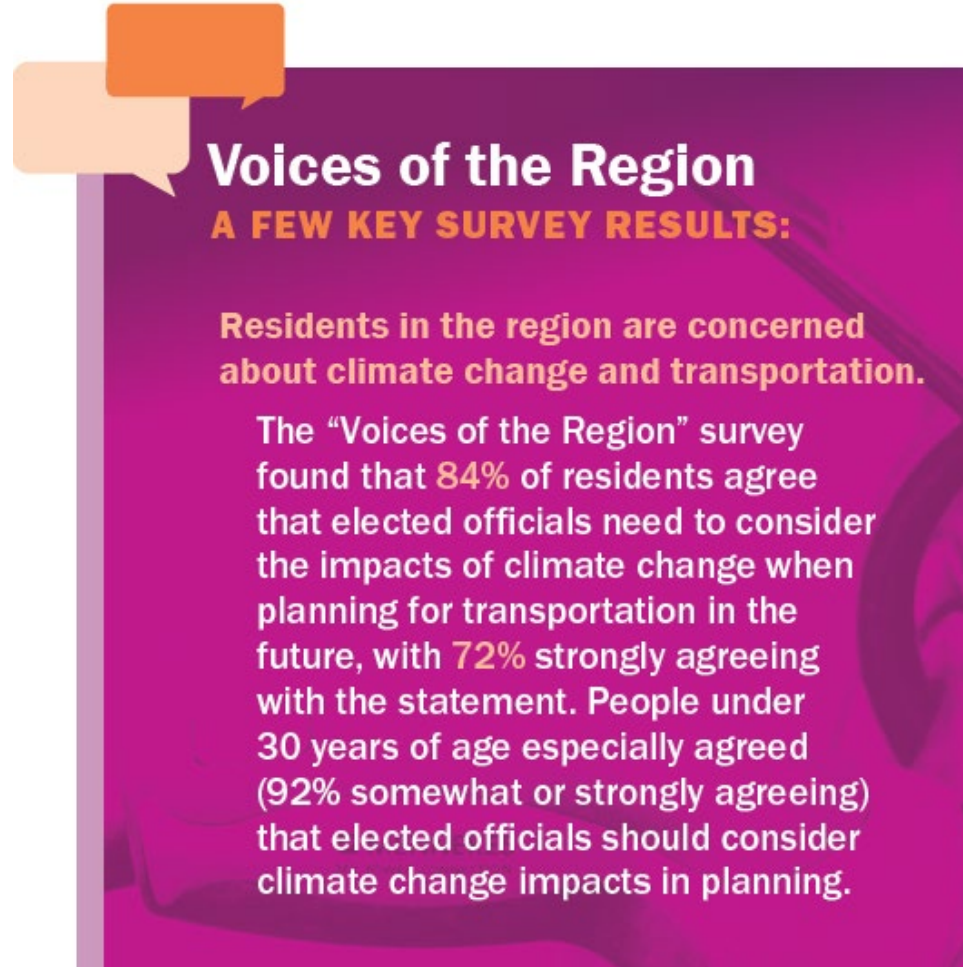
	Potential to Reduce Overall Greenhouse Gas Emissions	No-regrets Measures	Cost Level
Transportation Approaches:			
1. Assess vulnerability of critical assets		✓	\$\$
2. Improve real-time response to severe events through training, interagency coordination, and contingency planning		✓	\$
3. Maintain state of good repair for infrastructure and fleets and keep street tree and brush maintenance up to date	✓	✓	\$\$
4. Update maintenance and staff schedules to better accommodate heat waves and storm events		✓	\$\$\$
5. Strengthen long term air quality planning and implement short term measures such as discouraging engine idling and incentives to reduce emissions from mobile sources during heat waves	✓	✓	\$-\$\$\$
6. Coordinate capital projects with stormwater management, land use, and utility upgrades to reduce costs and enhance resiliency	✓	✓	\$
7. Site new facilities in less vulnerable locations; consider re-locating, hardening, or elevating facilities in vulnerable locations			\$-\$\$\$
8. Enhance redundancy: foster transit oriented development, increase street connectivity and enhance multi-modal options	✓	✓	\$\$\$
9. Implement complete streets and green streets practices	✓	✓	\$\$\$
10. Consider updating standards/materials/design to account for expected changes			\$-\$\$\$
11. Consider low-cost protective actions such as covering air vent shafts, cleaning culverts, or placing sandbags in strategic locations before a known major precipitation event		✓	\$

Public Perception

- **Voices of the Region Survey**
 - Over 2,400 completed surveys with ~12% response rate



The vast majority of the region's residents (88%) agree or strongly agree that human actions contribute to at least some climate change.



Voices of the Region
A FEW KEY SURVEY RESULTS:

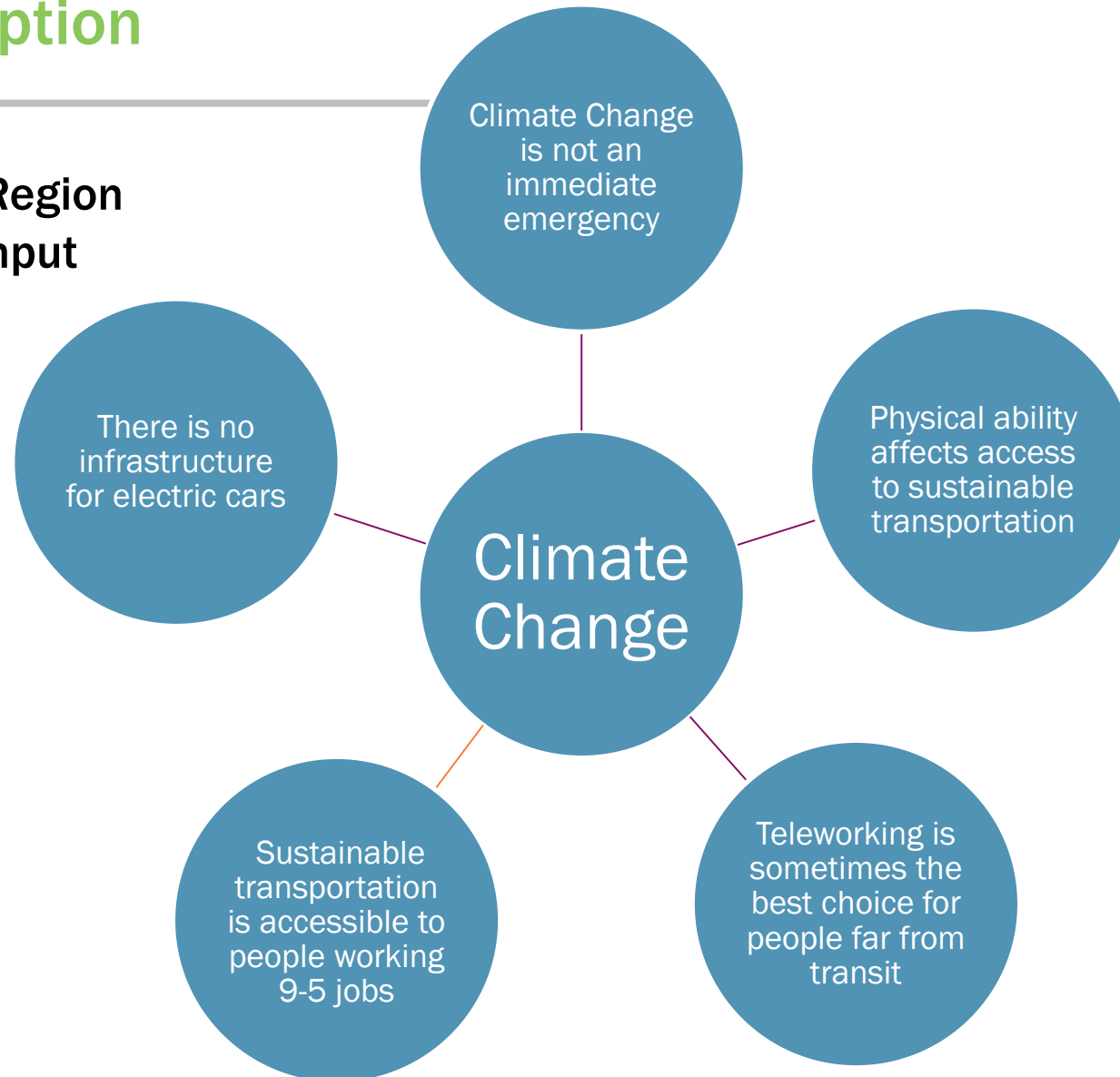
Residents in the region are concerned about climate change and transportation.

The “Voices of the Region” survey found that 84% of residents agree that elected officials need to consider the impacts of climate change when planning for transportation in the future, with 72% strongly agreeing with the statement. People under 30 years of age especially agreed (92% somewhat or strongly agreeing) that elected officials should consider climate change impacts in planning.



Public Perception

- **Voices of the Region
Focus Group Input**



Round robin



WMATA

- Rachel Healy, Director of Sustainability



City of Alexandria

- Ellen Eggerton, Sustainability Coordinator



Montgomery County

- Sandra Brecher, Chief of Commuter Services



Washington Metropolitan Transportation Authority

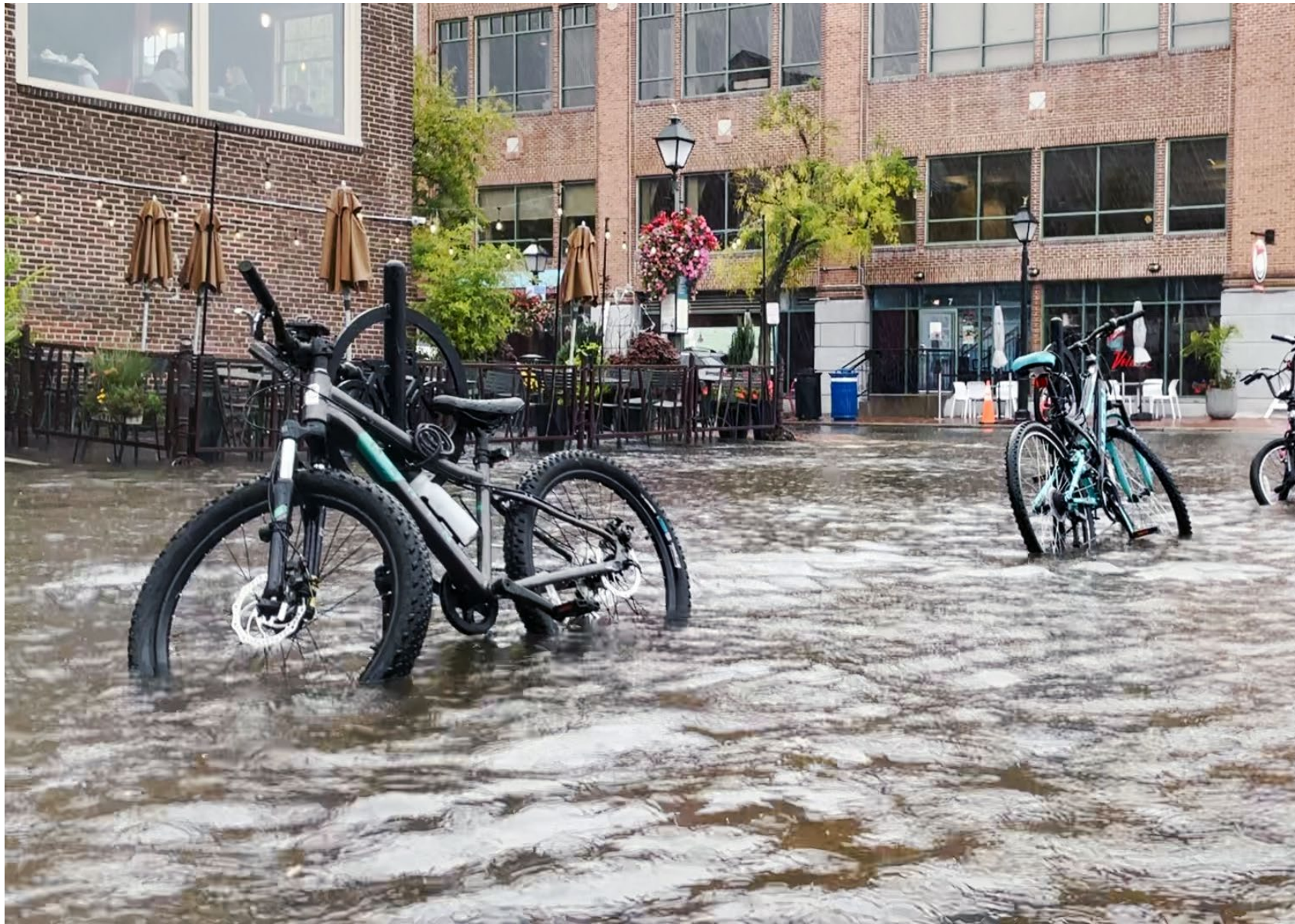


WMATA

- Rachel Healy, Director of Sustainability



Flooding Can Come Quickly





Coordination for Mitigation, Resiliency and Equity

- 1. Environmental Action Plan 2040**
2. ECCAP update (extreme heat/rain)
rain)
3. Alex Mobility Plan, Smart mobility,
Complete Streets, Rapid Transit,
Vision Zero, Electric Vehicle
Readiness Strategy
4. Free DASH transit, Plus Potomac
Yard Metro Rail
- 5. Flood Action**, Stormwater Funding
&Utility, Waterfront

Private Floodproofing Options



Montgomery County Climate Action Plan (CAP) and Transportation Resilience



MONTGOMERY COUNTY CLIMATE ACTION PLAN

Building a Healthy, Equitable, Resilient Community

JUNE 2021

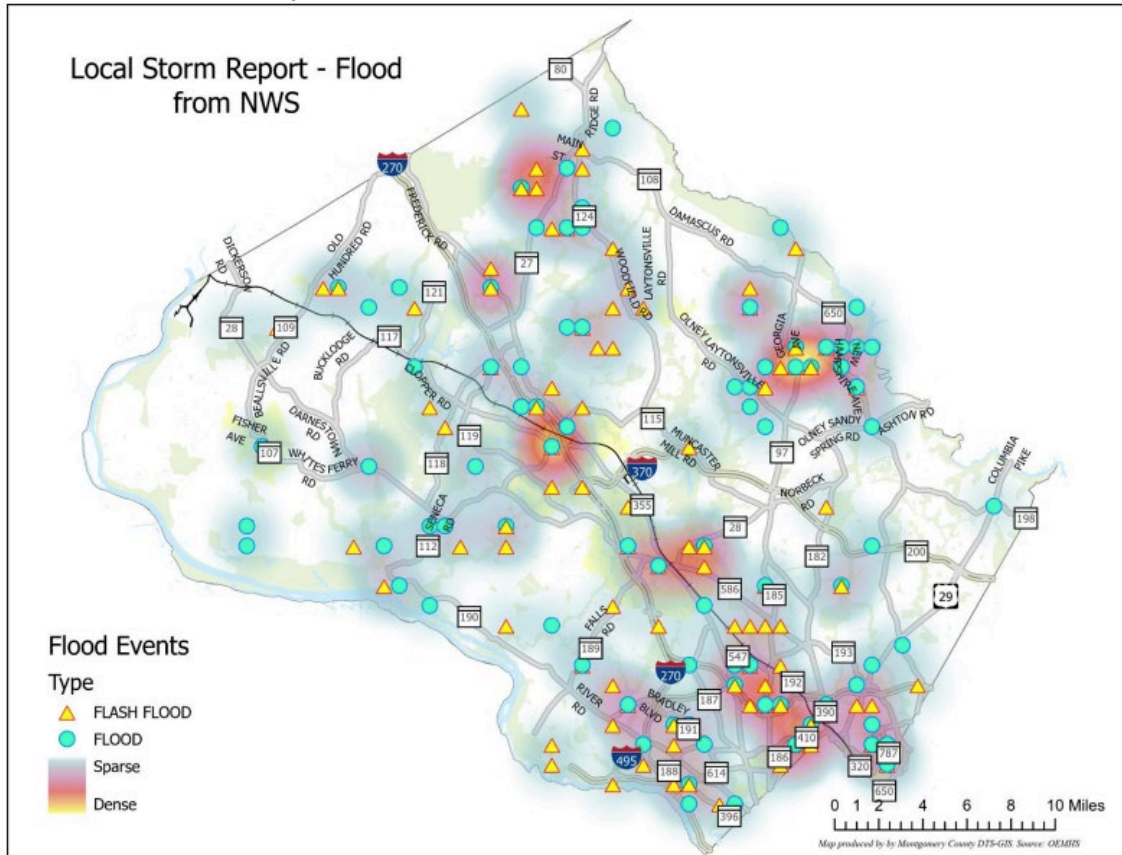


Transportation Actions Called for in the CAP

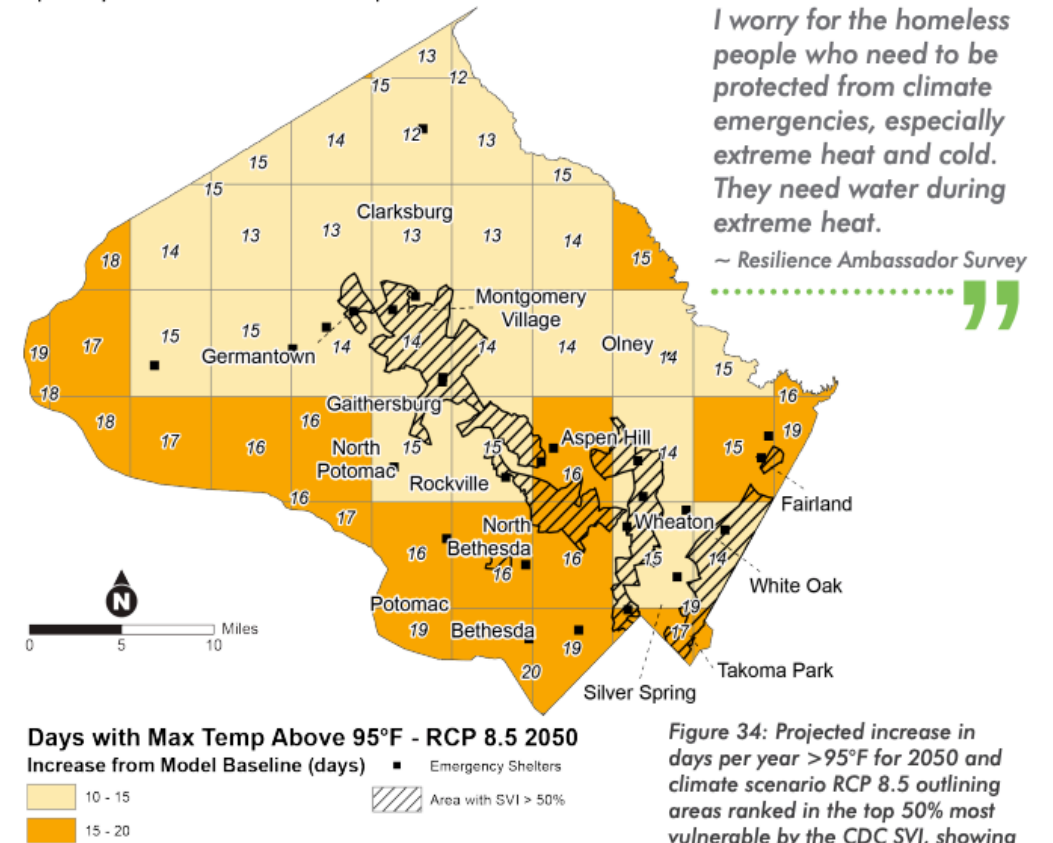
- T-1: Expand Public Transit
- T-2: Expand Active Transportation and Micromobility Network
- T-3: Private Vehicle Electrification Incentives and Disincentives
- T-4: Constrain Cars in Urban Areas, Limit Major New Road Construction
- T-5: Zero Emissions Public Buses and School Buses
- T-6: Electrify County and Public Agencies Fleet
- T-7: Expand the Electric Vehicle Charging Network
- T-8: Transportation Demand Management and Telework Strategies
- T-9: Traffic Management Systems
- T-10: Electric Vehicle Carshare Program for Low Income Communities
- T-11: Off-Road Vehicle and Equipment Electrification
- T-12: Advocate for a Vehicle Carbon/Gas Tax or VMT Tax
- T-13: Advocate for Rail Alternative Fuels

Montgomery County's Key Climate Impacts: Extreme Precipitation/Flooding & Extreme Heat

Map 4. National Weather Service Location of Floods and Flash Floods



Source: DTS & OLO Measuring Climate Resilience Report 2021-5



Source: Montgomery County Climate Action Plan, June 2021
SVI = CDC Social Vulnerability Index

Figure 34: Projected increase in days per year >95°F for 2050 and climate scenario RCP 8.5 outlining areas ranked in the top 50% most vulnerable by the CDC SVI, showing existing County emergency shelters

Montgomery County Brookville Depot Microgrid

- Ride On Bus Depot located in Silver Spring MD
- Depot is responsible for maintenance, servicing, and parking of over 200 County Ride-On buses.
- Montgomery County received its first electric buses in 2019 with an additional 10 buses added to the fleet in 2021. The County previously installed the electrical infrastructure and e-bus chargers to support the first buses.
- Brookville Depot Microgrid Project will install a renewable system to support power requirements for County's first 44 electric buses being added to Ride On fleet.
- Microgrid will incorporate EV charging, along with several clean energy production technologies that will enable the County to provide sustainable, resilient, and reliable energy supply for bus charging and site operations.
- Microgrid will include the following:
 - 2 MW of solar photovoltaic canopies that will provide electrical power to the buses and to the battery storage system
 - 1.5 MW/3MWH of battery storage
 - 2 MW of natural gas generation
 - Microgrid controllers



Q&A



Wrap-Up



Michael Neibauer, [Washington Business Journal](#)



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What was the most valuable thing you learned during today's session?

Which webinar session are you most looking forward to?



Webinar 2: Climate Vulnerability Assessments

Friday May 13th
2 to 3:30 pm

Goal:

Increase understanding of **different approaches to conducting a vulnerability assessment** and why these assessments are **valuable to decision makers**

Learning Objectives:

- Understand the **benefits and common challenges** of a vulnerability assessment
- Understand **different approaches** to conducting a vulnerability assessment
- Understand **roles in conducting or supporting** a vulnerability assessment



Thank You!



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Transportation Planning Board