

TRANSPORTATION RESILIENCE PLANNING UPDATE

Transportation Resilience Improvement Plan (TRIP) Progress Update

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National Capital Region
Transportation Planning Board

Today's Agenda

- Where we left off – TRIP/PROTECT overview
- Regional TRIP process/timeline
- Risk-based vulnerability assessment – methodology
- Other TRIP components completed to date
- Next steps

TRIP Objectives and Purpose

- Develop a Transportation Resilience Improvement Plan (TRIP) in collaboration with member organizations that will:
 - Contribute to member organizations' understanding of and planning for climate change risk and resilience
 - Identify priorities for resilience investment
 - Better position the region for federal funding and match reduction under the PROTECT program



Damage to Hunter Mill Road in Fairfax County from Tropical Storm Lee (Flicker/VDOT, 2011)

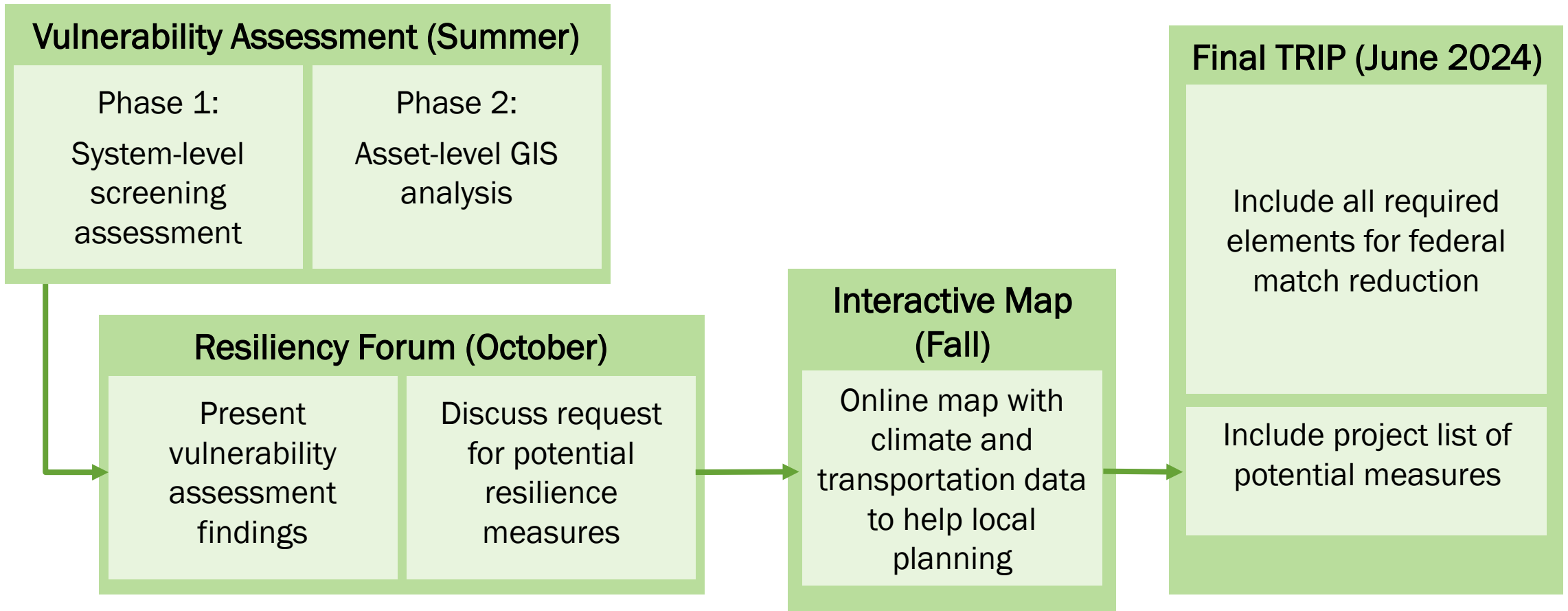


PROTECT Program

- Projects in the TRIP will be eligible for a **7% cost-share reduction** for the Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (**PROTECT**) Discretionary Grant Program
 - Additional **3% reduction** if incorporated into the TPB long-range transportation plan
- The TRIP must include several required elements, including but not limited to:
 - Address immediate and long-range planning activities and investments related to resilience
 - Demonstrate a systemic approach to resilience
 - Include risk-based assessment of vulnerabilities to current and future weather events and natural disasters
- **PROTECT** aims to help make surface transportation more resilient to natural hazards, including climate change, sea level rise, flooding, extreme weather events, and other natural disasters through support of planning activities, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure








Process and Timeline



Phase 1: System-Level Analysis

TABLE 1. SUMMARY SYSTEM-LEVEL ANALYSIS RESULTS FOR MWCOG REGION (INFRASTRUCTURE IMPACTS ON LEFT; SERVICE AND CUSTOMER IMPACTS ON RIGHT)

					
	Extreme Heat	Inland Flooding	Coastal Flooding	Extreme Winter	Extreme Wind
Roads and highways					
Bridges					
Public transit					
Active transport					
Airport					
Maritime					
Stormwater					

Legend:

High sensitivity	Medium sensitivity	Low sensitivity	Impacts to infrastructure	Impacts to customers and service

- Pairs that moved on to Phase 2:**
- **Extreme heat:** Public transit
 - **Inland flooding:** Roads and highways, bridges, public transit, stormwater
 - **Coastal flooding:** Roads and highways, bridges, public transit, stormwater, maritime
 - **Extreme winter:** Public transit, active transportation
 - **Extreme wind:** Roads and highways, public transit

Phase 2: Asset-Level Analysis (Literature Review)

For flagged Phase 1 pairs not well suited to a GIS analysis, we completed a qualitative literature review, with a focus on:

- Historical trends and future conditions for each hazard
- Previous events and impacts for each pair

Literature Review Pairs	
<ul style="list-style-type: none">• Inland flooding:<ul style="list-style-type: none">• Stormwater	<ul style="list-style-type: none">• Extreme winter:<ul style="list-style-type: none">• Public transit• Active transportation
<ul style="list-style-type: none">• Coastal flooding<ul style="list-style-type: none">• Stormwater• Maritime	<ul style="list-style-type: none">• Extreme wind:<ul style="list-style-type: none">• Roads and highways• Public transit



Phase 2: Asset-Level Analysis (GIS Analysis)

- For pairs with available data: Completing an asset-level GIS analysis using asset-specific data, exposure indicators, and criticality indicators

GIS Pairs

- Extreme heat:
 - Public transit
- Inland flooding:
 - Roads and highways
 - Bridges
 - Public transit
- Coastal flooding:
 - Roads and highways
 - Bridges
 - Public transit

Key Climate Datasets

Hazard	Dataset
Temperature	Land Surface Temperature
Inland Flooding	FEMA 100/500 Year Floodplain Maps
Sea Level Rise	NOAA Digital Coast 2 Ft Sea Level Rise

Key Criticality Elements

Criticality Element
MWCOG Equity Emphasis Areas (for all pairs)
Functional Class (for roads and bridges)
Detour Length (for bridges)



Regional Stakeholder Participation

- **Working Group** – quarterly meetings
 - State DOTs
 - Locality representatives
 - Transit agencies
- **Regional Transportation Resilience Forum**
 - Wider audience than working group
 - Regional partners
 - Advocacy groups
 - MPO representatives from outside our region



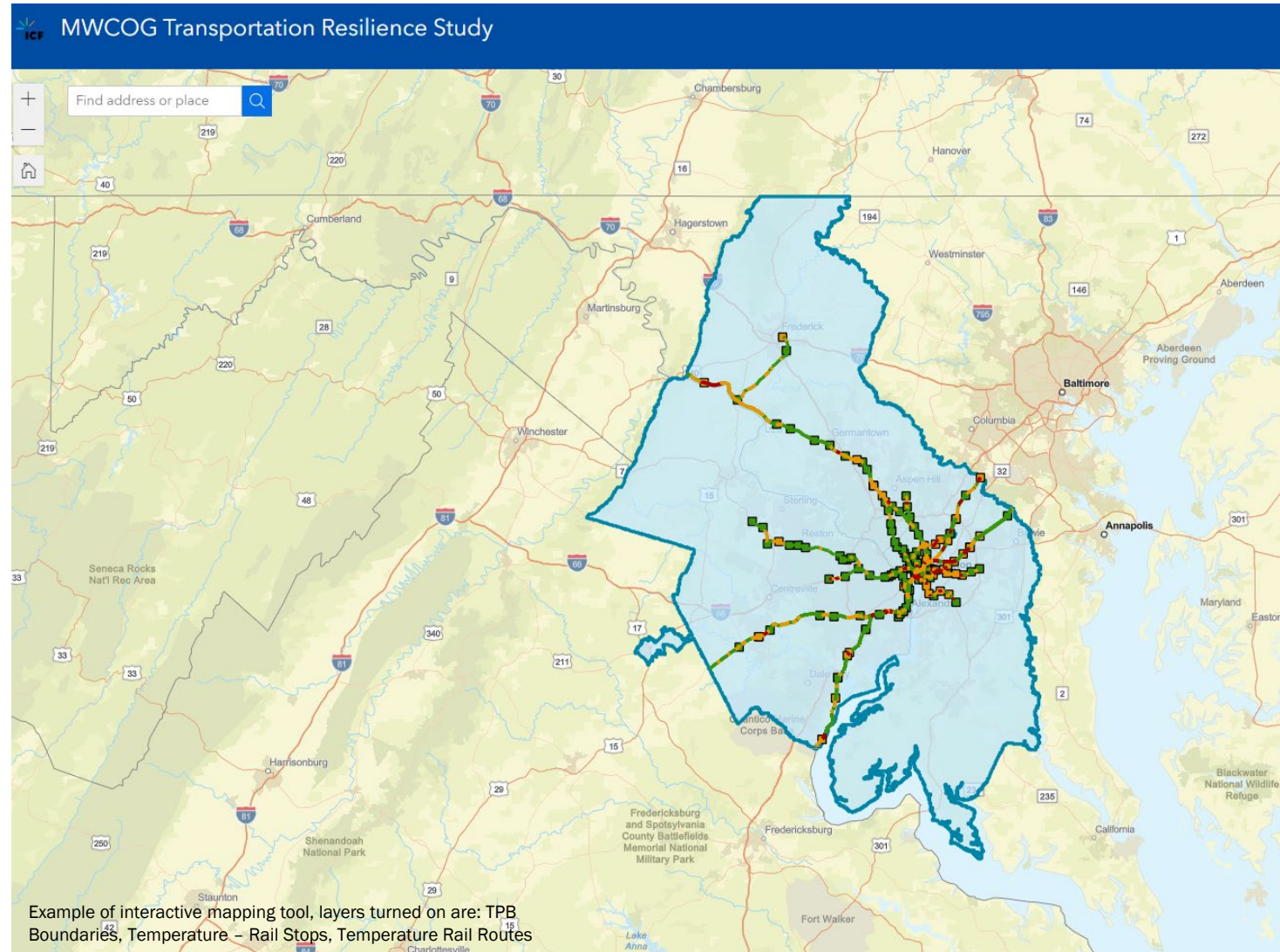
Regional Stakeholder Participation

Exhibit 1: What is a top-of-mind resiliency priority for your agency?



Interactive Mapping Tool

- The results of the Vulnerability Assessment will be integrated into an Interactive Mapping Tool on the TPB ArcGIS website
- The Mapping Tool layers transportation asset, climate, and equity spatial data to identify highly vulnerable assets
- Agencies can use the Mapping Tool to evaluate their assets and services



TRIP Project List

- The TRIP project list will be established using a project request form, which will be shared with this group and beyond to solicit project submissions
- The list of resilience projects should address, but are not limited to, the identified priority vulnerabilities
- The following resilience criteria will be used to help define a good/reasonable resilience project:

Resilience Criteria	Description
Eligible transportation asset	Roads and highways, bridges, public transit infrastructure, active transportation infrastructure, airports, maritime infrastructure, and stormwater infrastructure.
Qualifying project type for PROTECT	<ul style="list-style-type: none"> • Resilience Planning (e.g., resilience planning activities, capacity building) • Resilience Improvements (e.g., improving drainage, elevating bridges) • Community Resilience and Evacuation Routes (e.g., redundant evacuation routes) • At-Risk Coastal Infrastructure – (e.g., relocate coastal highway infrastructure)
Targets high priority risks	The proposed project protects the most vulnerable and critical assets/services identified via the MWCOG Climate Vulnerability Assessment or identified through local studies and assessments, or areas with historic evidence of natural hazard damage.
Reduces climate risks	The proposed project reduces the risks associated with one or more climate hazards: extreme heat, inland flooding, coastal flooding, extreme winter conditions, and extreme wind.





Next Steps

- Collect resilience project submissions – **I need your help here!**
- Finalize project list once submission window closes (end of January 2024)
- Working Group meetings #3 & #4
- Finalized mapping tool
- Draft and final version of plan
- Continued collaboration with member localities, state DOTs, other regions creating their own TRIPs

Route 50 in Prince George's County flooded after heavy rains in 2020. Source: WTOP News.



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Additional slides



Phase 2 GIS Methodology: Extreme Heat



- Extreme heat & public transit
 - **Exposure indicator:** Land surface temperature (70% weighting)
 - **Criticality indicator:** MWCOG Equity Emphasis Areas (30% weighting)

Scoring Scale for Exposure

Indicator Value	Score
Top 1/3 of surface temperatures	3
Middle tier of surface temperatures (1/3-2/3) experienced in the study area	2
Bottom 1/3 of surface temperatures experienced in the study area	1

Scoring Scale for Criticality

Indicator Value	Score
Located in Equity Emphasis Area	3
Not located in Equity Emphasis Area	1



Phase 2 GIS Methodology: Inland Flooding



- Inland flooding & roads and highways, bridges, and public transit
 - **Exposure indicator:** Located in FEMA Floodplain; or Bridge-specific indicators (70% weighting)
 - **Criticality indicator:** MWCOG Equity Emphasis Areas; Functional classification (roads and bridges only) (30% weighting)

Scoring Scale for Exposure

Indicator Value	Score
Located in the 100-year floodplain	3
Located in the 500-year floodplain	2
Located in the 500-year floodplain + differential buffer	1
Not inundated	0

Scoring Scale for Criticality Indicators

Indicator	Indicator Value	Score
MWCOG Equity Emphasis Area	Located in Equity Emphasis Area	3
	Not located in Equity Emphasis Area	1
Functional Classification	Interstate, Other freeways or expressways	3
	Other principal arterial	2
	Major and minor collector, minor arterial local	1



Phase 2 GIS Methodology: Coastal Flooding

- Coastal flooding was analyzed for **roads and highways, bridges, and public transit**
 - Exposure indicator:** Depth of inundation from a 2 feet sea level rise scenario; or Bridge-specific indicators (70% weighting)
 - Criticality indicator:** MWCOG Equity Emphasis Areas; Functional classification (for roads and bridges only) (30% weighting)

Scoring Scale for Exposure

Indicator Value	Score
Inundation of ≥ 1 ft	3
Inundation of $0.5 < x \leq 1$ ft	2
Inundation of $0 < x \leq 0.5$ ft	1
Not inundated	0

Scoring Scale for Criticality Indicators

Indicator	Indicator Value	Score
MWCOG Equity Emphasis Area	Located in Equity Emphasis Area	3
	Not located in Equity Emphasis Area	1
Functional Classification	Interstate, Other freeways or expressways	3
	Other principal arterial	2
	Major and minor collector, minor arterial local	1



Phase 2: Asset-Level Analysis (GIS Analysis)

Asset	High (2.5-3)	Medium (2-2.5)	Low (0-2)
Bridges	Flood: 1	Flood: 39	Flood: 1,281
Bus stops	Temp: 196 SLR: 0 Flood: 173	Temp: 6,468 SLR: 0 Flood: 877	Temp: 15,560 SLR: 0 Flood: 378 (excluding 0s)
Rail Routes	Temp: 36 SLR: 37 Flood: 233	Temp: 716 SLR: 83 Flood: 322	Temp: 1,320 SLR: 4 (excluding 0s) Flood: 258 (excluding 0s)
Rail Stops	Temp: 0 SLR: 0 Flood: 1	Temp: 53 SLR: 0 Flood: 6	Temp: 107 SLR: 0 Flood: 4 (excluding 0s)
Roads	SLR: 123 Flood: 2,844	SLR: 49 Flood: 3,869	SLR: 44 (excluding 0s) Flood: 2,682 (excluding 0s)

