TPB Resiliency Study

Findings and Next Steps

Stacy Cook
TPB Transportation Planner

CAC

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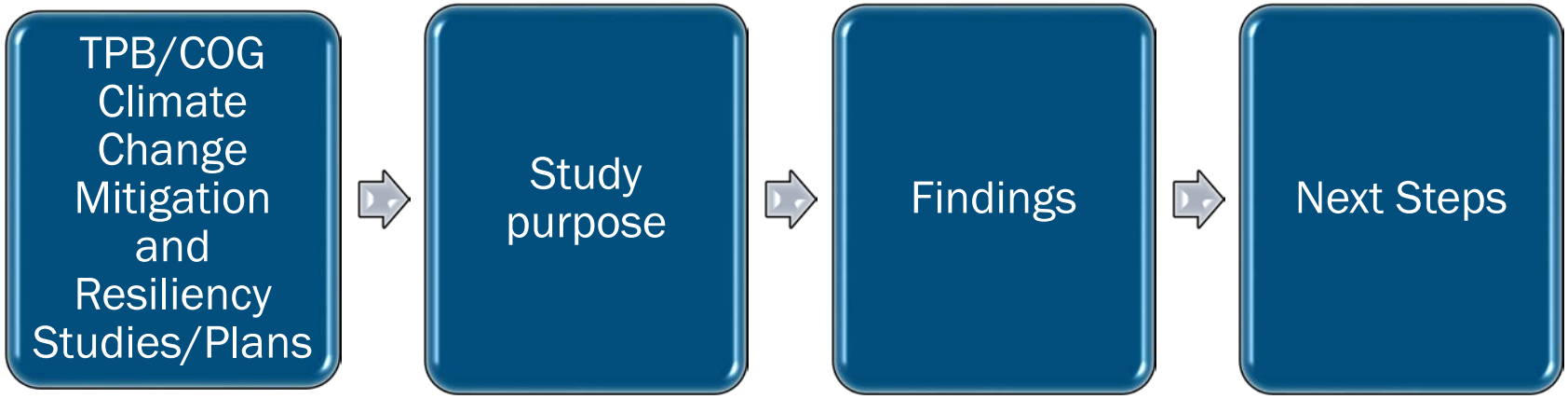
A long-range transportation plan for the National Capital Region

TPB Resiliency Study



Resiliency and Climate Change Studies*

Becoming a Climate Ready Region: making significant progress by 2030

Recent Studies:

- TPB Climate Change Mitigation Study of 2021
- TPB Resiliency Study

COG and TPB: Board Actions

- COG 2030 Climate and Energy Action Plan (CEAP)
  - TPB endorsed CEAP climate and multisector emissions goals for 2030/2050

Past Studies:

- What Would it Take
- Multi-sector Working Group Analysis

*This list is not comprehensive of all COG and TPB activities, visit www.MWCOG.org for more information

TPB Study Advances CEAP Actions

The TPB Resiliency Study advances the implementation of several of the COG 2030 Climate and Action Plan action items shown in Figure 9, including: PL-2, PL-3, PL-4, and inform RI-4 and RI-5.

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 and 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

TPB Resiliency Study Purpose

- Research and document agency adaptation planning activities to:
  - respond to one of the federal Planning Factors, and
  - advance important planning work and regional coordination on the topic of resiliency, one of TPB's policy priorities.

TPB Resiliency Study Purpose:
Federal Definition of Resilience:

What is *Resilience*?

Resilience: the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions

Source: Heather Holsinger, FHWA, 2018 AMPO Presentation

Study Purpose:
Respond to FAST Act Requirements

- **FAST ACT Transportation Planning Rule (May 2016) added:**
  - Metropolitan Transportation Plan must assess capital investment and other strategies that reduce the vulnerability of existing transportation infrastructure to natural disasters (23 CFR450.324(f)(7)).
  - MPOs recommended to consult with agencies and officials responsible for natural disaster risk reduction when developing Plan and TIP (23 CFR 450.316(b)).
  - New planning factor on improving the resiliency and reliability of transportation system (23 CFR 450.206(a) and 23 CFR450.306(b)).

Planning Factor: Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation.

Study Activities

- Activities:
  - Document resiliency planning considerations for transportation (building on COG CEAP and CRVA).
  - Conduct inventory of resiliency planning activities by TPB Develop research framework /template.
- Products*:
  - Completed inventory templates in coordination with TPB member agencies (counties, states, and WMATA).
  - Summary memorandum of inventory findings and TPB Resiliency white paper.

**The information gathering for this study was completed in spring of 2021, based on publicly-available information, therefore the documentation will not reflect new publications nor activities conducted by agencies since then.*

Inventory Findings Summary

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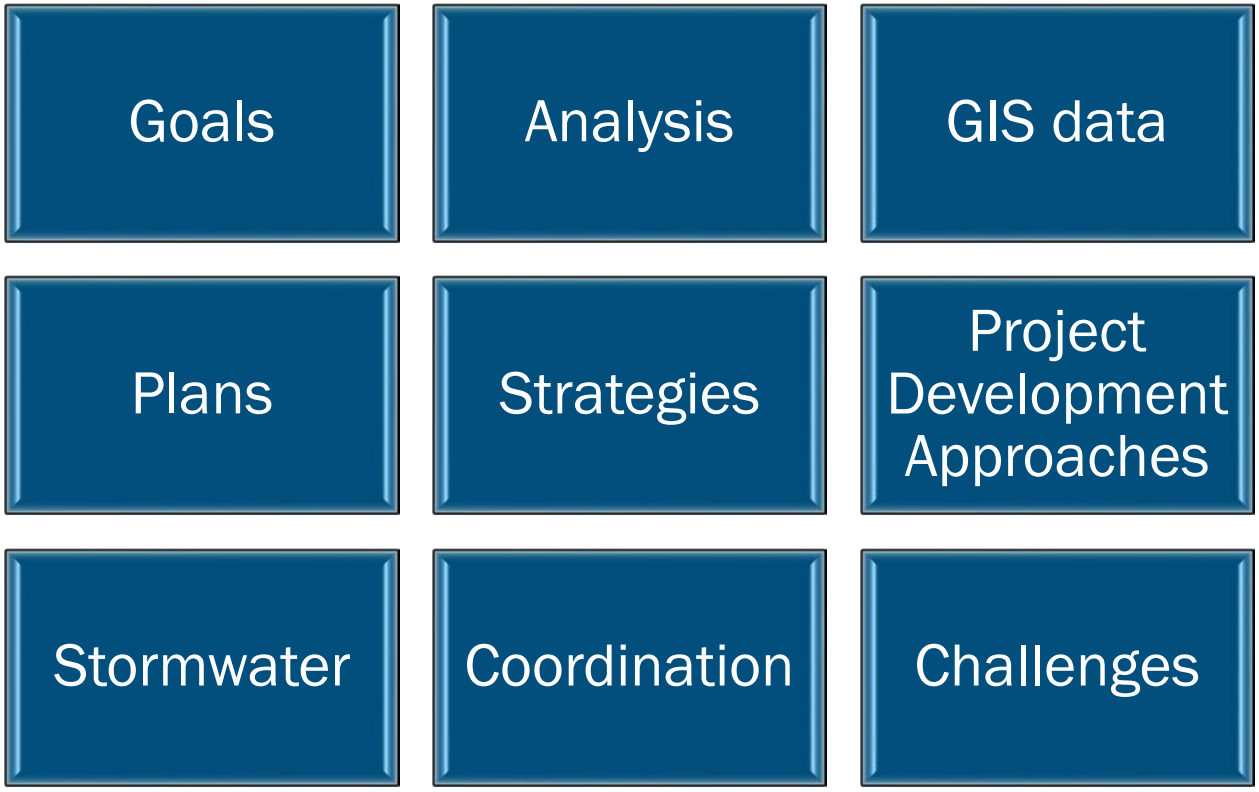
Overview: Research areas

The research framework includes a series of questions on a range of topics:



Terms

- **Priority infrastructure:** As the TPB's role in metropolitan Washington is to focus on regional priorities, this study did not look at all types of infrastructure. Instead, this study attempts to focus on infrastructure that facilitates regional transportation, which is "priority" infrastructure from a regional perspective.
- **Vulnerable infrastructure**: For the purposes of this study, the term "vulnerable infrastructure" refers to infrastructure that has been identified by an agency as having been exposed to natural hazards and potential climate risks.

*asterisks in the following tables indicate agencies that included maps (or other indications of GIS data) in the documents reviewed.

Types of Reasons for Addressing Resilience

Reasons	Jurisdiction
Responding to past disaster or recurring incidents	DC, MD, VA
Responding to legislative mandate	MD, VA
Responding to financial/economic concerns	DC, VA Prince George's County
Addressing safety and security concerns	MD, VA Montgomery County
Seeking to protect transportation assets	DC, MD, VA WMATA Frederick County
Inform managed retreat decision	VA

How TPB Member Agencies Describe Resilience: Examples

Agency (Document)	Definition
Arlington County (Community Energy Plan)	The ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions caused by deliberate attacks, accidents, climate change, or weather-related threats or incidents.
Charles County (Climate Resilience Action Strategy)	The ability to prepare for, recover from, and adapt to climate change impacts.
Government of D.C. (Resilient DC)	Urban resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and thrive no matter what kinds of chronic stresses and acute shocks they experience.
MDOT (2020 Annual Attainment Report)	Provide a resilient multimodal system by anticipating and planning for changing conditions and hazards whether natural or man-made.
Montgomery County (Climate Action Plan)	Ability to withstand and recover from a climate hazard.
NVRC (Resilient Critical Infrastructure: A Roadmap for Northern Virginia)	Resilient systems work to “ensure that functionality is retained and/or can be re-instated despite some failures or operational disturbances.”

[1] NVRC is not a TPB member but was added to this study due to the leadership role it has played in planning for resilience in Northern Virginia.
[2] NVRC and COG. 2018. Resilient Critical Infrastructure: A Roadmap for Northern Virginia. https://www.novaregion.org/DocumentCenter/View/11933/Resilient-Roadmap-Final-PDF

Types of Analyses by Jurisdictions

Analysis	Jurisdictions
Document references analyses or studies that the agency has undertaken regarding transportation infrastructure resiliency.	DC, MD, VA NVRC, WMATA Charles County, Frederick County, Montgomery County, Prince George's County
Agency's vulnerability assessment or study covers roads.	DC, MD, VA NVRC, NCPC City of Alexandria, Charles County, Fairfax County, Frederick County, Montgomery County, Prince George's County, Prince William County
Agency's vulnerability assessment or study covers bridges.	DC, MD, VA NVRC Charles County, Montgomery County, Prince George's County
Agency's vulnerability assessment or study covers drainage and culverts.	DC, MD, VA NVRC Charles County, Frederick County
Agency's vulnerability assessment or study covers transit stations (rail or bus stops)	MD, VA NVRC, NCPC, WMATA Charles County, Fairfax County, Frederick County, Montgomery County, Prince George's County
Agency's vulnerability assessment or study covers tunnels.	DC NVRC

Priority Infrastructure Referenced in Analyses and Studies

Priority Infrastructure	Jurisdictions
Agency documents identify transportation infrastructure that is high priority or critical	MD, VA* NVRC* Charles County, Fairfax County, Frederick County, (Prince George's County's list was redacted)
Roads and highways	MD, VA Charles County, Fairfax County
Bridges	MD, VA* NVRC*
Drainage and culverts	Charles County
Transit infrastructure	MD NVRC* Frederick County
Evacuation routes	MD Fairfax County, Frederick County*

Hazards Referenced in Analyses and Studies

Type of Hazards	Jurisdictions
Stormwater impacts, including extreme precipitation and flooding	DC, MD*, VA* NCPC, NVRC*, WMATA City of Alexandria, Charles County*, Fairfax County*, Frederick County*, Montgomery County*, Prince George's County, Prince William County*
Coastal inundation, including sea level rise and storm surge	DC, MD*, VA* NVRC*, NCPC Charles County*, Fairfax County, Prince George's County*
Landslides and other weather-related erosion of earth/materials supporting transportation structures	DC, MD*, VA* Charles County*, Frederick County*
Impacts from extreme temperatures, including heat and cold	DC, MD*, VA NVRC*, WMATA Charles County*, Frederick County*, Montgomery County
Other	DC*, VA* Montgomery County*, Prince George's County*

Vulnerable Infrastructure

- The research team sought to identify whether the region's transportation agencies had identified
  - (a) priority infrastructure,
  - (b) potential hazards, and
  - (c) whether the priority infrastructure was exposed to the potential hazards ("vulnerable infrastructure").

- The research team looked at whether the priority infrastructure was provided as a list of individual assets, or a blanket categorical consideration for specific asset-types (e.g., bridges). Most documents analyzed infrastructure categorically, and only a few resources named specific individual assets.

Vulnerable Infrastructure

Vulnerable Infrastructure	Jurisdictions
Roads	DC, MD*, VA* NVRC*, NCPC City of Alexandria, Charles County, Fairfax County, Frederick County, Montgomery County, Prince George's County, Prince William County*
Bridges	DC, MD*, VA* NVRC* Charles County, Montgomery County, Prince George's County
Drainage and culverts	DC, MD*, VA NVRC Charles County, Frederick County
Transit infrastructure	MD*, VA NVRC*, NCPC, WMATA* Charles County, Fairfax County, Frederick County*, Montgomery County, Prince George's County
Tunnels	DC NVRC*

Example

- NVRC:
  - 2017 – Northern Virginia Hazard Mitigation Plan Update – Identified and assessed vulnerable infrastructure for transportation, energy, water and wastewater, and more.
- WMATA:
  - Several documents identify and map Metrobus routes that are prone to flash flooding. The more technical documents outline the Metrorail system track requirements for operational safety and resilience.
- Charles County:
  - The Hazard Mitigation Plan (2018) and Nuisance and Urban Flood Plan (2020) identify and assess transportation infrastructure that is vulnerable to extreme weather and climate change impacts.

Types of Resilience Strategies Documented

Type of Strategies	Jurisdictions
Development of plans and lists of potential strategies to pursue	MD, DC, VA NVRC, WMATA Charles County, Fairfax County, Frederick County, Montgomery County
Research and studies, including enhanced data efforts	DC, MD, VA WMATA, NVRC Charles County, Frederick County
Coordination	DC WMATA Charles County, Montgomery County
Establishment of new staff or departments to address	MD, VA WMATA Charles County, Fairfax County

Example

- Commonwealth of Virginia:
  - Surging Seas Risk Finder is an online vulnerability assessment tool that shows analysis results for combinations of location, water level, and risk element.
- State of Maryland:
  - The 2016 Hazard Mitigation Plan used Mitigation Action Worksheets to evaluate, prioritize, and rank strategies to address vulnerabilities for projects.
- Charles County:
  - Established a Resilience Authority that undertakes and supports resilience infrastructure projects.

Types of Resilience Strategies Documented (cont.)

Type of Strategies	Jurisdictions
Legislative and regulatory changes	DC, MD Charles County
Funding and incentive strategies	Charles County
System management and operations	MD WMATA Frederick County
Asset management program strategies	MD Frederick County
Adapt existing infrastructure	MD WMATA City of Alexandria, Charles County, Frederick County, Montgomery County

Project Development Strategies

Project Development Strategies	Jurisdictions
Screening of projects	MD, VA Fairfax County
Project selection criteria	MD, VA Charles County
Project funding criteria	MD
Project design guidelines	MD, VA Fairfax County
Environmental review	MD, VA

Example

- Commonwealth of Virginia:
  - The OIPI's VTrans Update: Long-Term Needs, includes identification of external factors including Flooding and Sea Level Rise and Vulnerability Assessments during project screening.
- State of Maryland:
  - MDOT SHA addresses Federal requirements by incorporating vulnerability data into the asset management program.
- Charles County
  - For project prioritization, the level of flooding risk was a key factor.
  - The county and its stakeholders identified six locations as high-priority flood mitigation sites.

Findings Summary

- Resilience planning is occurring at TPB member agencies, but, with different approaches, levels of detail, and implementation levels.
- Inventory did not generate an extensive list of specific facilities or projects that TPB can map at this time to provide a regional view of resiliency vulnerabilities for the transportation system.
- Agencies are eager to coordinate regionally and advance this planning area.
- There are numerous challenges to resiliency planning for transportation.
- Agencies recognize the need for multi-sectoral planning for this topic.

Challenges

Challenges	Jurisdictions
Financial/funding	MD, VA Charles County, Montgomery County
Time	MD, VA Montgomery County
Identifying integration points	MD, VA
Data gaps	MD, VA Montgomery County
Training	VA, WMATA
Coordination amongst varying agencies and business units	MD, VA, City of Alexandria, Loudoun County, Montgomery County
Prioritizing in the face of such a large and complex problem	MD, VA Charles County, Montgomery County Most agencies reflected this challenge in discussions

TPB Resiliency White Paper – Content

- Introduction
- Section 1: Defining Resilience
- Section 2: Federal Requirements
- Section 3: TPB Resilience and Climate Work
- Section 4: Public Opinion and Equity Considerations
- Section 5: Vulnerability Analysis Summary
- Section 6: Strategies for Resilience
- Section 7: MPO Role
- Conclusion

Visit Visualize2045.org for paper access

https://https://visualize2045.org/future-factor/climate-resiliency-and-environmental-health/

Next Steps

- Study Outputs:
  - Content will be summarized in the TPB's Long-Range Transportation Plan, Visualize 2045
  - This information about resiliency strategies and actions that can support future coordination and collaboration
    - Spring/Summer 2022 webinar series

Next Steps

- FY 2023
  - Develop a regional interactive map, using data provided by previous COG studies, that includes GIS layers of major resiliency hazards, to inform future planning and programming.
  - Conduct a TPB Transportation Resiliency Study (Phase II), to expand upon the Phase I study completed in FY 2022, informing future planning and programming.
  - Convene a temporary working group to guide current resiliency planning activities, to identify and engage stakeholders and member agency participants in this new regional planning task.
  - Conduct one or more regional resiliency planning or training, outreach, or professional development forums to strengthen regional awareness.

Stacy M. Cook

Transportation Planner

(202) 962-3335

scook@mwcog.org

mwcog.org/TPB

Metropolitan Washington Council of Governments

777 North Capitol Street NE, Suite 300

Washington, DC 20002

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