BREAK DOWN BARRIERS: INTEGRATE CLIMATE RESILIENCE INTO PLANNING & PROGRAMMING

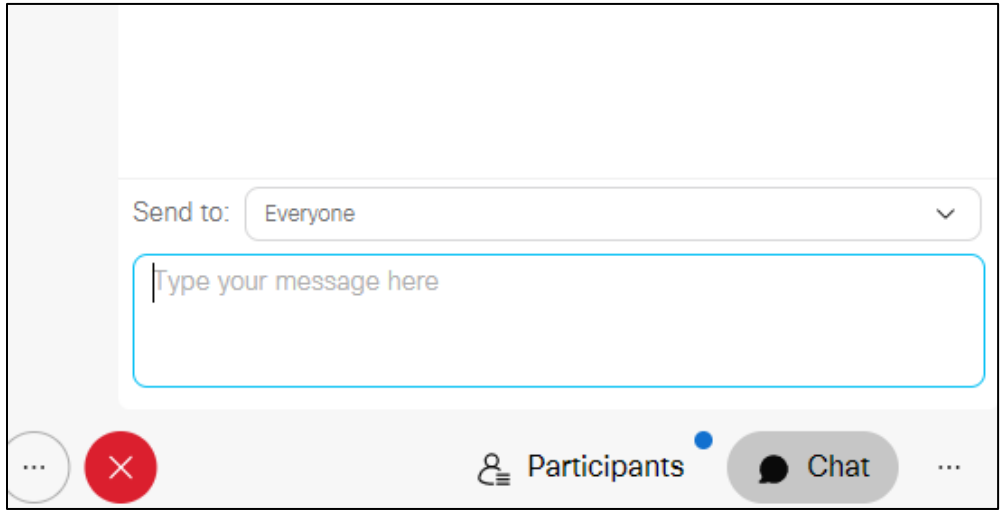
Transportation Resiliency Planning Webinar #4

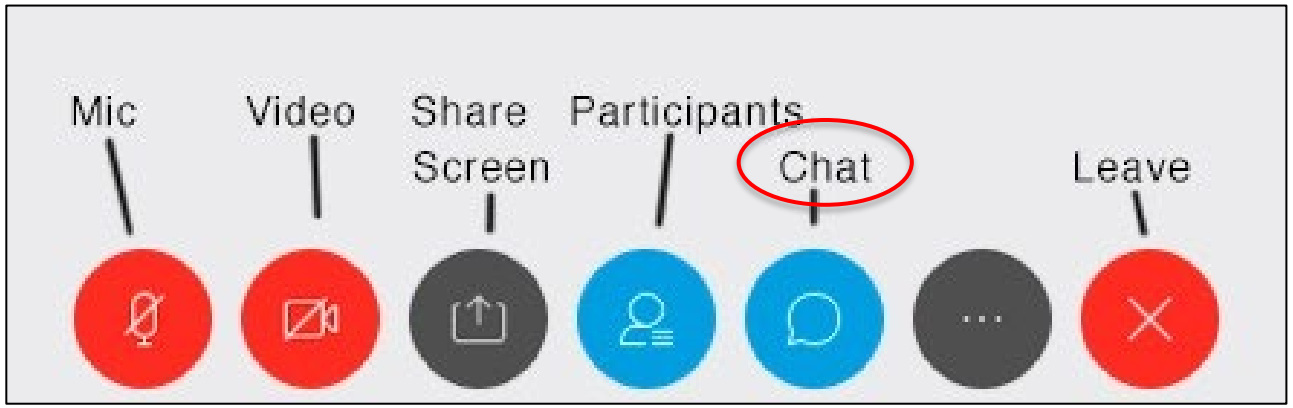
JULY 15, 2022

National Capital Region
Transportation Planning Board

WebEx Logistics

- Please stay on mute
- Type questions in the chat





Project Team

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Poll

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Which organization are you joining us from?

What is your title/role?

AICP Credit

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

#9251069

Agenda

Overview of opportunities to integrate resilience into planning and programming

Peer Presentations

- Maryland DOT
- Frederick County
- Fairfax County

Moderated Discussion

Wrap-Up

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 Project Development & Design

Webinar 4

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

Session 4 Goals and Objectives

Goal

- Illustrate the value of and process for integrating resilience into planning and programming

Objectives

- Identify opportunities for integrating resilience into planning and programming
- Increase familiarity with FHWA resources
- Gain knowledge and lessons learned from peer organizations

Overview of Integrating Resilience into Planning and Programming

U.S. Department of Transportation
Federal Highway Administration

Sustainable Transportation and Resilience Team

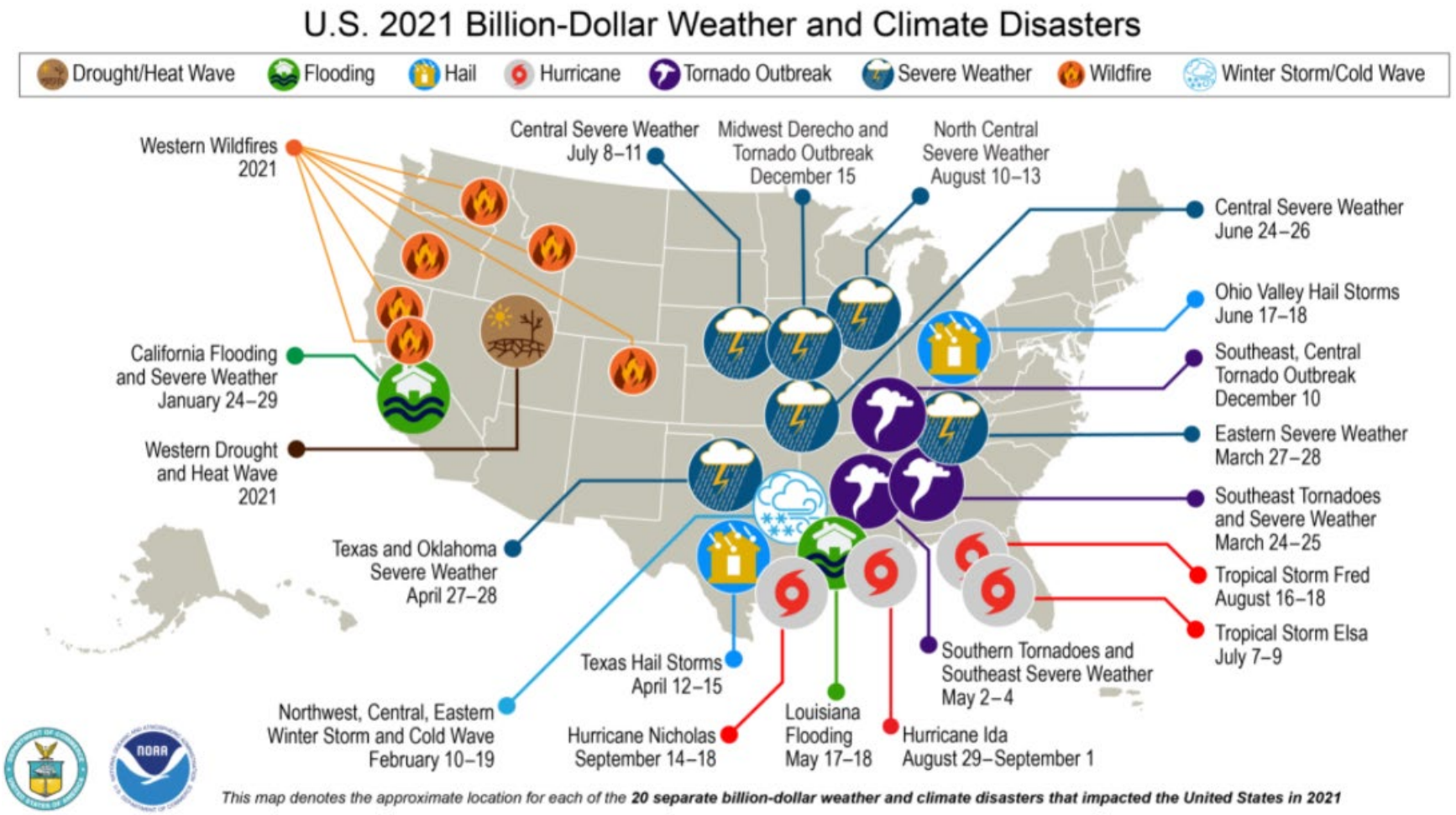
Office of Natural Environment, FHWA

Integrating Natural Hazard Resilience into the Transportation Planning Process

Except for any statutes or regulations cited, the contents of this presentation do not have the force and effect of law and are not meant to bind the States or the public in any way.

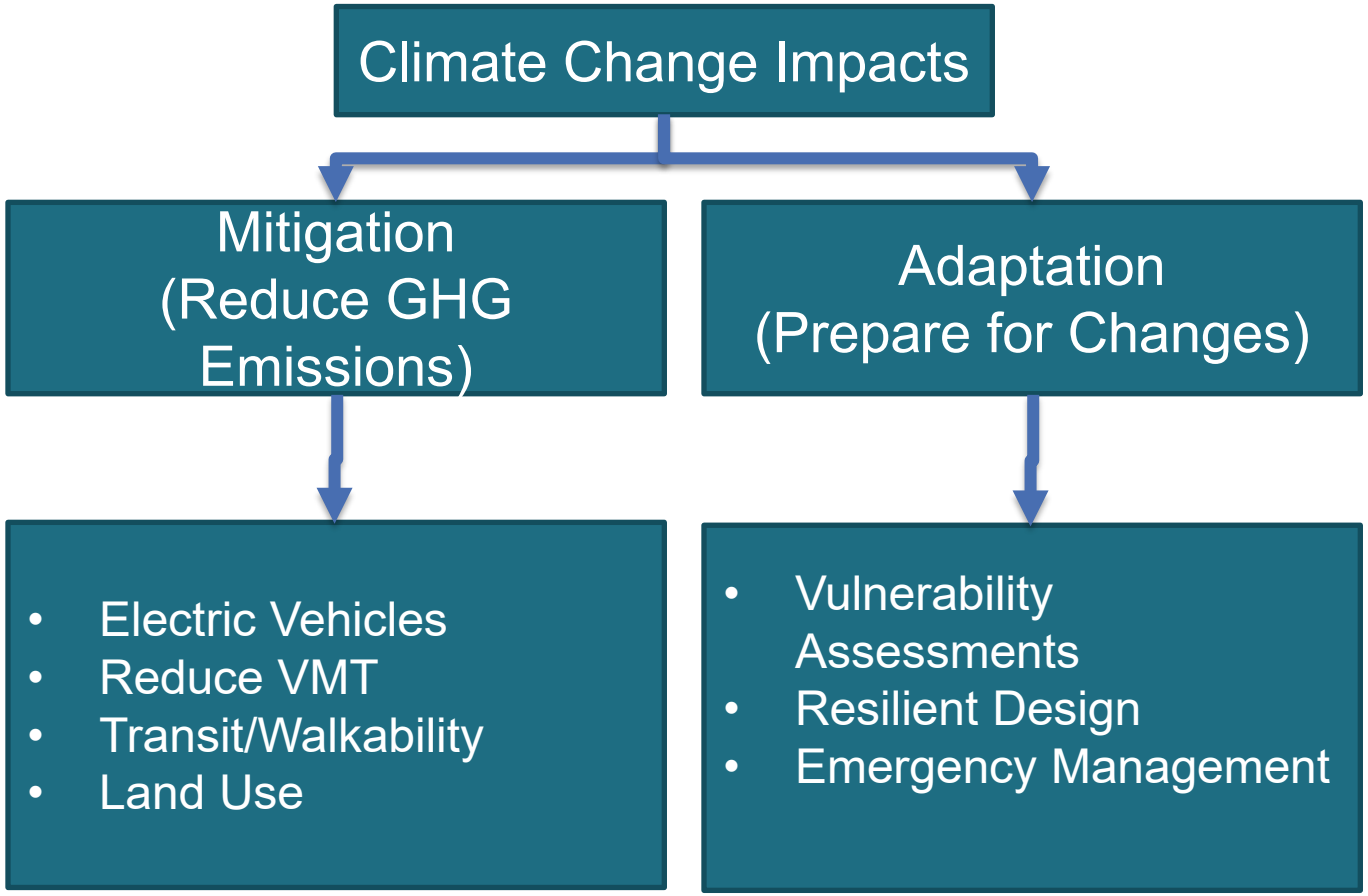
This presentation is intended only to provide information regarding existing requirements under the law or agency policies.

US 2021 Billion-Dollar Weather & Climate Disasters



Source: NOAA

Mitigation v Adaptation



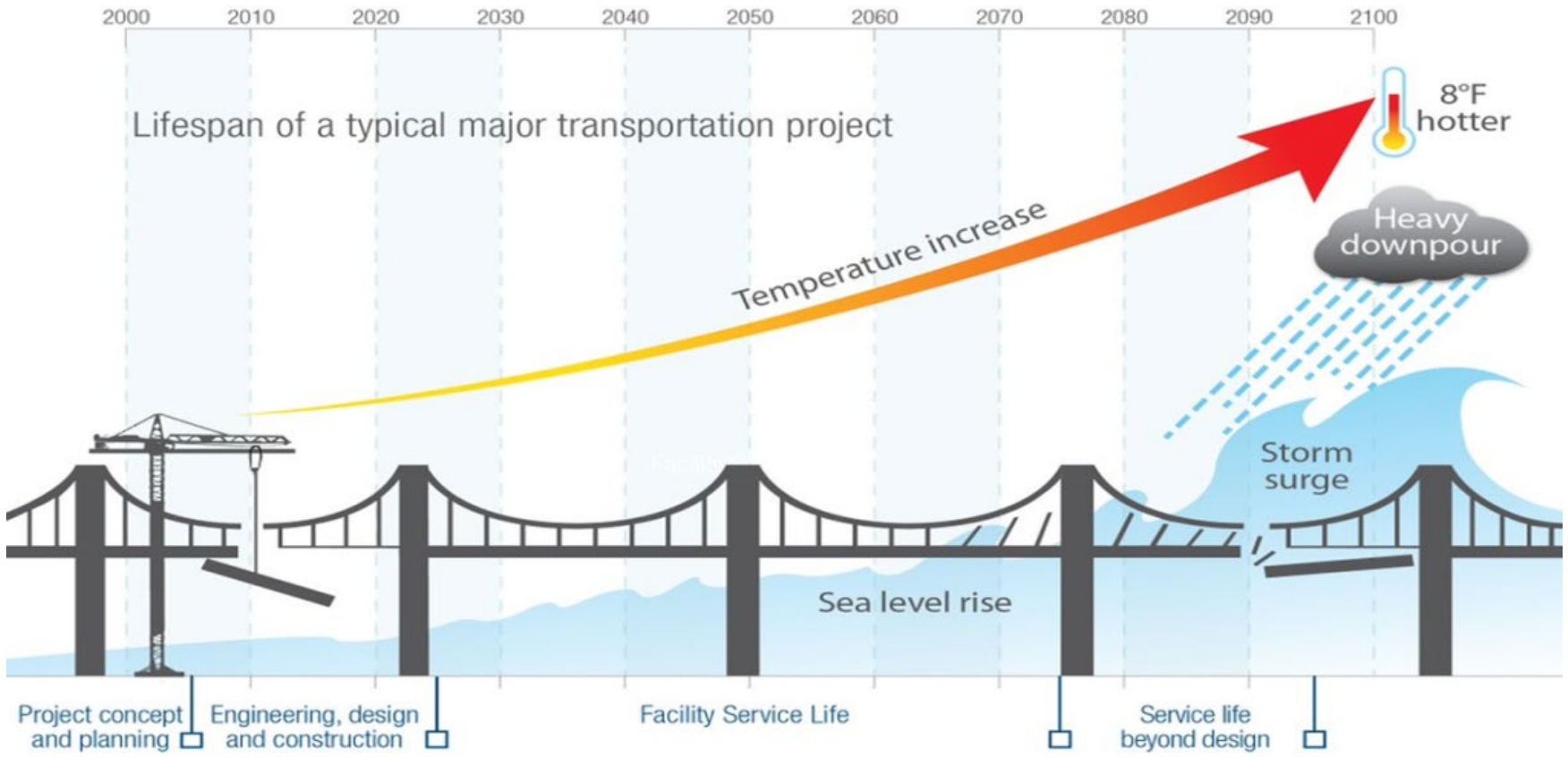
What is Resilience?

Resilience: With respect to a project, resilience means "…the ability to anticipate, prepare for, or adapt to conditions or withstand, respond to, or recover rapidly from disruptions…"

- 23 U.S.C 101(a)(24) (Added by sec. 11103 of the Bipartisan Infrastructure Law (BIL), enacted as the Infrastructure Investment and Jobs Act, Pub. L. 117-58 (Nov. 15, 2021). See also FHWA Order 5520)

Source: Microsoft 2022

Why is Resilience Important to Consider?

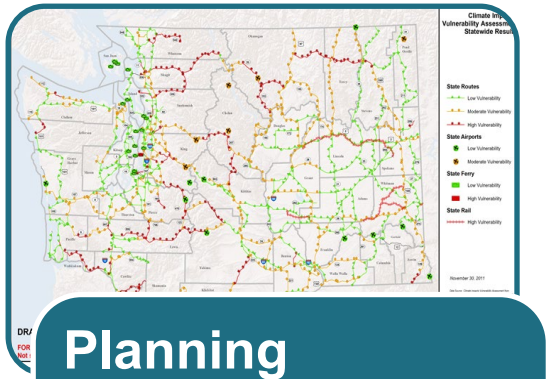


Source: FHWA, Data Visualization Center

- Extreme weather events are disrupting transportation systems across the country
- Natural disasters have become increasingly damaging and costly

Goal: Integrate Resilience into Transportation Decision Making

Source: WSDOT



Planning

- Transportation Planning
- Asset Management

Source: FHWA

Project Level

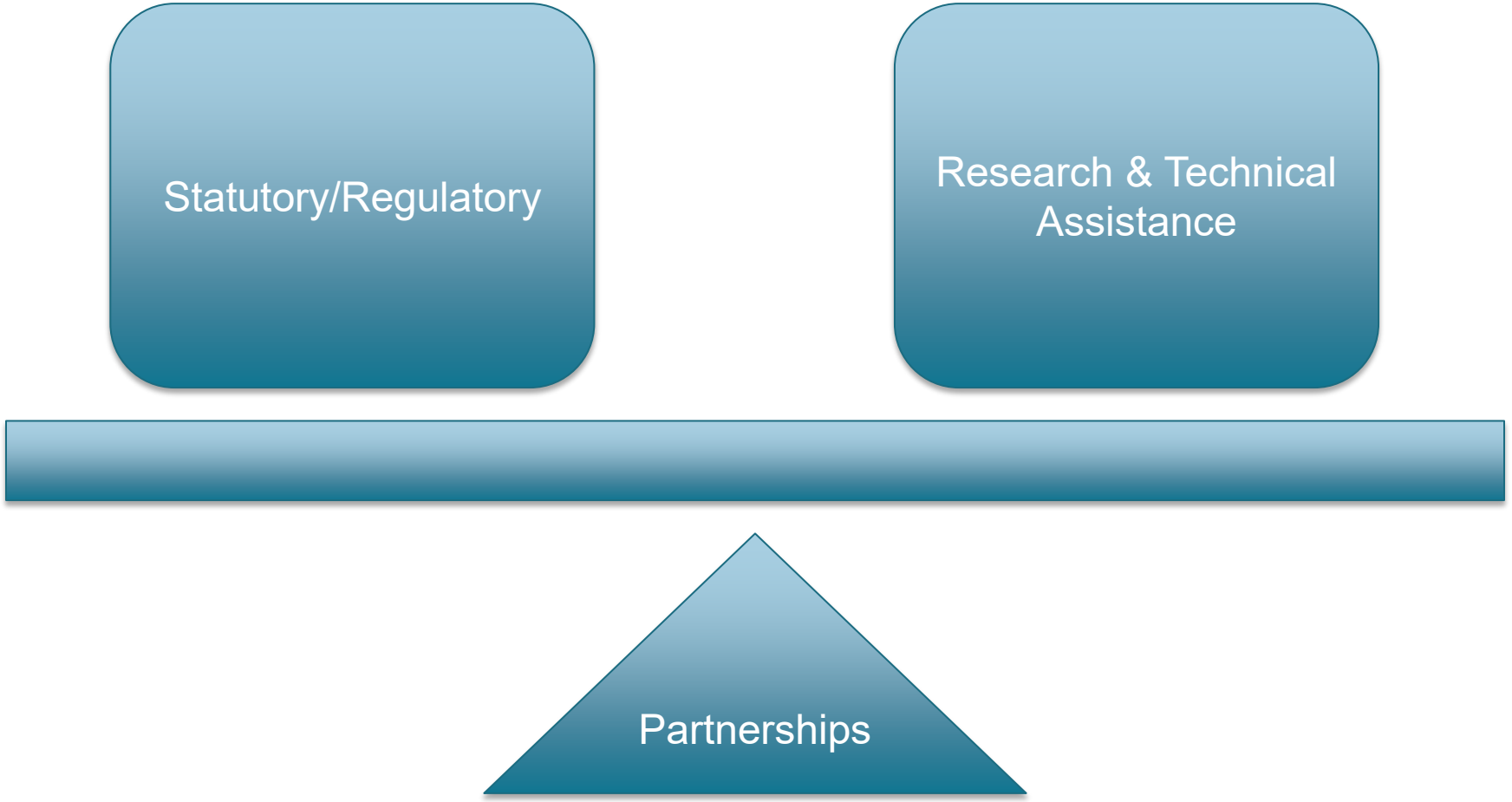
- Project Development
- Environmental Review
- Engineering and Design

Source: FHWA

Operations and Maintenance

- Maintenance Programs
- Emergency Response
- Resilient Recovery

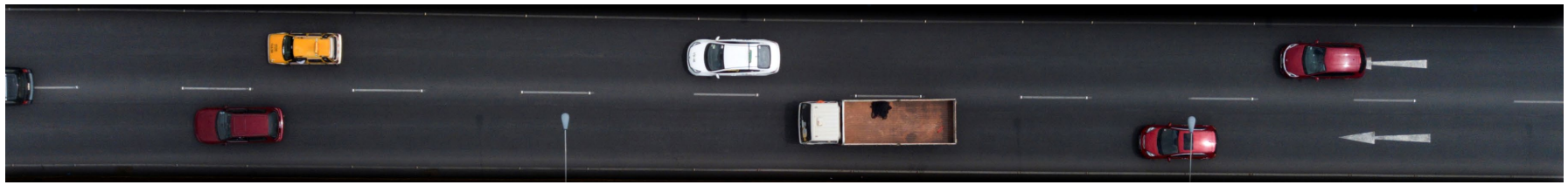
Opportunities for Resilience



Statutory/Regulatory: Considerations

Resilience to be considered in:

Asset Management Plans	Transportation Plans	Emergency Events	FHWA Programs and Policies
• 23 CFR Part 515	• 23 USC 134 • 23 USC 135 • 23 CFR Part 450	• 23 CFR Part 667	• Order 5520



Source: Microsoft 2022

New/Expanded Programs in the Bipartisan Infrastructure Law (BIL)*

- Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Program *Guidance Forthcoming*
- Carbon Reduction Program (CRP)
- Expanded Eligibilities in other Title 23 Programs
- https://www.fhwa.dot.gov/bipartisan-infrastructure-law/

*Enacted as the Infrastructure Investment and Jobs Act (IIJA) (Pub. L. 117-58, Nov. 15, 2021)

Non-Regulatory: FHWA Resilience Resources

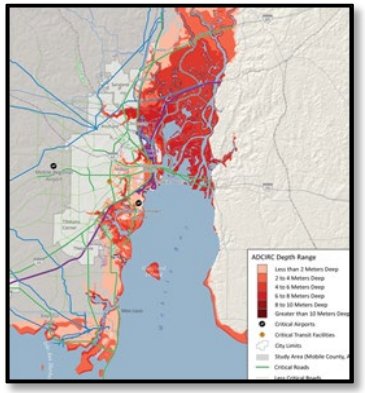
Research

Technical Assistance

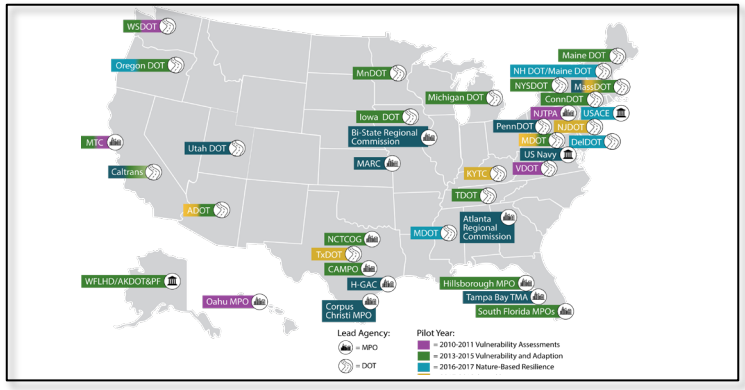
Source: TTI

FHWA's Resilience Resources

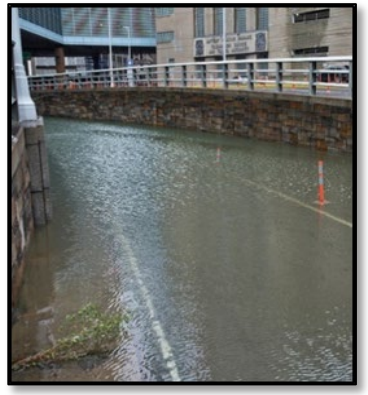
Gulf Coast 2 Study



Resilience Pilots with State DOTS & MPOs



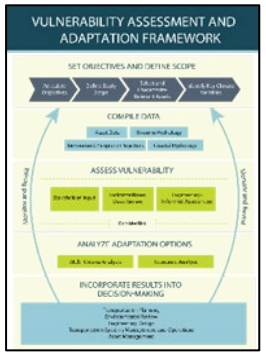
Hurricane Sandy Project



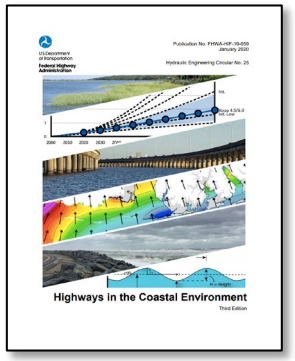
Engineering Assessments Study

https://www.fhwa.dot.gov/environment/sustainability/resilience/

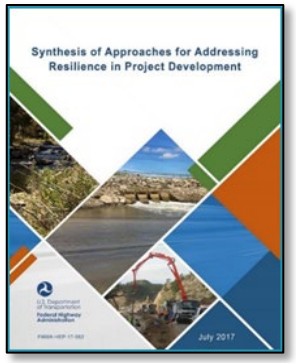
Vulnerability & Adaptation Framework



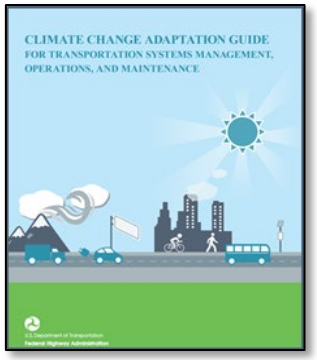
Engineering Guidance (HEC-25 & 17)



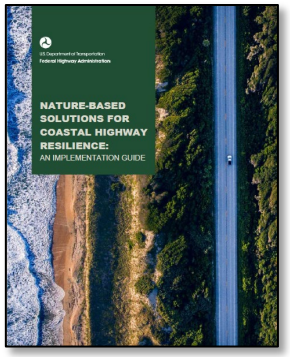
Project Development



Operations & Maintenance



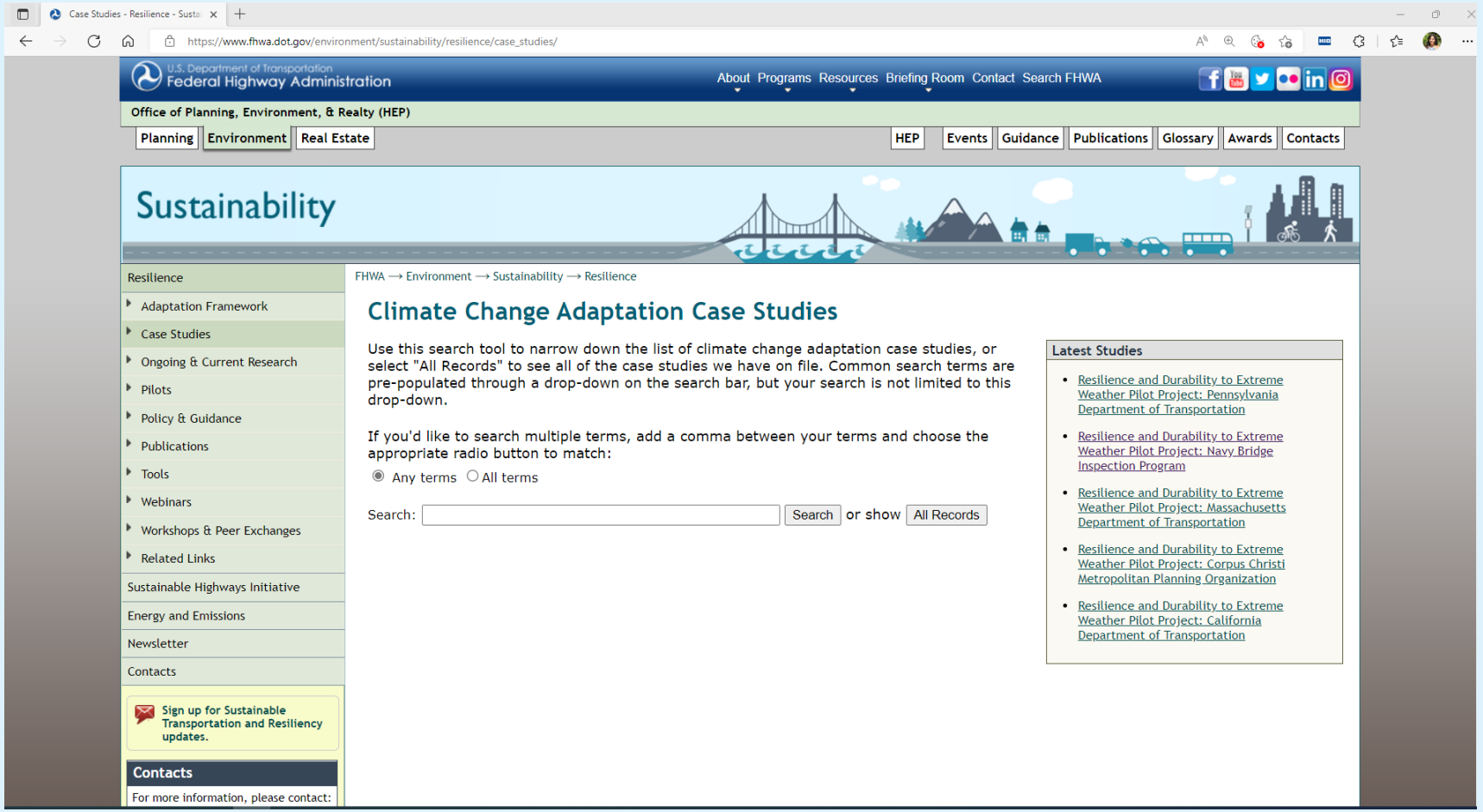
Nature-Based Solutions



Sources: FHWA

FHWA's Resilience Resources

www.fhwa.dot.gov/environment/sustainability/resilience/case_studies/



In Development: Resilience in Planning Handbook

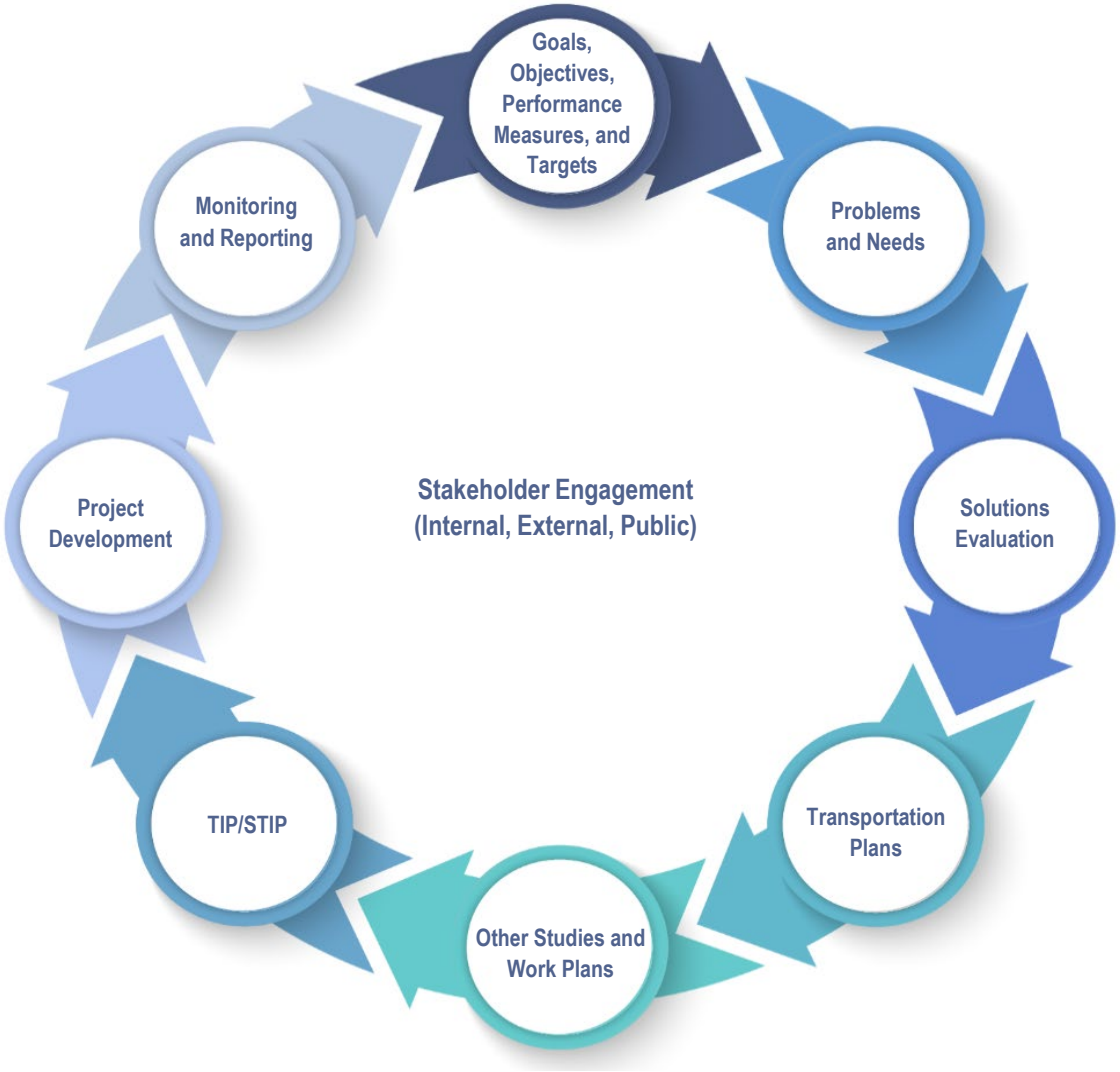
Build transportation resilience to:

- Climate change
- Natural disasters

Who is the Handbook for?

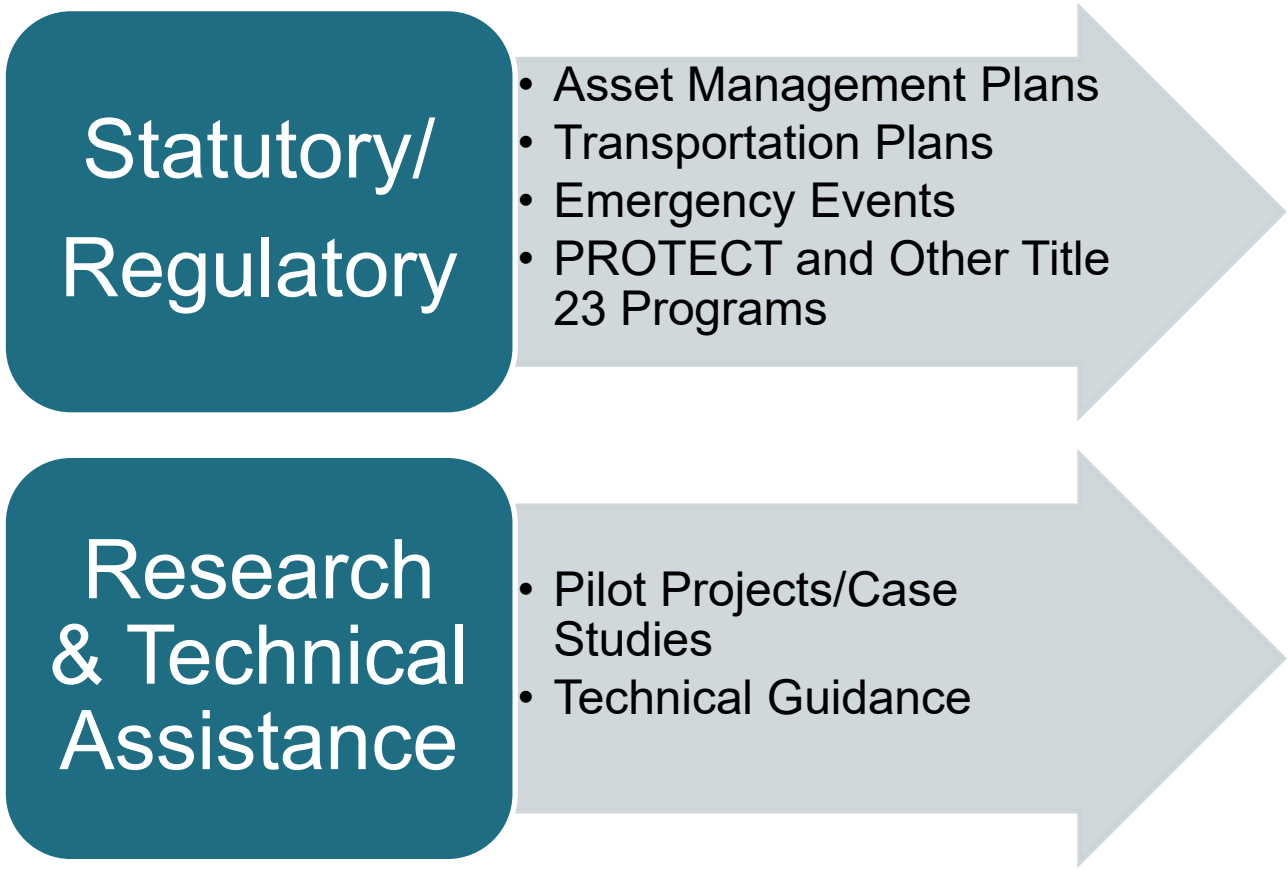
- State Departments of Transportation
- Metropolitan Planning Organizations
- Public Transportation Operators
- Federal Land Management Agencies
- Tribal Governments
- Regional Transportation Planning Organizations

Integrating Resilience into the Transportation Planning Process



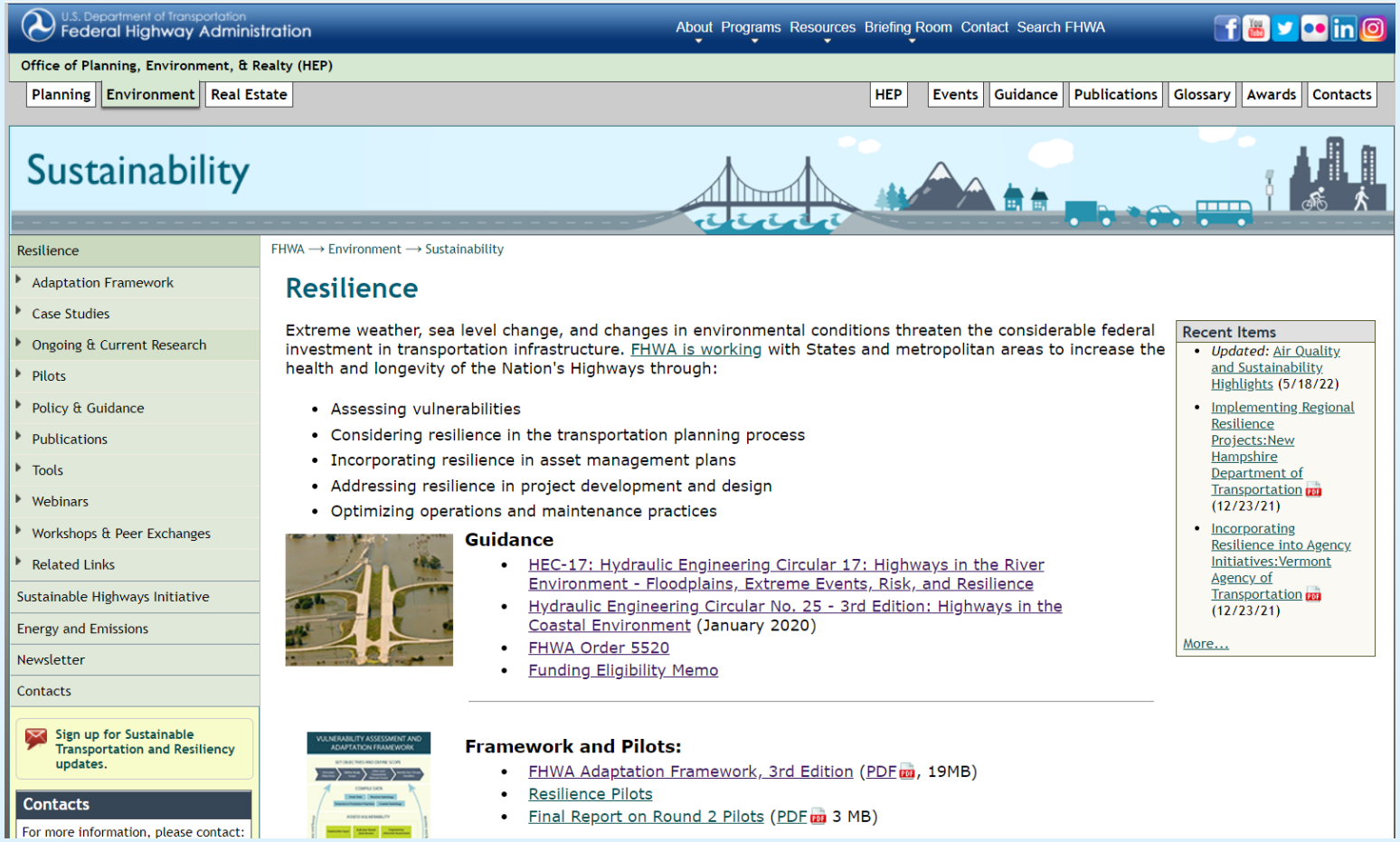
Source: FHWA

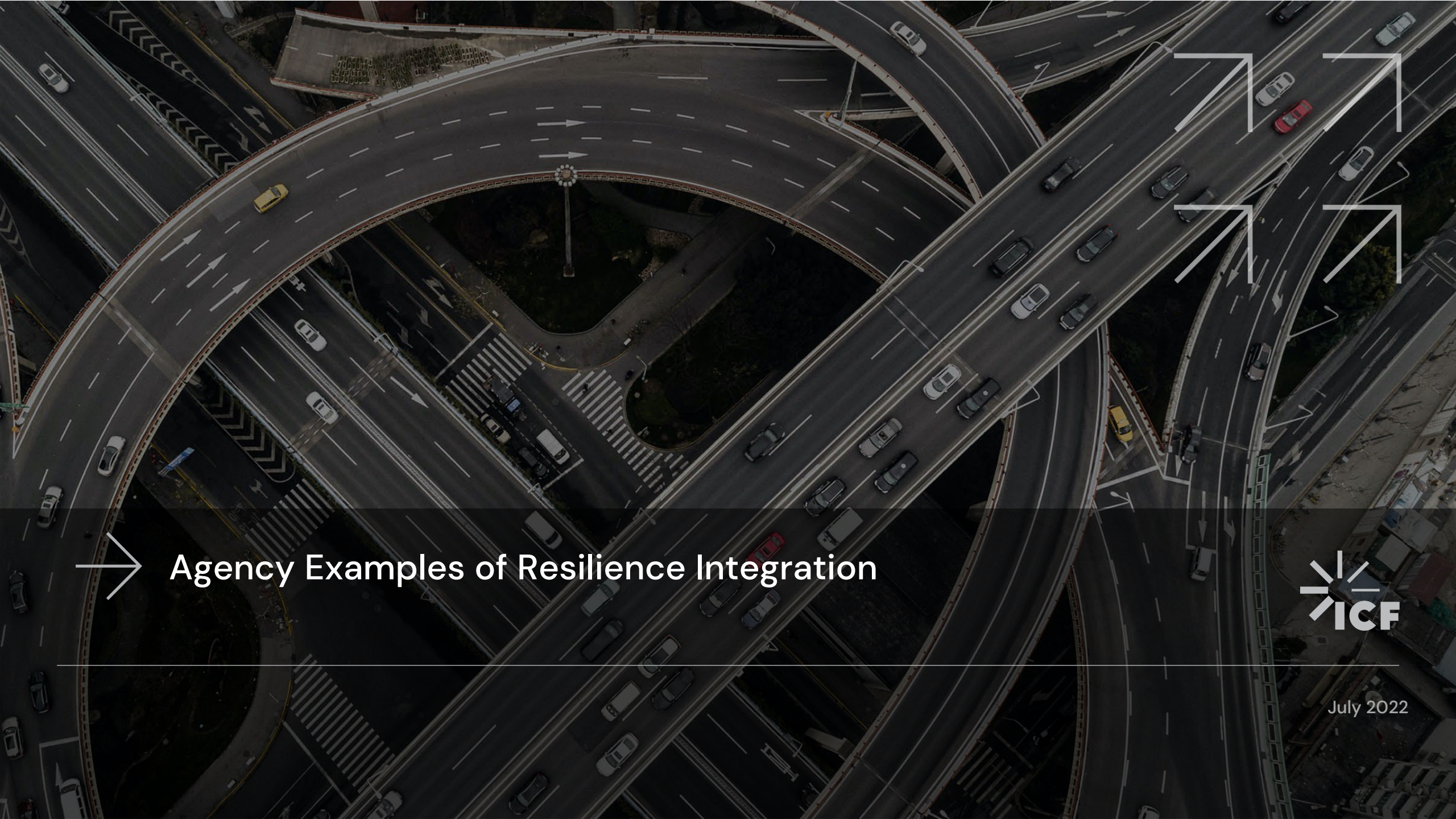
Opportunities for Resilience



Thank you!

www.fhwa.dot.gov/environment/sustainability/resilience





Agency Examples of Resilience Integration

July 2022

Identify Resilience Priorities for Transportation Plans

Hawaii DOT included resilience in a goal & weighting exercise

Weight Assignment Results:

- *Highest weighted planning factor:* System preservation
- *Second highest priority goal:* "Promote long-term resiliency… and reduce future impacts of climate change on the transportation system"

Include Resilience in Scenario Planning

Hillsborough County MPO developed investment scenarios for risk management solutions

Risk Management Solutions	Unit	Unit Cost	Medium	High
Raise profile/strengthen base*	Lane	$268,883	$20,854,540	$68,807,075
Wave attenuation (WADs)	1 Unit	$750	$3,887,400	$17,628,600
Shoreline protection (riprap)	Linear ft	$350	$5,442,360	$24,680,040
Drainage improvements*	Cent mile	$14,737	$816,566	$816,566
TOTAL			$31,000,866	$111,932,281
TOTAL plus contingency	20%		$37,201,039	$134,318, 738
*counts marginal costs only, all costs are approximate				

Develop Resilience Evaluation Criteria

Boston Region MPO developed resilience evaluation criteria

Scoring Criteria → Prioritized Project List

- ❑ (+2 points) Addresses flooding problems and/or sea level rise issues and enables facility to function in such a condition
- ❑ (+1 point) Implements hazard mitigation or climate adaptation plans
- ❑ (+1 point) Addresses critical transportation infrastructure

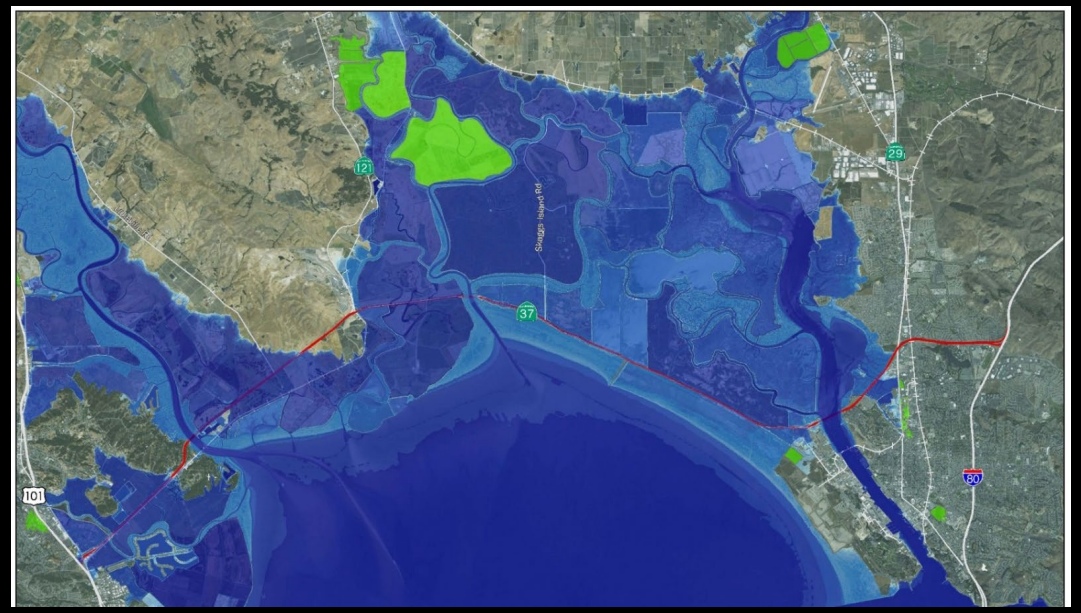
Integrate Resilience into Asset Management Plans

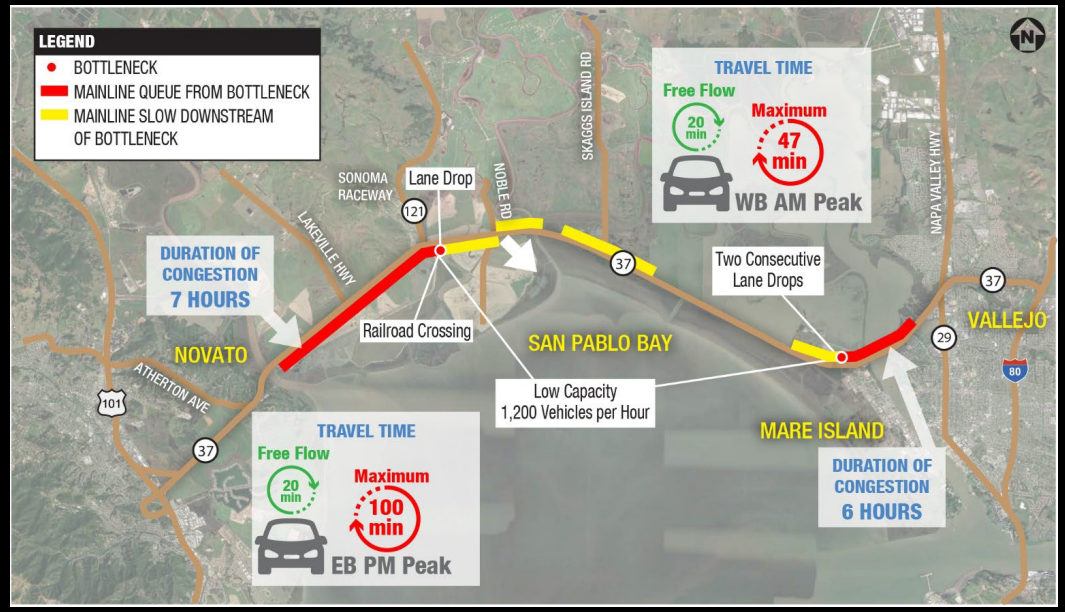
Northeast Ohio Areawide Coordinating Agency included extreme weather in their risk register

Event Description	Likelihood	Consequence					Event Score
		Public Safety	Asset Condition Impact	Regional Scope	Mobility	Finance	
Pavement and bridge deck damaged by major floods, caused by excess rainfall	2	5	4	2	4	2	6.8
Ice flows break up and damage bridge infrastructure	2	2	2	1	1	1	2.8
Pavement and bridge deck damaged by extreme temperature	3	1	3	2	3	2	6.6
Wind events damage infrastructure	3	2	2	2	2	2	6.0
Extreme snowfall causes major disruptions in mobility	5	3	1	5	5	2	16.0

Integrate Resilience into Corridor Planning Studies

Metropolitan Transportation Commission conducted a corridor study focused on flood resilience





ICF

METROPOLITAN TRANSPORTATION COMMISSION

Integrate Resilience into Capital Investment Plans

North Jersey TPA incorporated resilience in their Regional Capital Investment Strategy objectives

- ❑ Prioritize transportation investments that offer additional benefits for resiliency, for system preservation projects as well as upgrades and expansions
- ❑ Incorporate vulnerability and risk assessments into project development
- ❑ Scrutinize investments that are in places highly vulnerable to potential flooding/sea level rise

Poll

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Or use the link in the chat:

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What challenges have you faced integrating resilience into planning?

What successes do you want to share with the participants?

Peer Examples

Peer Examples

MDOT

Sandy Hertz, Director of Office of Climate Change Resilience and Adaptation

Toria Lassiter, Chief of Planning and Preliminary Engineering

Frederick County

Dennis Dudley, Director of Emergency Preparedness

Fairfax County

Alison Homer, Senior Community Specialist, Office of Environmental and Energy Coordination

Matthew Meyers, Division Manager, Office of Environmental and Energy Coordination

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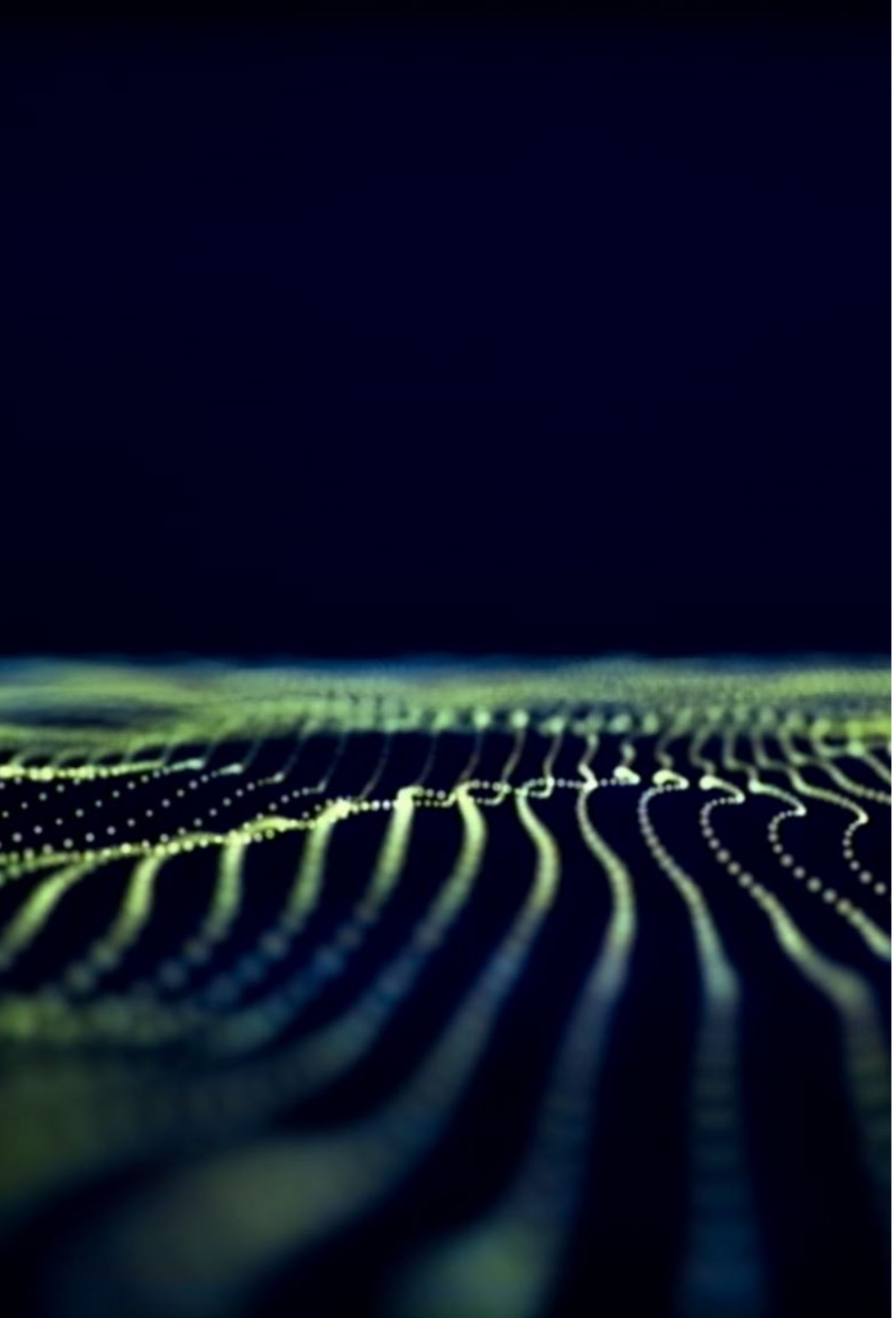
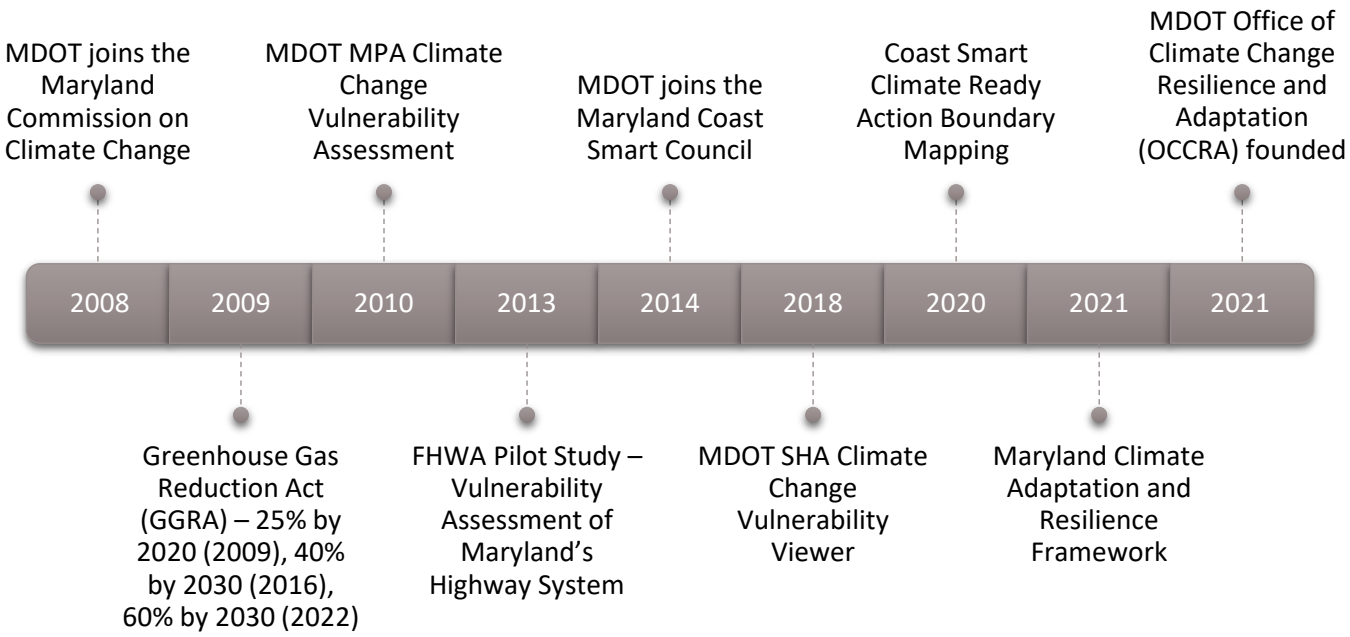
Integrating Climate Resilience into Planning

National Capital Region Transportation Planning Board

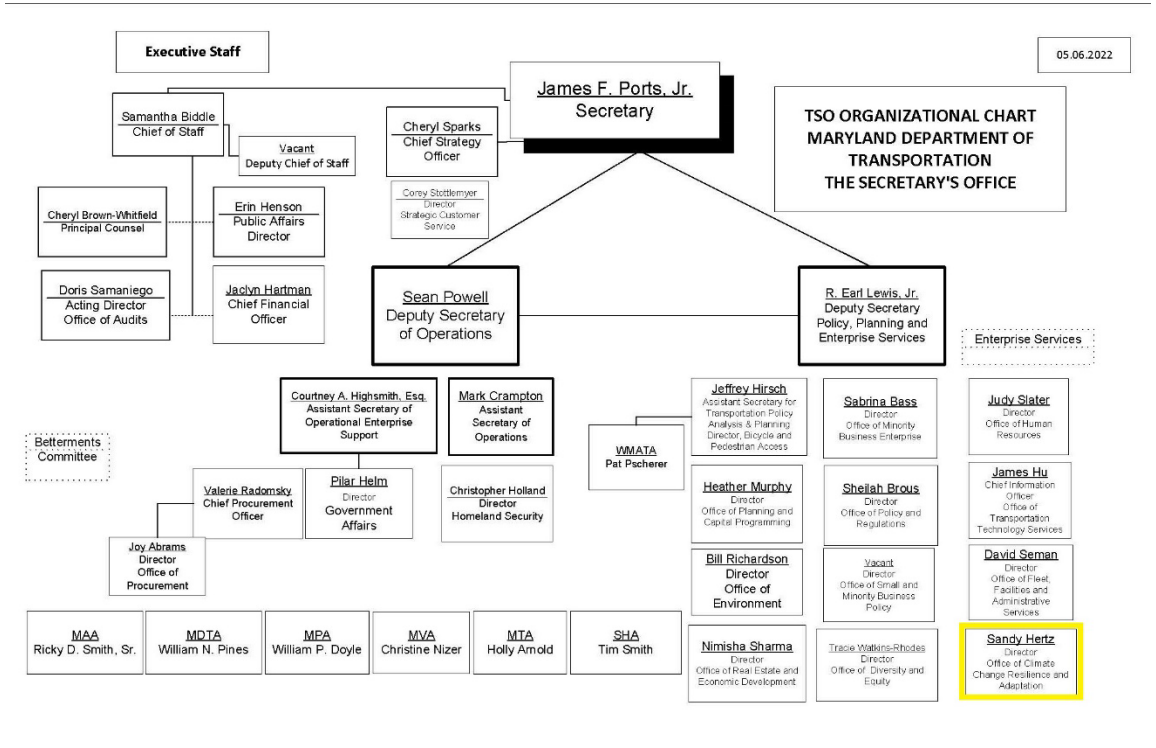
July 15, 2022

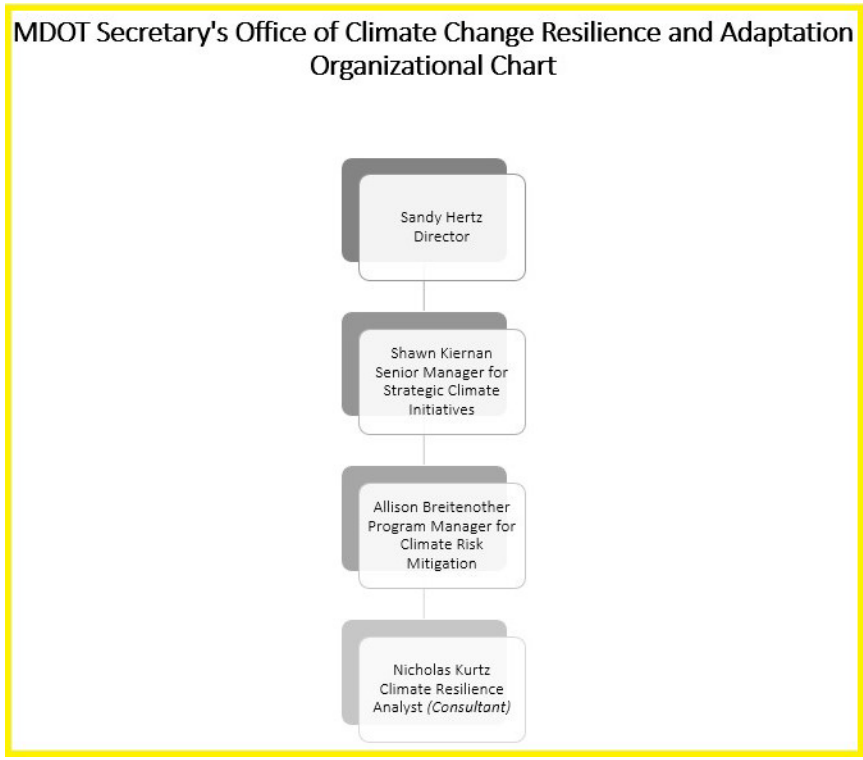


A History of Resilience Planning at MDOT



MDOT's Office of Climate Change Resilience and Adaptation





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OCCRA's Responsibilities

Establish a cohesive, proactive, and coordinated response to the impacts of climate change across transportation systems -

with consideration for state and federal initiatives around climate change and a focus on opportunities to support State of Maryland transportation climate change related activities and projects.

OCCRA:

ASSISTS WITH MDOT-WIDE RESILIENCY IMPROVEMENT PLANNING

Shares technical resources

Connects staff with SMEs

Increases awareness across MDOT

DEVELOPS STRATEGIC PARTNERSHIPS

Urban Tree Program w/ DNR

Maryland Resiliency Partnership

State Resilience Planning Group

SUPPORTS INNOVATION THROUGH ACTION!

Identifies innovative carbon capture technologies

Explores unique asset management opportunities

Transportation Needs Solutions That:

Reduce	Our greenhouse gas emissions
Provide	Resilient strategies for extreme weather events
Leverage	Technology and innovation to improve operations
Recognize	The needs of the community stakeholders both now and in the future.

Planning with a Focus on What's Within Our Control

Work with federal and state legislators to align priorities

Identify and use technology to improve asset life cycles

Integrate MDOT resilience goals into strategic planning

Prepare and track MDOT's Climate Action Plan goals

Share information and resources across the TBUs

Maryland Department Of Transportation

State Highway Administration

TPB Resilience Webinar

Integrating Climate Risk and Resilience at MDOT SHA

July 15, 2022

Toria Lassiter
Acting Division Chief
Office of Planning and Preliminary Engineering

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MDOT SHA Climate Risk and Resiliency Program

- Promotes education, communication, and climate data sharing among State and Local transportation stakeholders;
- Builds understanding of the vulnerability of statewide transportation infrastructure to climate risk and potential mitigation options;
- Integrates consideration of resilience in transportation decision making.

A Resilient Maryland Infrastructure

MARYLAND DEPARTMENT OF TRANSPORTATION

- Outlines the overall vision for a resilient transportation system in Maryland
- Makes the case for resilience in the face of climate risks that threaten MDOT SHA's ability to provide a safe, well-maintained, reliable highway system, which include:
  - **Flooding**
    - **Sea Level Rise**
    - **Precipitation Change**
    - **Extreme High Tides**
  - **Extreme Weather**
    - **Hurricanes**
    - **Winter Storms**
    - **High Winds**

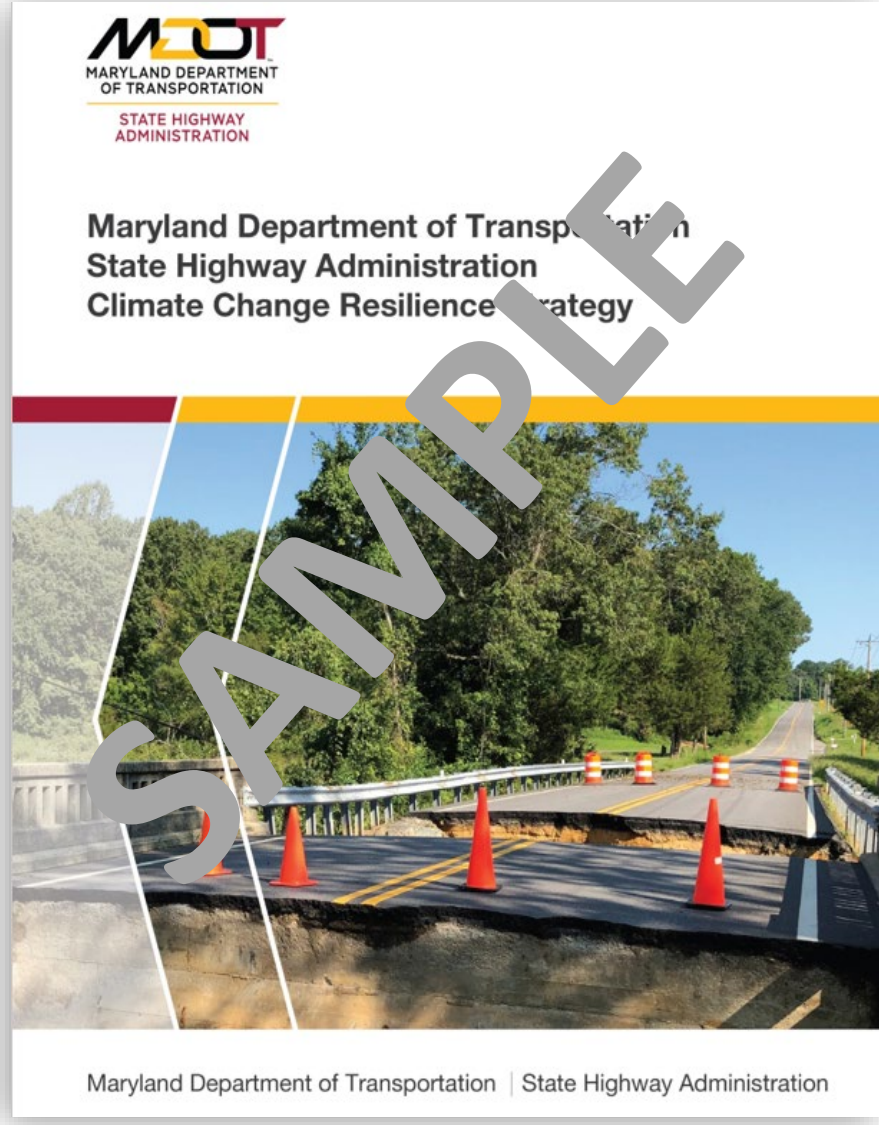
The Strategy aims to achieve its purpose and contribute to MDOT SHA's overall goals through three main categories of actions:

1) **COMMUNICATION**
   Increase organizational awareness of climate change risks and opportunities to build resilience through internal and external stakeholder coordination.

2) **IMPLEMENTATION**
   Mainstream climate change considerations throughout all areas of MDOT SHA through the implementation of an enterprise Risk Register and other strategies.

3) **PERFORMANCE MANAGEMENT**
   Inform performance-based planning and programming through improved monitoring, analysis, and mitigation of extreme weather and climate change risk to transportation assets.

- Outlines specific actions and implementation timeframes for how nearly all agency Divisions and offices will take part in advancing the agency's commitment resilience.



MDOT SHA Climate Resilience Strategy

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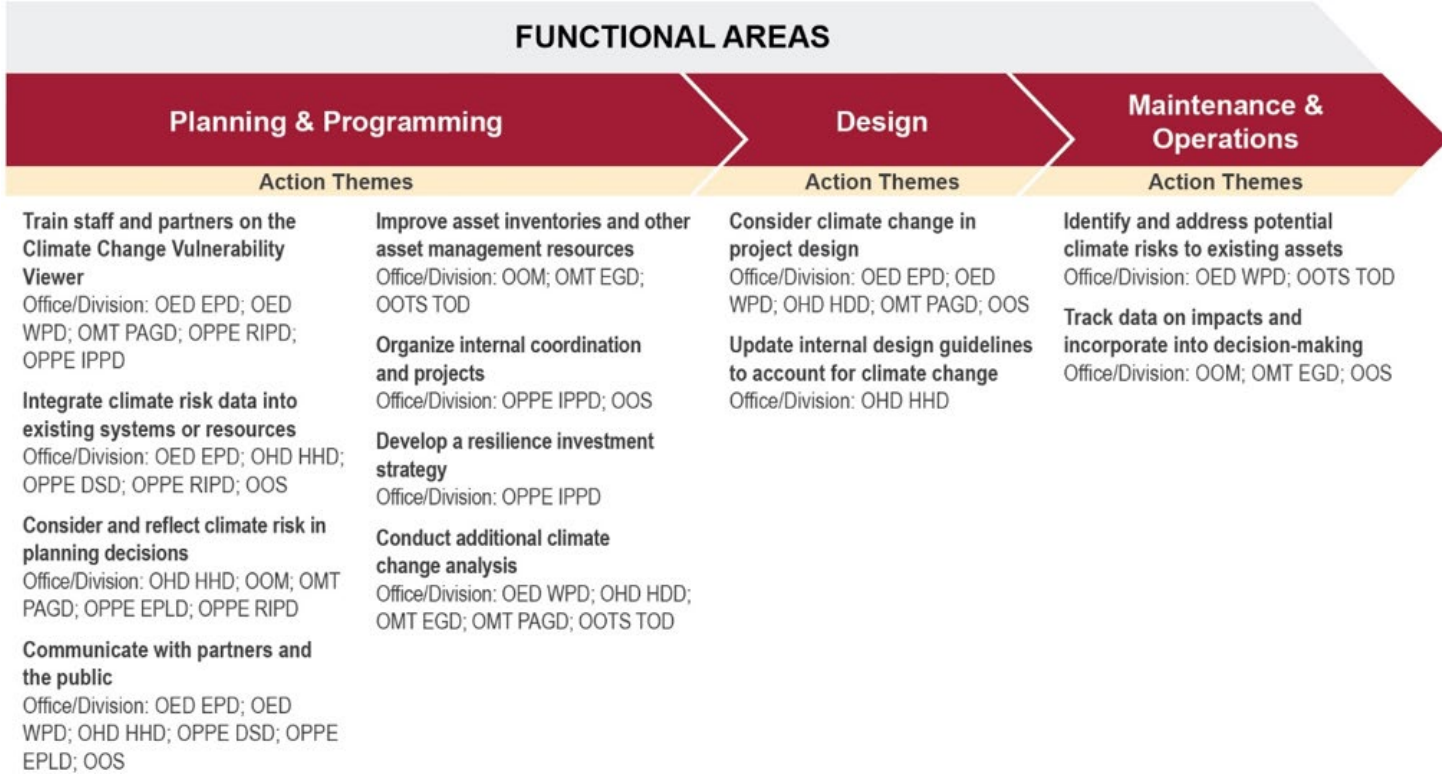
- The Climate Change Resilience Strategy includes 50 actions across seven offices and 11 divisions
- Each action is assigned to an office or division that is responsible for its implementation. Actions are labeled according to one of three major Functional Areas of MDOT SHA:
  - Planning & Programming
  - Design
  - Maintenance & Operations
- Each action is tagged with one of three action categories (communication, implementation, or performance management), a description of the action and a relative time frame to implementation.



- The actions together ensure that MDOT SHA will consider climate risks early on in the planning process, account for climate change considerations in project design, and track, adjust, and inform future planning through effective maintenance and operations

- Core goals for achieving resilience include:
  - Reduce current and known vulnerabilities
  - Avoid creating future vulnerabilities

- Agency-wide asset managers (of less mature asset classes) would like to improve their databases of asset inventory and condition data, in order to assess asset vulnerability to climate risk.

- Vulnerability x Criticality = Prioritization
  - Comparing vulnerability against criticality, the latter of which was piloted through our program and expanded agency wide through SHA Asset Management Plan initiative would lend itself to the climate risk-based prioritization of asset treatment.

MDOT SHA Climate Resilience Strategy

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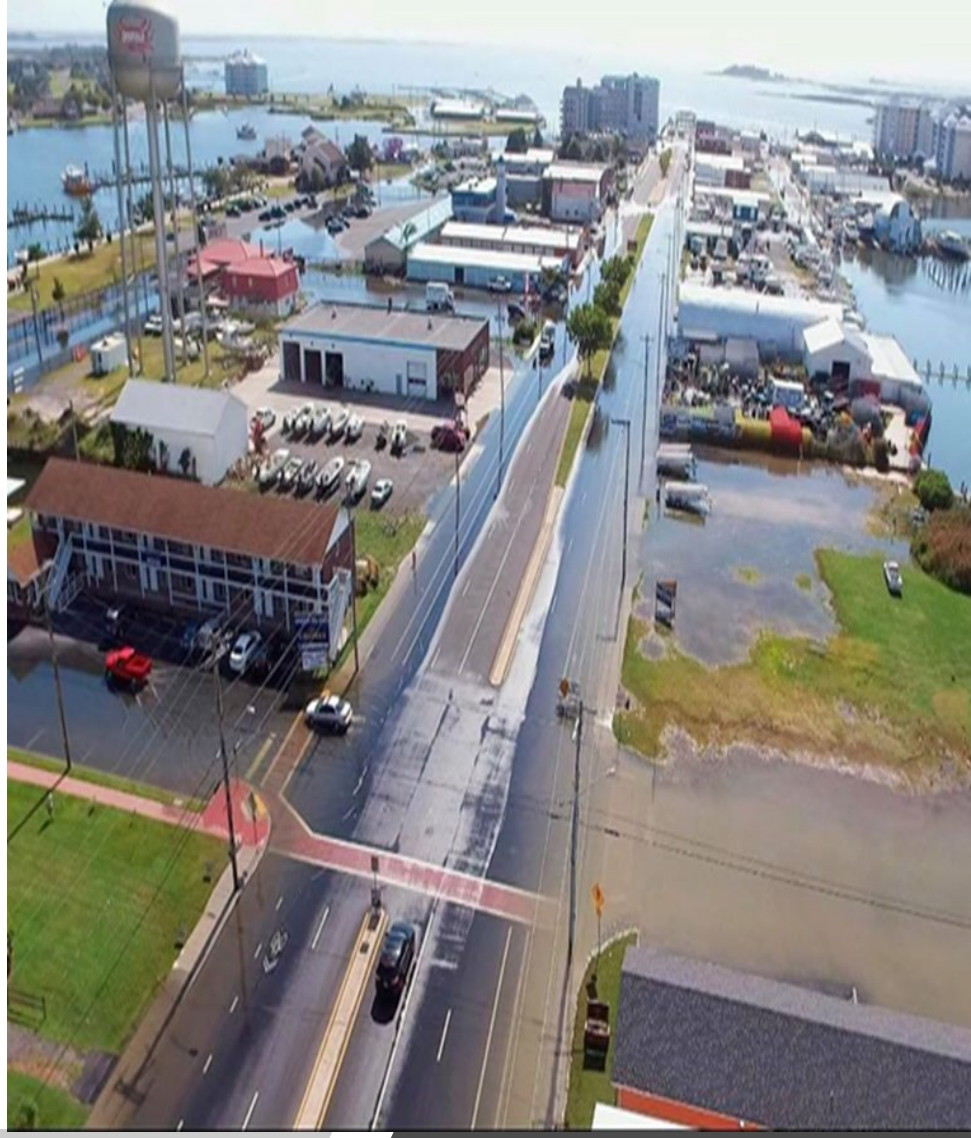
POTENTIAL NEXT STEPS

- Resilience Implementation Plan
- Infrastructure Resilience Assessment



NEXT STEPS

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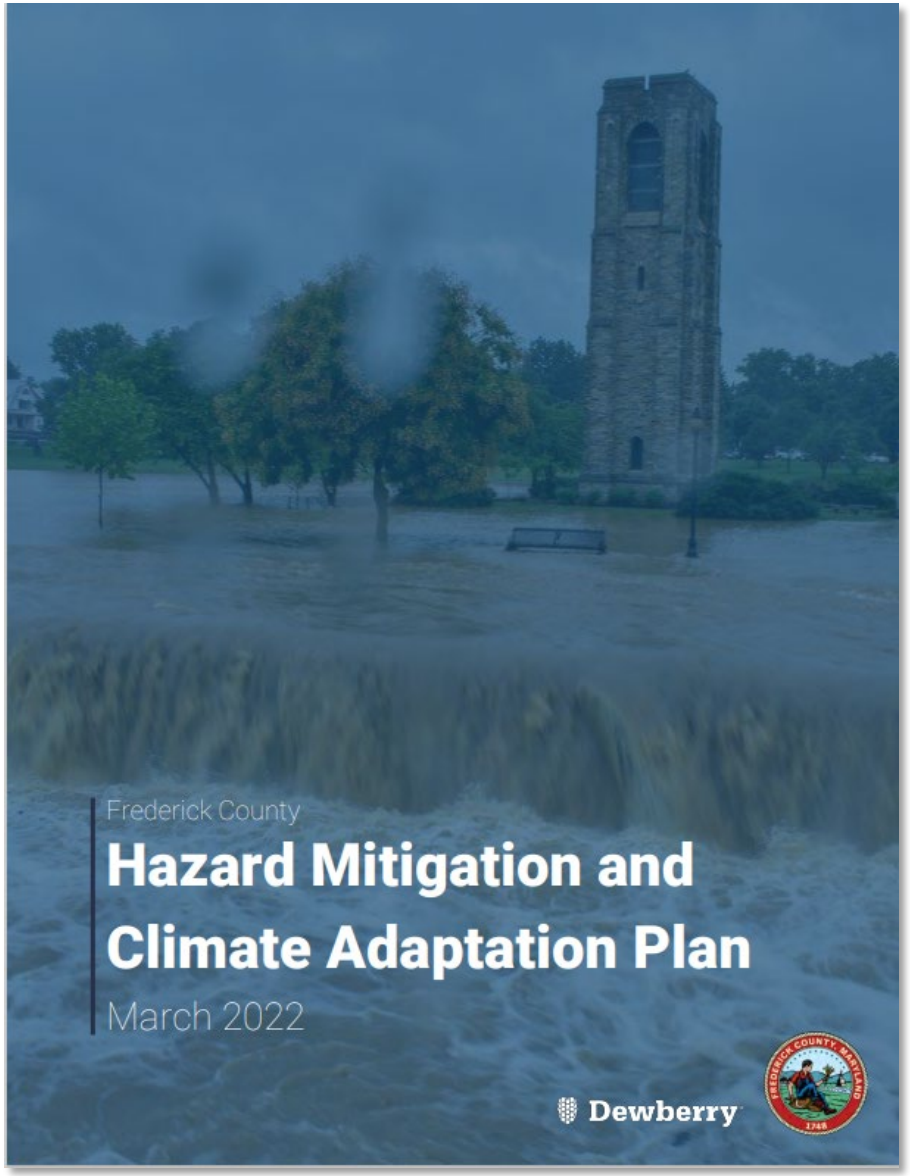
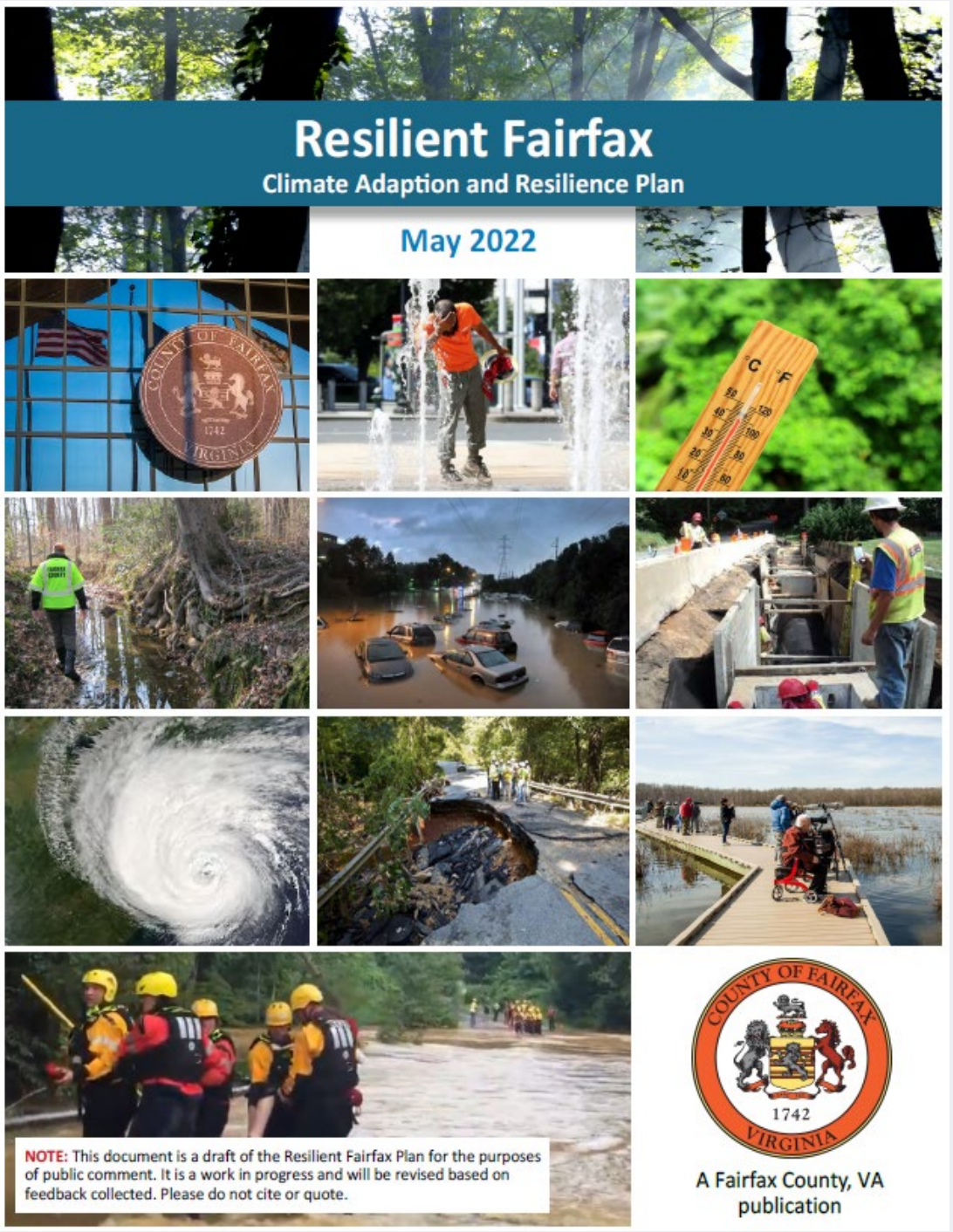
Frederick County Hazard Mitigation and Climate Adaptation Plan

Dennis Dudley, Frederick County Director of Emergency Preparedness





Resilient Fairfax

Climate Adaptation and Resilience Plan

Presentation to the National Capital Region Transportation Planning Board (TPB)

July 15, 2022

Office of Environmental and Energy Coordination

Background: Climate Plans for Fairfax County

CECAP: Community-Wide Climate & Energy Action Plan

"Cause:" Reducing emissions that globally contribute to climate change

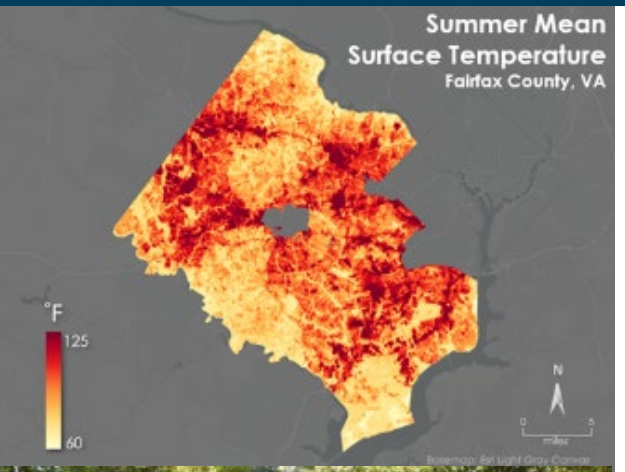
- Ex: Transition to renewable energy, energy efficiency, waste reduction, alternative transportation
- Community-oriented plan, because 95% of emissions are from the community
- Accepted by BOS in September 2021

Resilient Fairfax

"Effects:" Adaptation & resilience to long-term change in climate hazards

- Ex: Resilience to flooding, extreme temperatures, severe storms and wind
- BOS direction, led by government, infrastructure partners, interagency effort
- Feb 2021 – Oct 2022 planning process

Resilient Fairfax: Planning Process



1. What climatic conditions and hazards do we face now? In the future?

- Climate Projections Report (CPR)

2. How is our county vulnerable to climate hazards?

- Climate Vulnerability and Risk Assessment (VRA)

3. How are we currently doing in terms of resilience?

- Audit of Existing Policies, Plans, and Programs

4. Which strategies will strengthen our resilience?

- Adaptation and Resilience Strategies (available in full plan)

5. What is the path to implementation?

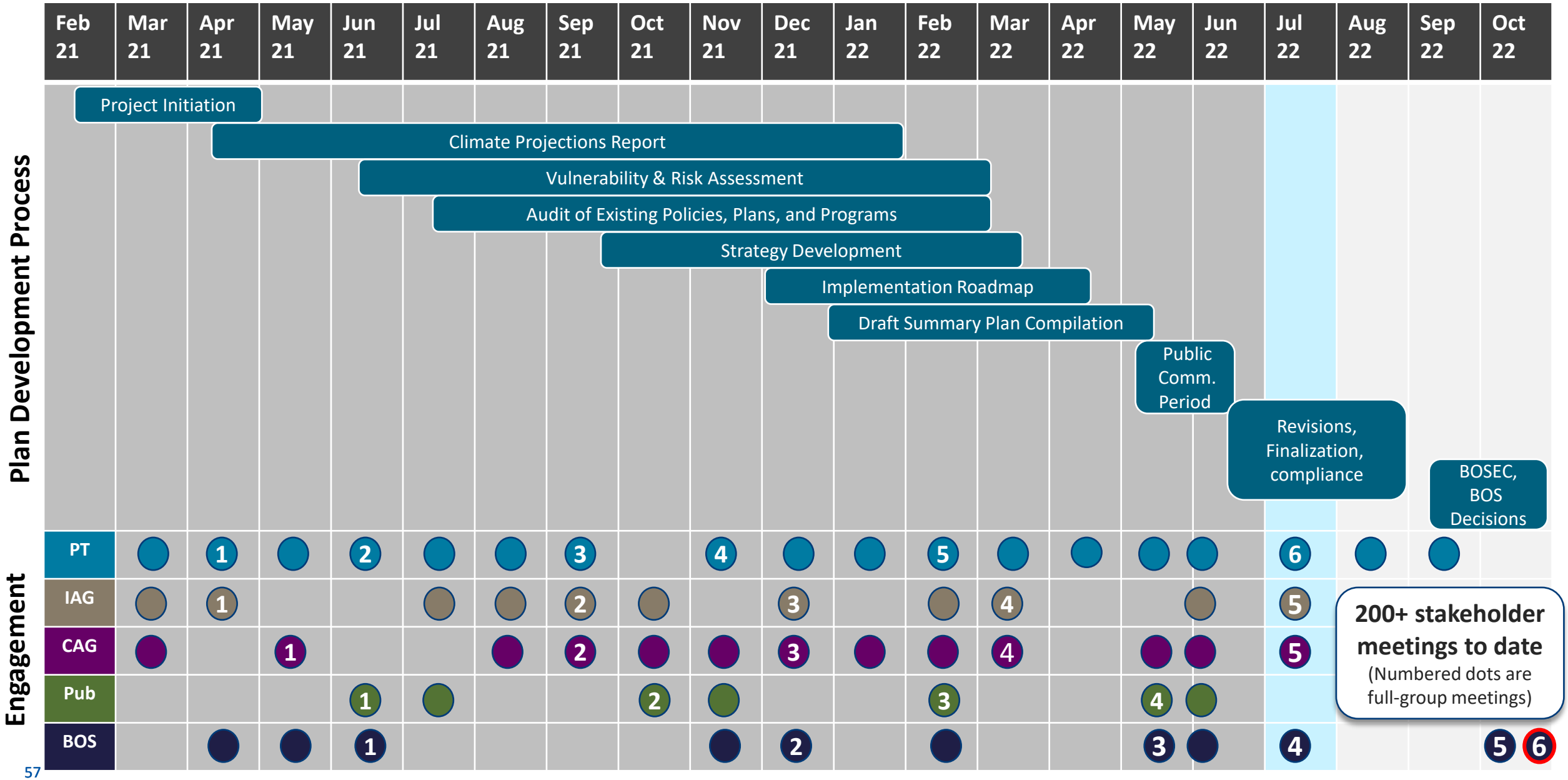
- Implementation Roadmap (available in full plan)

Resilient Fairfax Key Players

Project Lead		**Office of Environmental and Energy Coordination (OEEC) Staff**	OEEC	
Consultants	CADMUS	**Consultant Team**	Cadmus, WSP, NspireGreen	
Planning Team (PT)		**County departments and agencies**	DEMS, DFS, DPD, DPSC, DHCD, DPWES, DVS, FCDOT, FCHD, FCPA, FCPS, FMD, GIS, HHS, LDS, NCS, NVSWCD, OEEC, One Fairfax, UFMD	**20 entities 40 reps**
Infrastructure Advisory Group (IAG)		**Utilities, authorities, infrastructure managers at the local, regional, state, and federal levels**	Columbia Gas, Cox, DEMS, Dominion, DPWES, Fairfax Water, ESI, FCPS, FEMA, MWCOG, NAIOP, NOVEC, NVBIA, NVRC, NVTA, OEEC, RUCA, TAC, USDOD, VDCR, VDEM, VDEQ, VDOT, Verizon, Washington Gas, WMATA, WTS	**27 entities 44 reps**
Community Advisory Group (CAG)		**Representatives of each Supervisor District, advocacy organizations, non-profits, community groups**	Braddock, Dranesville, Hunter Mill, Lee, Mason, Mount Vernon, Providence, Springfield, Sully, 350, Chamber, Cornerstones, EcoLatinos, EQAC, FACS, FCA, GMU, League of Women Voters, Multicultural Advisory Council, NAACP, NVSWCD, Resilient VA, Reston Association, Sierra Club, Small Business Commission, Tysons	**26 entities 33 reps**

Total: 117 Resilient Fairfax advisory group members. (Transportation-related entities are highlighted)

Resilient Fairfax Planning Timeline

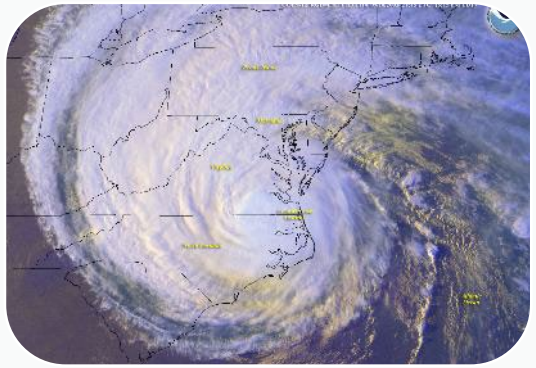


Resilient Fairfax Climate Projections Report (CPR)

Six Hazards Analyzed

Extreme Heat

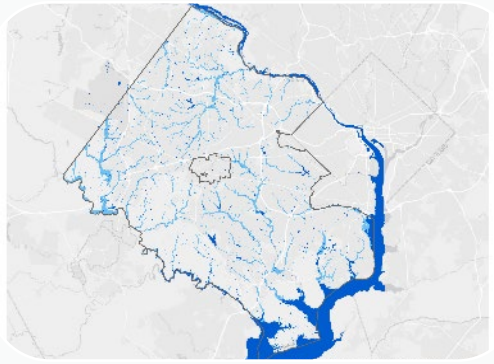
Heavy Precipitation



Severe Wind & Storms

Extreme Cold

Drought



Coastal Flooding

Two Scenarios

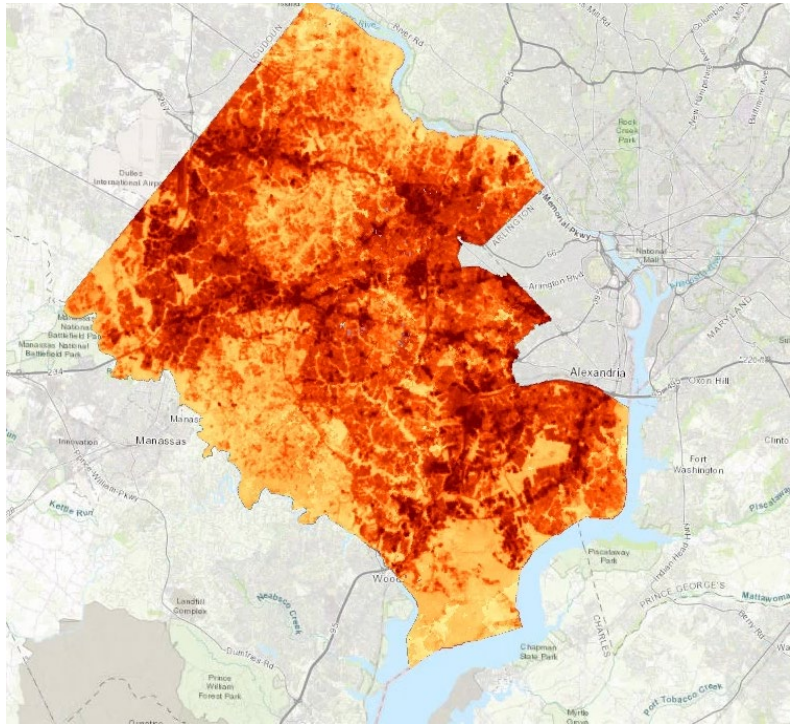
- **RCP4.5**
  (Low Scenario)
- **RCP 8.5**
  (High Scenario)

Four Periods

- **Baseline**
  (1976 – 2005)
- **Current**
  (1991 – 2020)
- **Mid-Century**
  (2035 – 2064)
- **End of Century**
  (2070 – 2099)

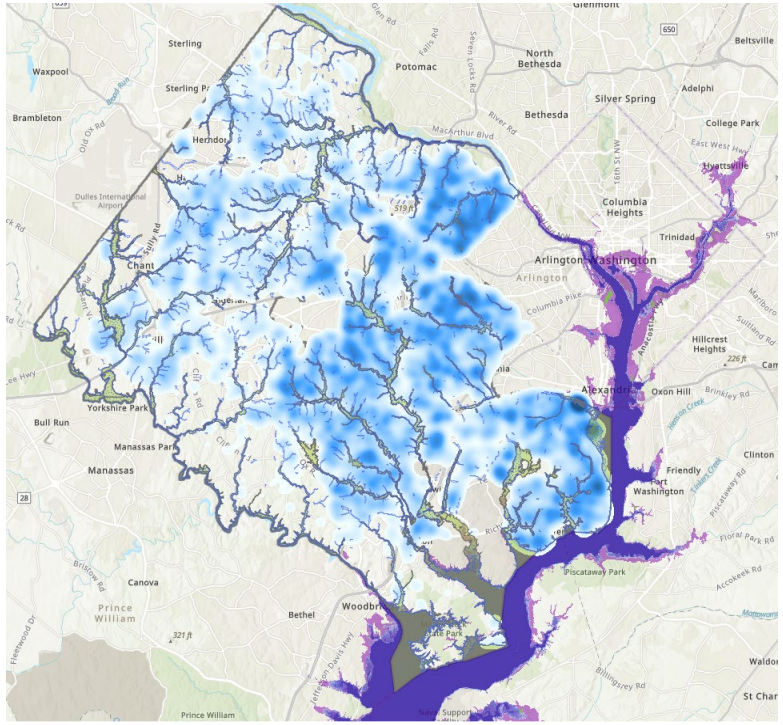
Climate Projections Report (CPR)

Warmer



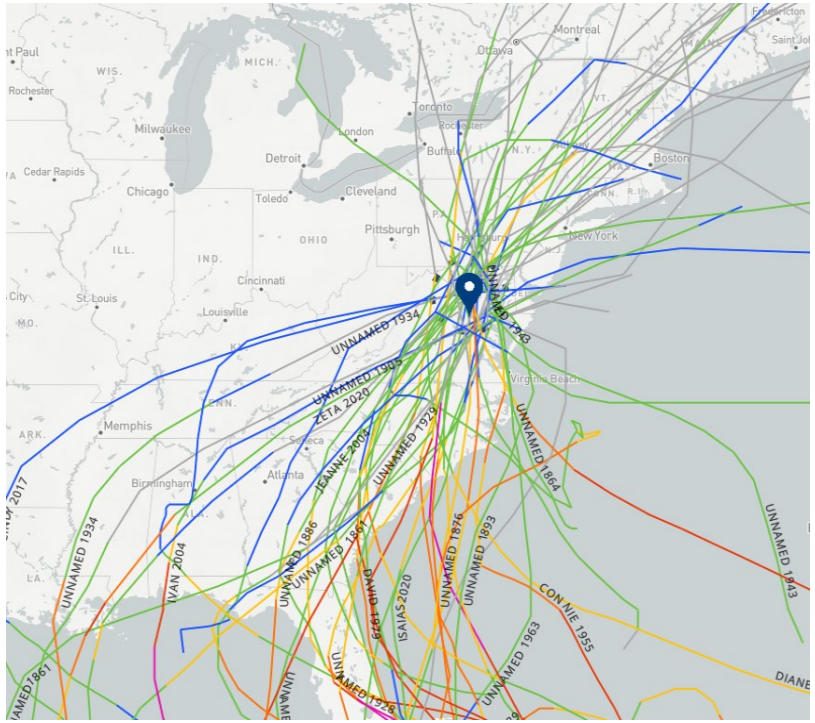
- **Annual temperature** rise 4.4 – 8°F by 2085
- **Extreme heat days** projected to increase from 7 to 70 days per year by 2085
- **Urban Heat Island Effect** on top of temperature increase

Wetter



- **Annual and seasonal precipitation** increase
- **Precipitation intensity** increase across all return periods
- **Sea level rise** --> Potomac River

Weirder



- **Severe storm strength** increase, including tropical storms, derechos, hurricanes, nor'easters
- **Unseasonably warm/cool** temperatures
- **Periods of no precipitation followed by sudden, heavy precipitation**

Wetter: Flooding Types

There are 4 major types of climate-related flooding in Fairfax County

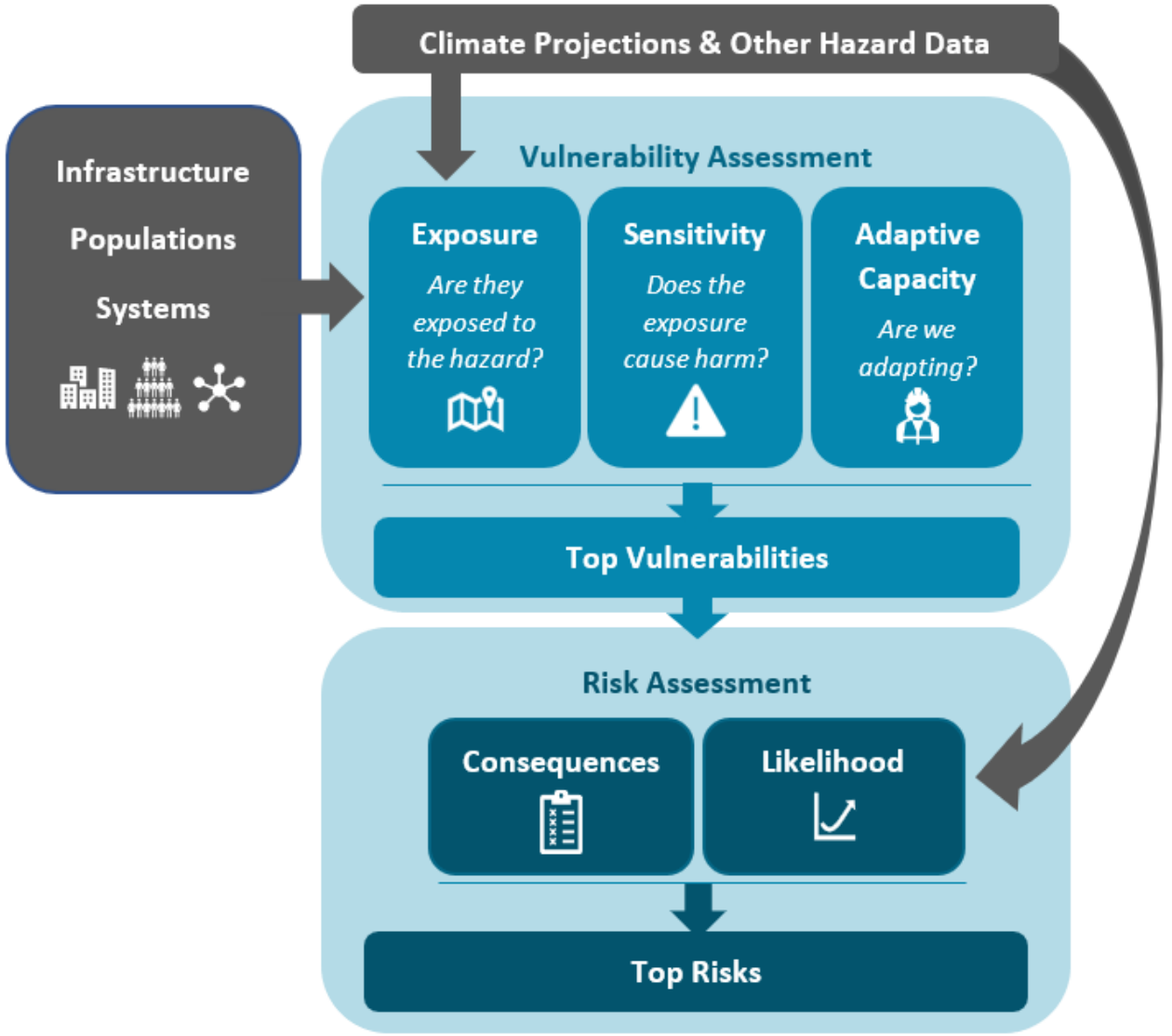
Inland Flooding		Coastal Flooding	
1. STORMWATER ISSUES Heavy rain overwhelms stormwater infrastructure	**2. FLOODPLAINS** Heavy rain makes rivers and streams overflow	**3. SEA LEVEL RISE** Rising sea means a rising Potomac River	**4. COASTAL STORM SURGE** Hurricanes, tropical storms, etc. push water on shore
			

“Inland” or “urban flooding” is the most common in our county
(Rather than riverine or floodplain flooding)

Resilient Fairfax Vulnerability and Risk Assessment (VRA)

"Given these projections, where are we vulnerable?"

- 21 sub-sectors analyzed for 6 hazards
- **Vulnerability =**
  - *Exposure*
  - *Sensitivity*
  - *Adaptive Capacity*
- **Risk =**
  - *Likelihood*
  - *Severity of Consequence*



Top Vulnerability Groups

1. Heavy Precipitation causing inland flooding of communities

People, Roads, Bldgs, Historic, Electric, EMS, HCS, Transit, WWM, Parks/Rec, Waters, Trees, Farms

2. Combined hazard stress on natural systems

Trees, ESAs, Farms, Parks/Rec, Waters

3. Storms & Wind causing damage & safety risks

People, EMS, HCS, Roads, Trees, Bldgs, Transit, Tele, Parks/Rec, Historic, Bike/Ped

4. Storms & Wind causing power outage impacts

Electric, People, EMS, HCS, Water, Bldgs, Telecomm, Transit

5. Extreme heat causing health impacts

People, EMS, HCS, Transit, Bike/Ped, Parks/Rec, WM

6. Coastal flooding impacts

People, Bldgs, Waters, ESAs

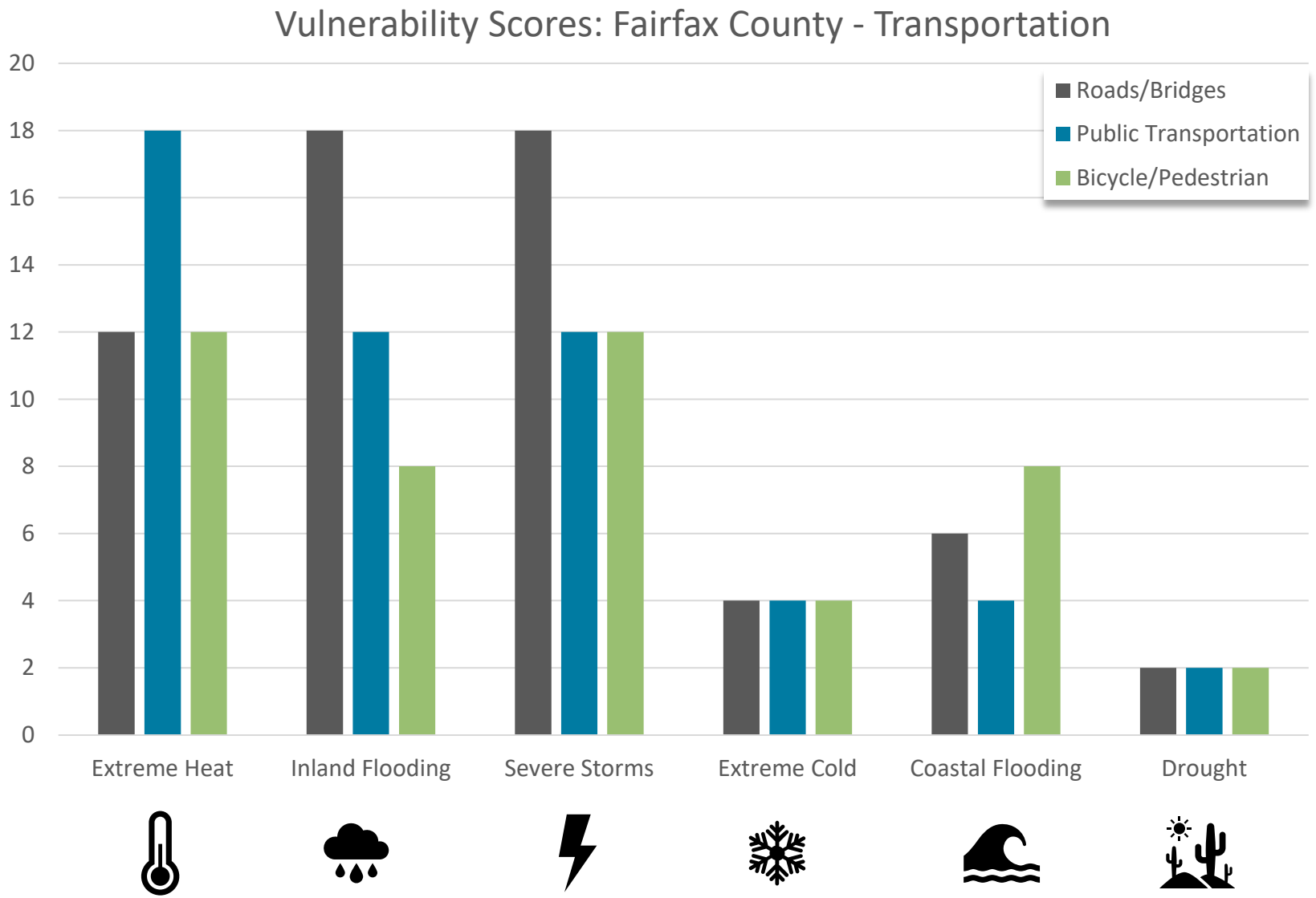
7. Extreme heat causing damage to built systems

Electric, Roads, Transit, Bike/ Ped

Summary of Vulnerability Analysis

The transportation sector in Fairfax County is most vulnerable to the following changing climatic conditions:

- **Extreme Heat**
- **Inland Flooding**
- **Severe Storms**

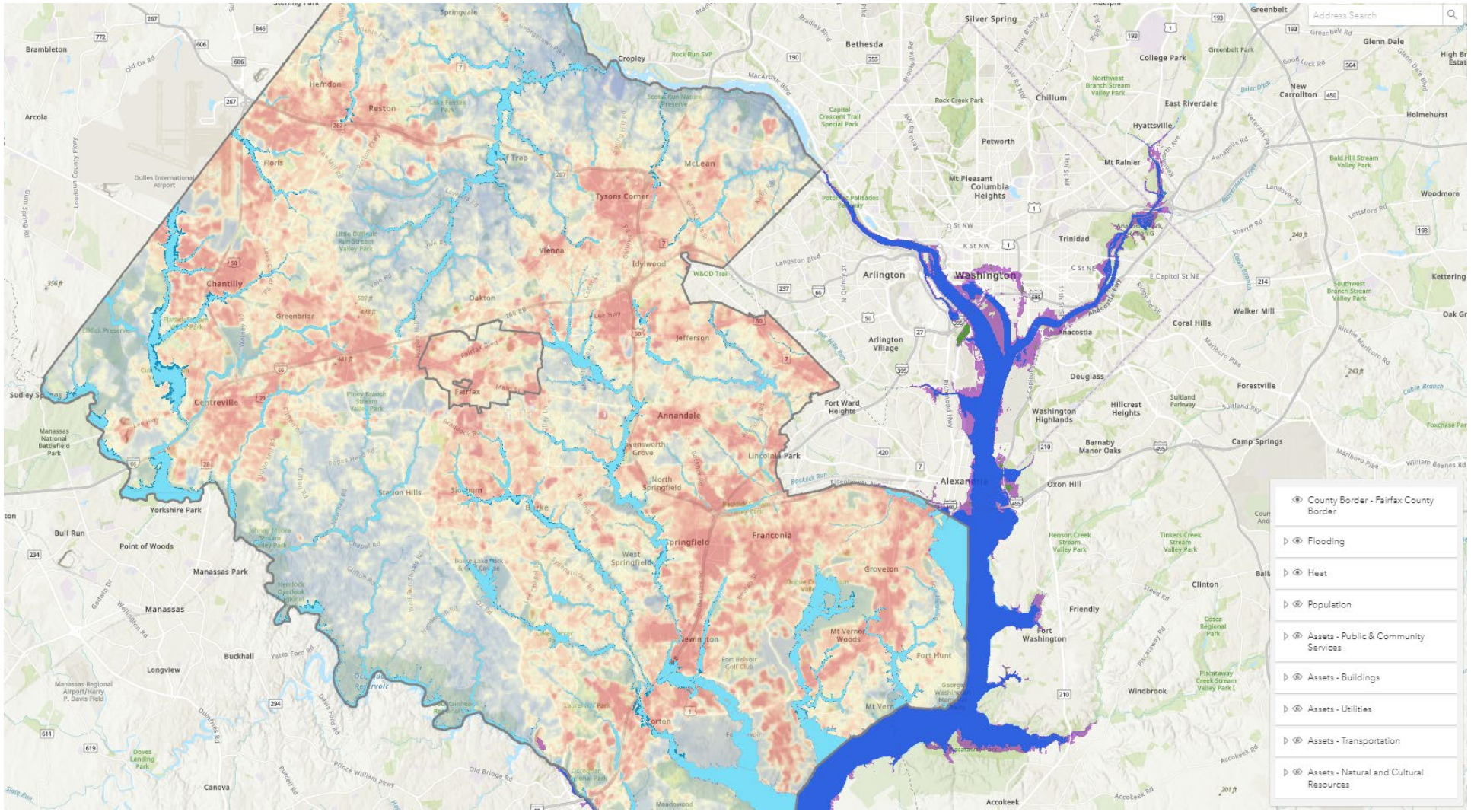


Climate Vulnerabilities: Transportation

	Extreme Heat	Heavy Precipitation & Flooding	Severe Storms & Wind
Roads, Bridges, Vehicles	**E = High:** 73% roads, 98% EV **S = Mod:** Damage, pavement softening, EV charging issues	**E = High:** <2% roads in FPs, but urban flooding significant **S = High:** Damage, erosion, scour, human safety risks, debris, emergency access blocked	**E = High:** Unprotected **S = High**: Power loss, debris, damage, erosion, reduced visibility, fuel access, bridge scour, human safety risks
Bike & Ped	**E = High:** 70% bike routes, 51% trails, 83% walkways, 96% CBS **S = Mod:** Heat health risks to cyclists and pedestrians, pavement softening, damage	**E = Mod:** 16% bike trails in FPs, urban flooding moderate **S = Mod:** Safety risks to cyclists and pedestrians, routes blocked, damage, trail erosion	**E = High:** Unprotected **S = Mod:** Safety risks to cyclists and pedestrians, routes blocked, debris, damage
Rail, Transit & Air	**E = High:** 98% Metrorail, 85% Metrobus stops **S = High:** Track kinks, derailment, inefficiency, deterioration, equip failure, passenger heat risk, BE Buses: 59-95 F; runway damage, takeoff and lift disruption	**E = Mod:** <5% assets in FPs, urban flooding of underground stations **S = High:** Flooding, service disruption +24 hrs, structural deterioration, electrical equip. issues, safety issues, fare revenues, increased maintenance	**E = Mod:** Partial protection **S = High:** Power loss, severe asset damage, service disruption, debris blockages, rail bridge instability – high wind, lost fare revenues, increased maintenance.

E = Exposure. S = Sensitivity. The third factor, **Adaptive Capacity**, was largely similar throughout these assets.
This is a small sample of results. Please see the full Resilient Fairfax Vulnerability and Risk Assessment for more information.

Interactive Climate Map Viewer



[Resilient Fairfax Interactive Map Viewer]

Audit of Existing Policies, Plans, and Programs

"How are we currently doing in terms of climate resilience?"

- ✓ 100+ Policies, Plans, and Programs reviewed by Consultants, Planning Team, IAG, CAG
- ✓ 50 Questions
- ✓ 8 categories

Category		Summary	
	**Governance**	Strong	Climate commitments, coordination, funding, staff
	**Water Infrastructure**	Strong	Drinking water, stormwater, wastewater plans & policies
	**Natural & Cultural Resources**	Strong	Floodplain regs, insurance, NR protections, incentives
	**Transportation Infrastructure**	Neutral	Transportation assessments, design, standards, upgrades
	**Buildings & Sites**	Neutral	Building code, site design, permitting, incentives
	**Energy Infrastructure**	Neutral	Grid assessments, back-up power, energy storage policies
	**Interdisciplinary/ Other**	Neutral	Data, resources, emergency management, incentives
	**Population Services**	Neutral	ID vulnerabilities, engagement, investments, resources

For more information, please see the Resilient Fairfax Audit of Existing Policies, Plans, and Programs

Audit of Existing Policies, Plans, and Programs

Transportation Infrastructure in Fairfax County : Climate Resilience
SCORE: 3 out of 5

Positives	Negatives
• Transportation infrastructure **regularly studied** (MWCOG, NVRC, USACE, FEMA, VDOT, VDCR, WMATA, FCDOT, etc.)	• Many entities involved in transportation = **complexity,** coordination and funding challenges
• **Many databases** on roadway flooding, drainage,& obstructions: DEMS, LDS, DPWES, DCC, FRD, NVSWCD	• **Separate databases not consolidated;** data not kept long-term to track patterns
• **VDOT Bridge Manual Ch. 33** – updated for climate • **VDOT Design Manual Ch. 12 –** 200-year for certain stream crossings, riverine analysis • **HB 1217 – Planning District 8** (but not our District) • **MARISA** and other IDF curve research complete • Regular **roadway maintenance** • **Floodplain Management Plan** includes replacement of vulnerable and undersized culverts	• Transportation infrastructure **difficult to adapt**; long planning and design processes • Other than bridges, **few updates** on design guides • No mention of climate in Comp Plan - Transportation • Continued **excess impervious surface** → flooding • Transportation assets often designed for SWM **individually**, rather than network-level SWM • Older neighborhoods' roads built **without SWM** • Transportation assessments traditionally consider past conditions, **not future/changing conditions**

For more information, please see the Resilient Fairfax Audit of Existing Policies, Plans, and Programs

Resilient Fairfax (Draft) Strategy Categories

Integrated Action Planning

- Resilience into county plans and policies
- Resilience data collection
- Resilience funding
- Continued interagency coordination

Climate Ready Communities

- Network of safe & resilient spaces
- Community capacity to prepare for, withstand, and recover from events
- Climate-ready development

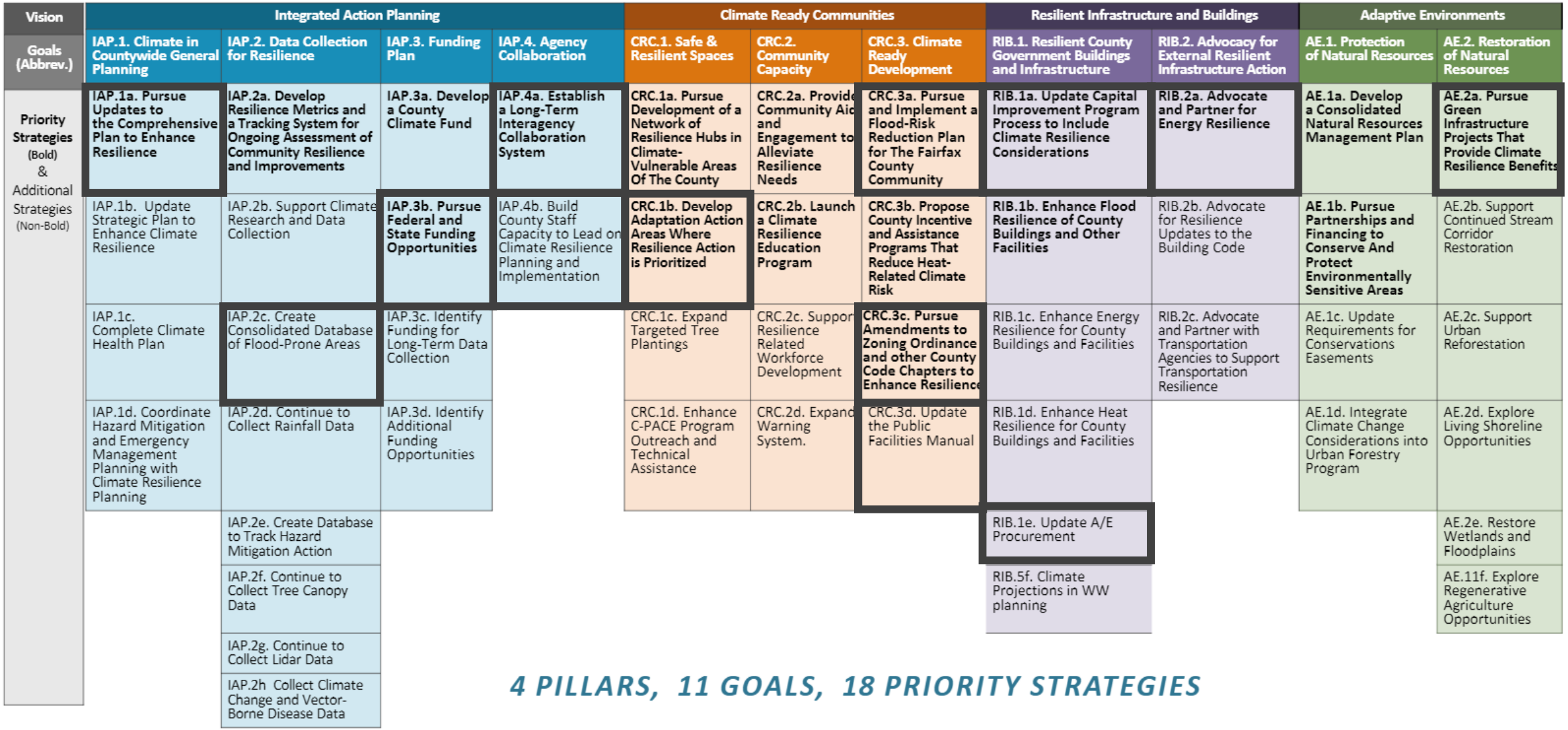
Resilient Infrastructure & Buildings

- Resilience in major county infrastructure decisions
- County building & facility resiliency
- Advocacy for external infrastructure resiliency, i.e., energy grid & transit

Adaptive Environments

- Protection of natural resources that enhance resilience
- Restoration of damaged areas with nature-based and natural solutions

Resilient Fairfax Snapshot of Strategies



Vision	Integrated Action Planning				Climate Ready Communities			Resilient Infrastructure and Buildings		Adaptive Environments	
Goals (Abbrev.)	IAP.1. Climate in Countywide General Planning	IAP.2. Data Collection for Resilience	IAP.3. Funding Plan	IAP.4. Agency Collaboration	CRC.1. Safe & Resilient Spaces	CRC.2. Community Capacity	CRC.3. Climate Ready Development	RIB.1. Resilient County Government Buildings and Infrastructure	RIB.2. Advocacy for External Resilient Infrastructure Action	AE.1. Protection of Natural Resources	AE.2. Restoration of Natural Resources
Priority Strategies (Bold) & Additional Strategies (Non-Bold)	**IAP.1a. Pursue Updates to the Comprehensive Plan to Enhance Resilience**	**IAP.2a. Develop Resilience Metrics and a Tracking System for Ongoing Assessment of Community Resilience and Improvements**	**IAP.3a. Develop a County Climate Fund**	**IAP.4a. Establish a Long-Term Interagency Collaboration System**	**CRC.1a. Pursue Development of a Network of Resilience Hubs in Climate-Vulnerable Areas Of The County**	**CRC.2a. Provide Community Aid and Engagement to Alleviate Resilience Needs**	**CRC.3a. Pursue and Implement a Flood-Risk Reduction Plan for The Fairfax County Community**	**RIB.1a. Update Capital Improvement Program Process to Include Climate Resilience Considerations**	**RIB.2a. Advocate and Partner for Energy Resilience**	**AE.1a. Develop a Consolidated Natural Resources Management Plan**	**AE.2a. Pursue Green Infrastructure Projects That Provide Climate Resilience Benefits**
	IAP.1b. Update Strategic Plan to Enhance Climate Resilience	IAP.2b. Support Climate Research and Data Collection	**IAP.3b. Pursue Federal and State Funding Opportunities**	IAP.4b. Build County Staff Capacity to Lead on Climate Resilience Planning and Implementation	**CRC.1b. Develop Adaptation Action Areas Where Resilience Action is Prioritized**	**CRC.2b. Launch a Climate Resilience Education Program**	**CRC.3b. Propose County Incentive and Assistance Programs That Reduce Heat-Related Climate Risk**	**RIB.1b. Enhance Flood Resilience of County Buildings and Other Facilities**	RIB.2b. Advocate for Resilience Updates to the Building Code	**AE.1b. Pursue Partnerships and Financing to Conserve And Protect Environmentally Sensitive Areas**	AE.2b. Support Continued Stream Corridor Restoration
	IAP.1c. Complete Climate Health Plan	IAP.2c. Create Consolidated Database of Flood-Prone Areas	IAP.3c. Identify Funding for Long-Term Data Collection		CRC.1c. Expand Targeted Tree Plantings	CRC.2c. Support Resilience Related Workforce Development	**CRC.3c. Pursue Amendments to Zoning Ordinance and other County Code Chapters to Enhance Resilience**	RIB.1c. Enhance Energy Resilience for County Buildings and Facilities	RIB.2c. Advocate and Partner with Transportation Agencies to Support Transportation Resilience	AE.1c. Update Requirements for Conservations Easements	AE.2c. Support Urban Reforestation
	IAP.1d. Coordinate Hazard Mitigation and Emergency Management Planning with Climate Resilience Planning	IAP.2d. Continue to Collect Rainfall Data	IAP.3d. Identify Additional Funding Opportunities		CRC.1d. Enhance C-PACE Program Outreach and Technical Assistance	CRC.2d. Expand Warning System.	CRC.3d. Update the Public Facilities Manual	RIB.1d. Enhance Heat Resilience for County Buildings and Facilities		AE.1d. Integrate Climate Change Considerations into Urban Forestry Program	AE.2d. Explore Living Shoreline Opportunities
		IAP.2e. Create Database to Track Hazard Mitigation Action						RIB.1e. Update A/E Procurement			AE.2e. Restore Wetlands and Floodplains
		IAP.2f. Continue to Collect Tree Canopy Data						RIB.5f. Climate Projections in WW planning			AE.11f. Explore Regenerative Agriculture Opportunities
		IAP.2g. Continue to Collect Lidar Data									
		IAP.2h Collect Climate Change and Vector-Borne Disease Data									

4 PILLARS, 11 GOALS, 18 PRIORITY STRATEGIES

Transportation-Related Strategies in Resilient Fairfax

(Note: The draft Resilient Fairfax plan is currently being revised – strategies may change)

- **IAP.1a. Pursue Update to the Comprehensive Plan to Enhance Resilience** (includes transportation)
- **IAP.2c. Create Consolidated Database of Flood-Prone Areas** (includes roadway flooding)
- **IAP.3b. Pursue Federal and State Funding Opportunities**
- **IAP.4a. Long-Term Interagency Collaboration System**
- **IAP.4b. Build Staff Capacity on Climate Resilience in Planning and Implementation**
- **CRC.1b. Adaptation Action Areas Where Resilience is Prioritized**
- **CRC.3a. Pursue and Implement Flood-Risk Reduction Plan for Fairfax County (DPWES)**
- **CRC.3c. Update the Zoning Ordinance and Other County Codes**
- **CRC.3d. Update the Public Facilities Manual**
- **RIB.1a. Update Capital Improvement Program to Include Resilience Considerations**
- **RIB.2c. Advocate and Partner with Transportation Agencies to Support Transportation Resilience**
- **RIB.1e. Update A/E and other Procurement Criteria**
- **AE.2a. Pursue Green Infrastructure Projects that Provide Climate Resilience Benefits**

Resilient Fairfax: Implementation Roadmaps

- ✓ Action Steps
- ✓ Leads
- ✓ Partners
- ✓ Timeline
- ✓ Cost
- ✓ KPIs
- ✓ Equity
- ✓ Co-benefits

Goal RIB.1 County Infrastructure Decisions: Incorporate Climate Projections and Resilience into County Infrastructure Decisions

STRATEGY RIB.1a Update Capital Improvement Program Process to Include Climate Resilience Considerations.

Strategy Description: The Capital Improvement Program (CIP) is Fairfax County's five-year roadmap for creating, maintaining, and funding present and future capital infrastructure requirements. It provides the framework for the investment in and planning of capital projects. This strategy promotes revising the CIP evaluation and project prioritization process to integrate climate resilience into capital projects and to consider impacts and consequences from projected extreme heat, heavy precipitation, coastal flooding, severe storms, and other climatic conditions into infrastructure planning and development. These climate hazards can impact function, maintenance costs, and lifespan. Integration of climate projections and resilience enhancements into the county's CIP will ensure continued provision of critical county services that protect public health and safety and that capital investments provide their intended function and benefit over their lifespan.

Climate Hazards Addressed:

Lead:	DMB, DPWES, OEEC
Partners:	DEMS, FCDOT, DPWES, UFMD, FCPA, OCA, One Fairfax, UFMD
Timeline:	Medium-Term (2-5 years)
Cost:	$$$ ($500k - 1 million)

Implementation Actions:

i.	Review the existing CIP process to identify revisions needed to embed consideration of: climate change projections, potential risks from climate hazards, and resiliency enhancements for the county's infrastructure and facilities. Resilience enhancements should consider ways a project could enhance overall community resilience. Explore screening criteria and identify selection criteria for projects that support the county's resilience goals. Identify pathways to prioritize implementation and funding for climate resilience projects.
ii.	Build a project list of identified resilience projects, including those identified in the Flood Risk Reduction plan and the Hazard Mitigation Plan. Integrate One Fairfax and build upon the completed analysis of the Vulnerability and Risk Assessment to prioritize projects that support the needs of vulnerable populations and/or address top climate risks to the county.
iii.	Partner with staff responsible for capital improvement evaluation, project management, and implementation to draft proposed revisions.
iv.	Proceed through revision and approval processes to encourage capital projects that mitigate risk and build resilience to future projected extreme heat, heavy precipitation, coastal flooding, and severe storms. Coordinate with the department responsible for asset management or use in advance of project approval to ensure there are no adverse impacts.
v.	Monitor and evaluate CIP implementation results and project outcomes. Adjust process and/or prioritization criteria if needed.

Key Performance Indicators:
Outcome: Updated CIP process.

- *Number (#) of CIP projects identified on project list for resilience*
- *Board approval of CIP process updates*

Equitable Implementation:

- ✓ Consider how to factor needs of disadvantaged communities into Capital Improvement Program process.
- ✓ Identify how the county can monitor the effects of proposed projects on disadvantaged populations.
- ✓ Consider how to maintain the integrity and fabric of communities that are seeing significant impacts from flooding due to their location, while protecting them from potential risk and loss during storm events.

How to Equitably Implement:

- ✓ Ensure distribution of projects to areas most impacted by climate change and serving vulnerable communities.
- ✓ Build in method to identify and highlight proposed projects that disproportionately impact vulnerable communities and prioritize these projects.

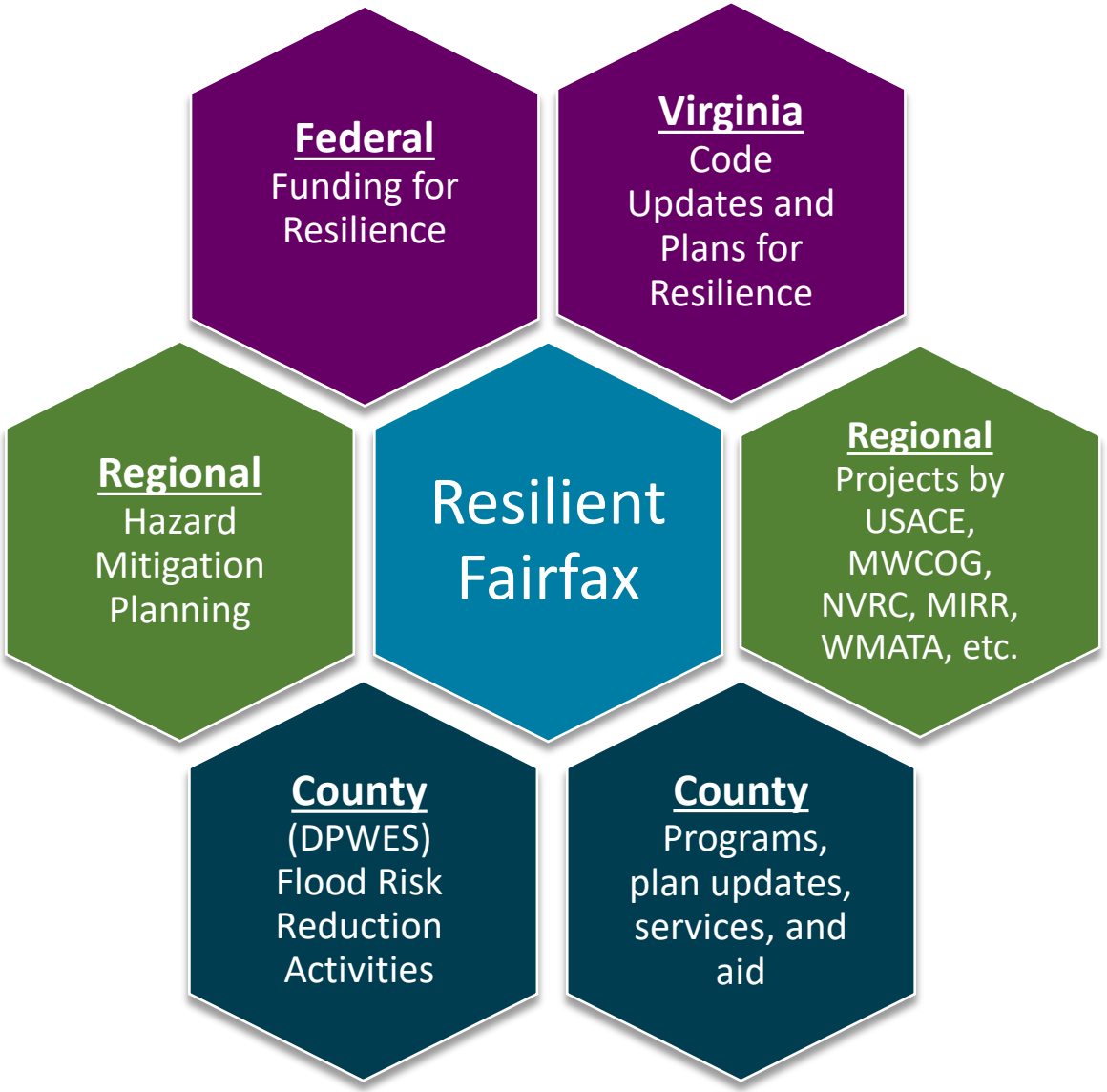
Funding Opportunities:

- *BRIC*
- *Hazard Mitigation Grant Program (HMGP)*

Co-Benefits:

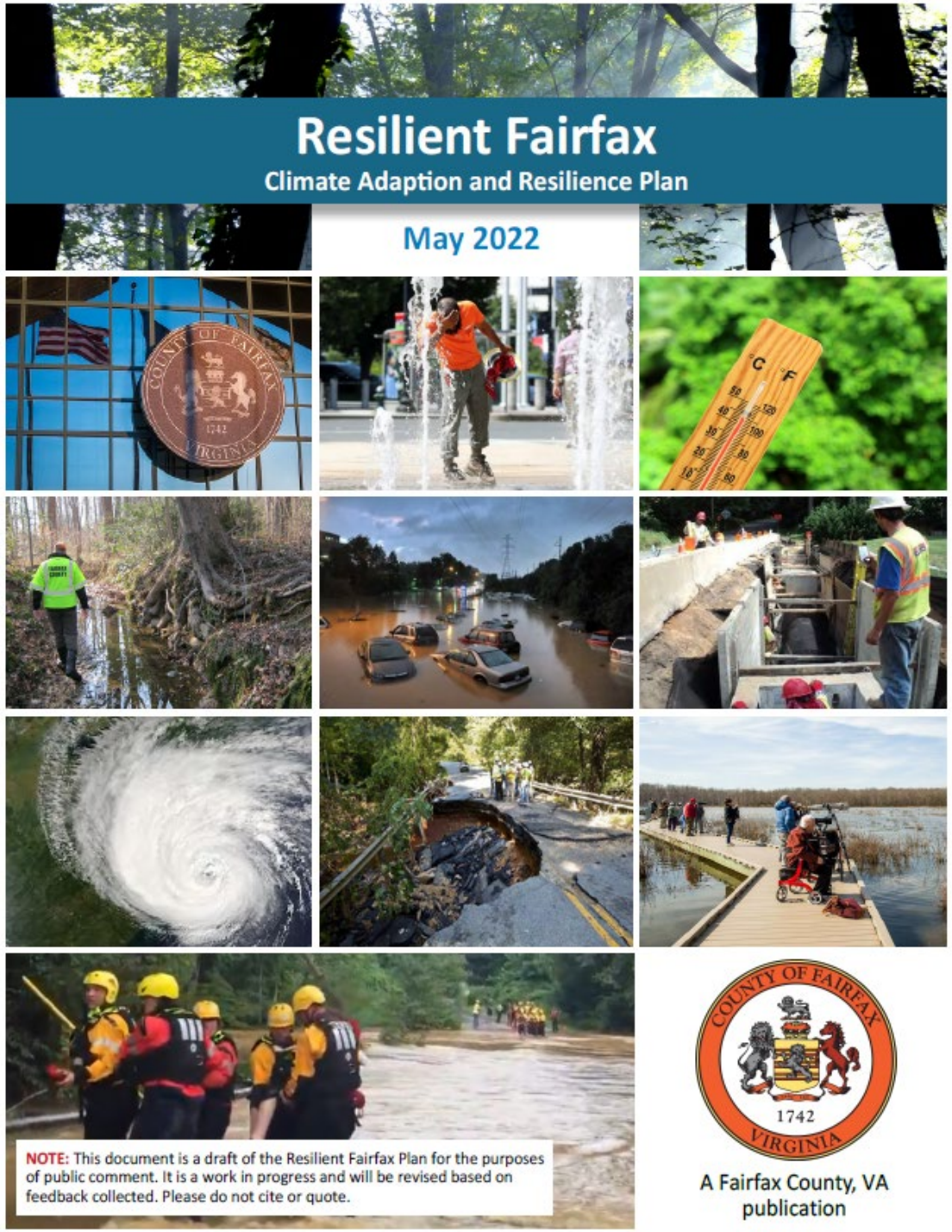
Case Study: VDOT Design Standards Consider Climate Change and Coastal Storms
The Virginia Department of Transportation (VDOT) issued new design standards for bridge structures that aim to make them more resilient to climate change impacts. The standards account for sea level rise, water salinity, temperature changes, and rainfall intensity when constructing and maintaining bridges. The guidelines identify adaptive measures, such as building certain bridges higher and longer to account for rising seas and more intense rains. The department is also developing new standards to make roadways more adaptive to climate change.

How does Resilient Fairfax align with related initiatives?



Alignment at multiple levels

- ✓ **Data** that is shared, consistent, and complementary
- ✓ **Staff** collaboration
- ✓ **Plan** alignment at multiple levels of government
- ✓ **Strategy** and project alignment across multiple departments and plans
- ✓ **Funding** coordination and opportunities



OFFICE OF
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FAIRFAX COUNTY

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  Allison.Homer@fairfaxcounty.gov

Links:

- Draft Resilient Fairfax Plan
- Longer technical reports that provide additional detail
  - *Climate Projections Report*
  - *Climate Vulnerability and Risk Assessment*
  - *Audit of Existing Policies, Plans, and Programs*
- Climate Viewer Map
- Resilient Fairfax website

Moderated Discussion

Wrap-Up

Michael Neibauer, Washington Business Journal

Poll

Mentimeter

Please go to www.menti.com

Use code: 5728 9143

Or use the link in the chat:

https://www.menti.com/9d95fgyeav

What was the most valuable thing you took away from today's session?

If you attended all or most of the sessions, which webinar session did you find most valuable?

Are there any topics would you like to see covered in future webinars?

Thank You!

National Capital Region
Transportation Planning Board