

NATIONAL CAPITAL REGION TRANSPORTATION RESILIENCE IMPROVEMENT PLAN

Plan Overview: TPB Board Notice for Approval

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TPB Technical Committee
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National Capital Region
Transportation Planning Board

Today's Objectives

Overview how the Transportation Resilience Improvement Plan (TRIP) improves regional resilience:

- TRIP Objectives and Components
- Vulnerability Assessment
- Regional Resilience Improvement Projects



TRIP Financial Benefits

FHWA's Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Program provides grants to projects that make surface transportation more resilient to natural hazards. Grants cover planning activities; resilience improvements; community resilience and evacuation routes; and at-risk coastal infrastructure.

TRIP Benefit:

- Projects in the TRIP are eligible for a **7% reduction in non-federal cost share.**
- If the TRIP is incorporated into the TPB National Capital Region Transportation Plan, the projects are **eligible for an additional 3% cost share reduction.**
- Projects included in the TRIP do not have to complete a benefit-cost assessment as part of their grant application.

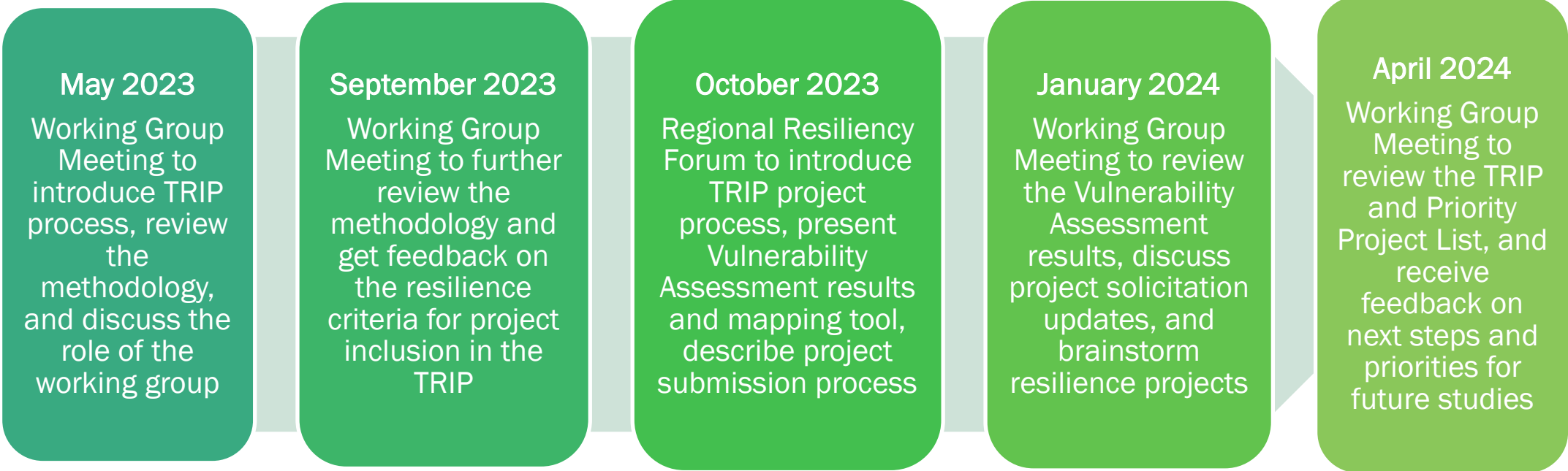


TRIP Objectives

- Build on the strong foundation of resilience work by TPB
- Contribute to member organizations' understanding of and planning for climate change risk and resilience
- Identify regional priorities for resilience investment
- Better position member agencies/jurisdictions for federal funding and match reduction under the PROTECT program



Stakeholder Engagement and Collaboration

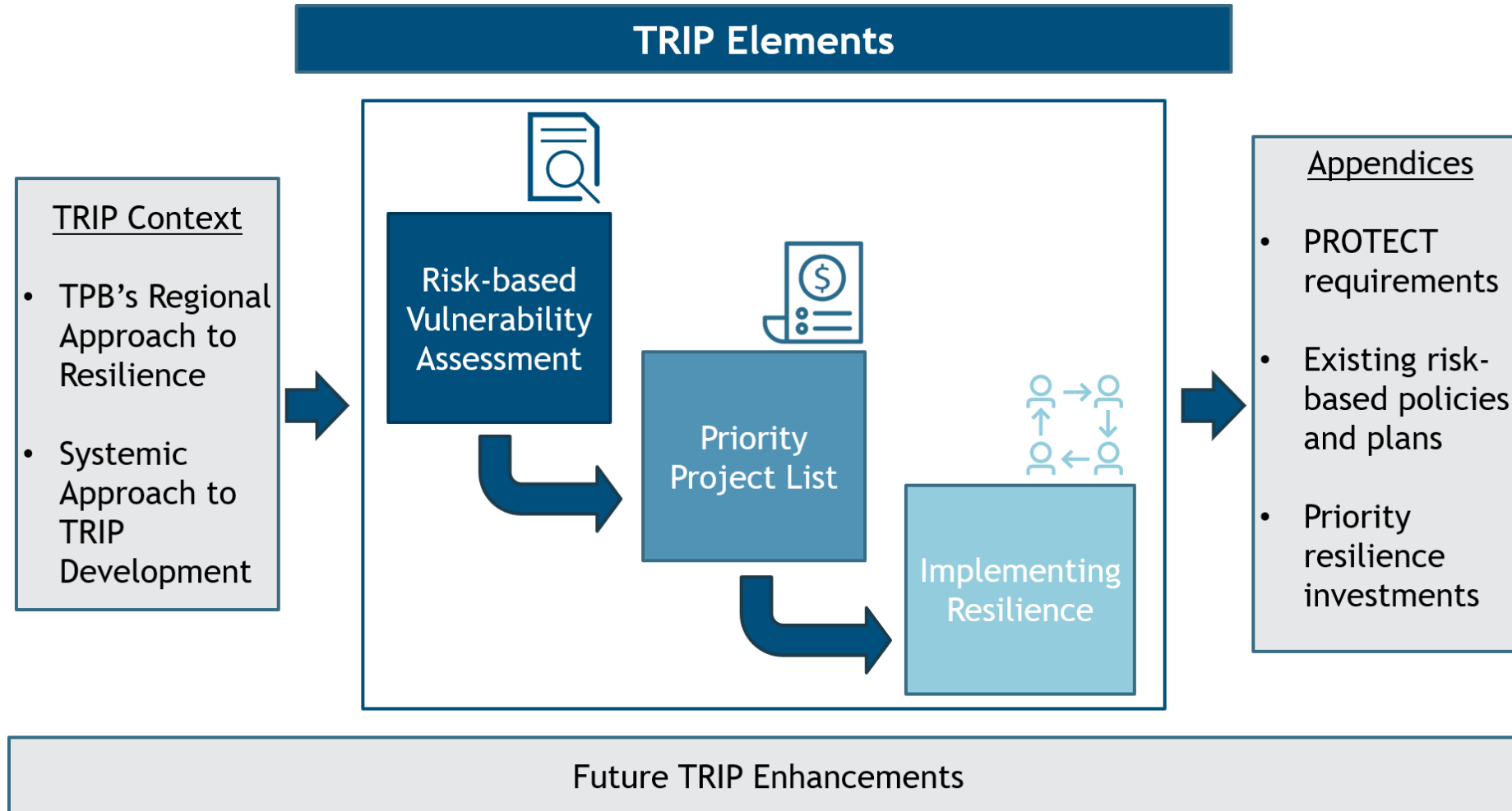


TRIP COMPONENTS



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TRIP Components











Vulnerability Assessment Overview

The assessment

- Identifies climate vulnerabilities of the region’s transportation system and priority areas for resilience investments
- Informs the resilience project list that facilitates the use of PROTECT funding

Asset/Hazard Pairs Analyzed in the Vulnerability Assessment

Hazard	Asset Groups				
	Public transit	Roads and highways	Active transportation	Bridges	Stormwater
Extreme Heat 					
Temporary Flooding (Coastal and Riverine) 					
Permanent Flooding (Sea Level Rise) 					
Extreme Winter 					
Extreme Wind 					

Analysis Method	
	Asset-level, indicator-based vulnerability assessment
	Literature review
	Map layer

Asset-Level Assessment Methodology

Assets receive a score based on exposure to hazard and asset criticality

- **Exposure indicator:** Hazard Exposure (70% weighting)
- **Criticality indicator:** MWCOG Equity Emphasis Areas, Functional Classification, Detour Length (30% weighting)

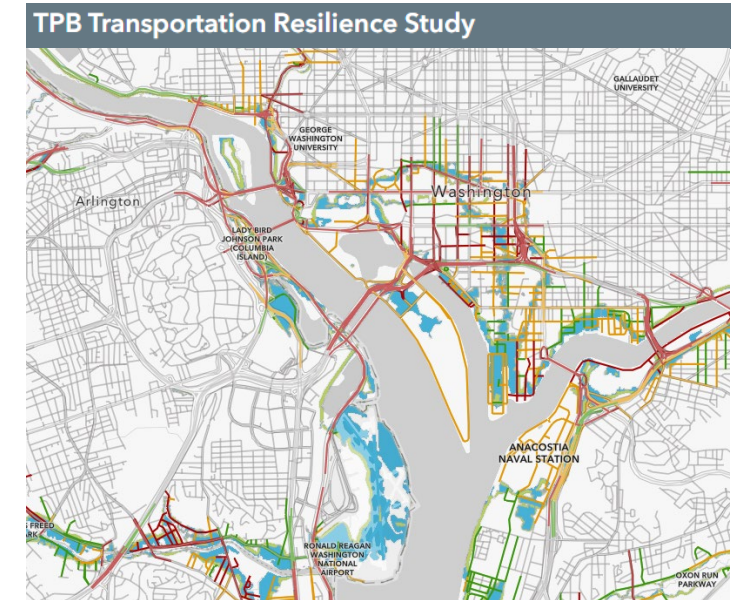
Example scoring system: Extreme Heat and Public Transit

Scoring Scale for Exposure		Scoring Scale for Criticality	
Indicator Value	Score	Indicator Value	Score
Top 1/3 of surface temperatures	3	Located in Equity Emphasis Area	3
Middle tier of surface temperatures (1/3-2/3) experienced in the study area	2	Not located in Equity Emphasis Area	1
Bottom 1/3 of surface temperatures experienced in the study area	1		



Asset-Level Assessment Results




- Greatest number of assets are highly vulnerable to **temporary flooding (coastal and riverine)**, followed by **extreme heat** and **permanent flooding (sea level rise)**.
- **Equity emphasis areas (EEAs)** contributed **15-30%** of the overall vulnerability score. For several asset categories, all highly vulnerable assets were in an EEA.
- Several assets are highly vulnerable to multiple hazards:
 - 50 miles of road
 - 20 miles of rail line
 - 6 bus stops
- Rates of vulnerability to each climate hazard vary by geography.
 - The online mapping tool helps determine vulnerabilities of specific areas.



Mapping tool example with visualization of roads, temporary flooding hazards (coastal and riverine), and road vulnerability to temporary flooding. Source: [Mapping tool](#).

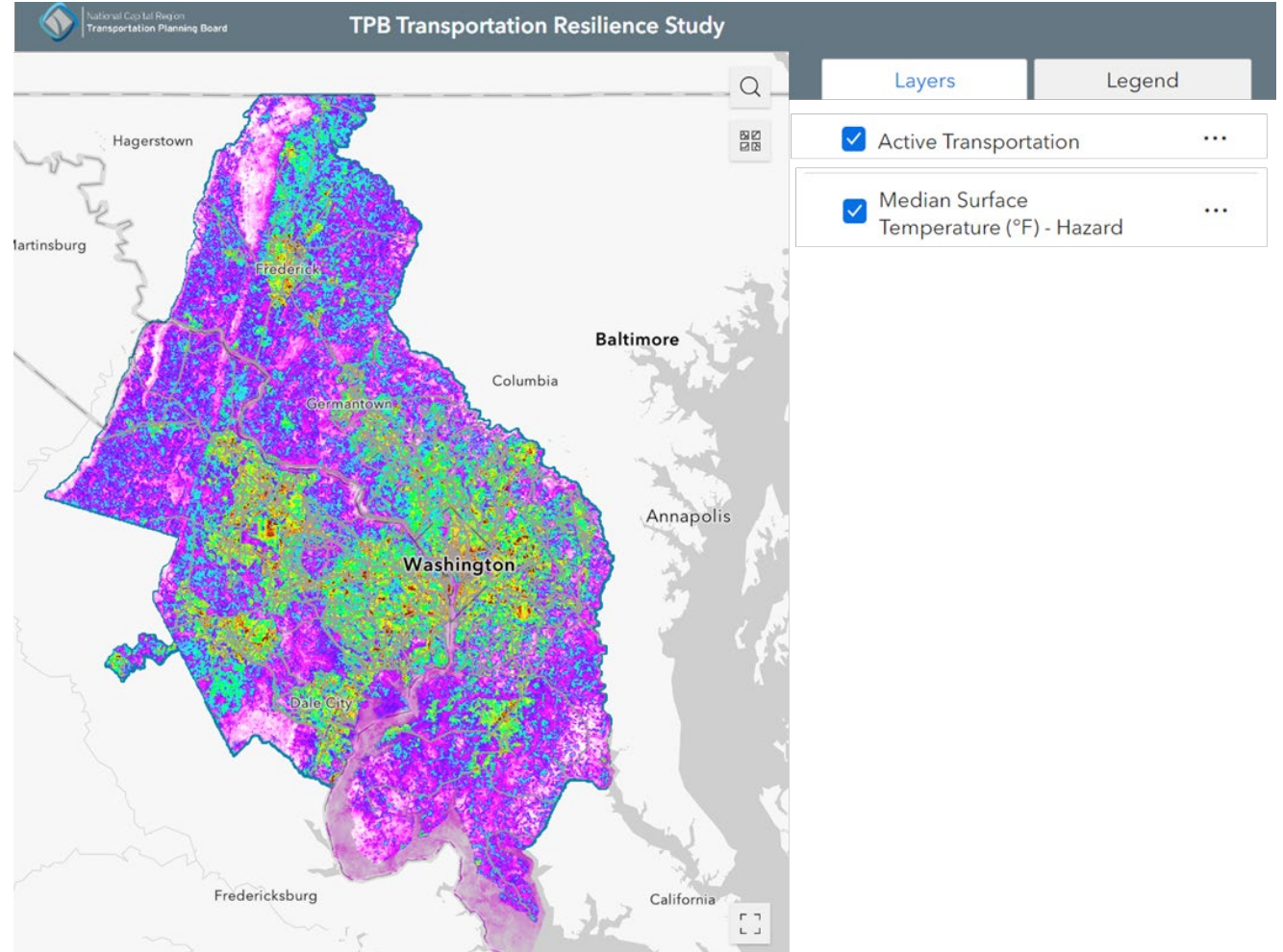
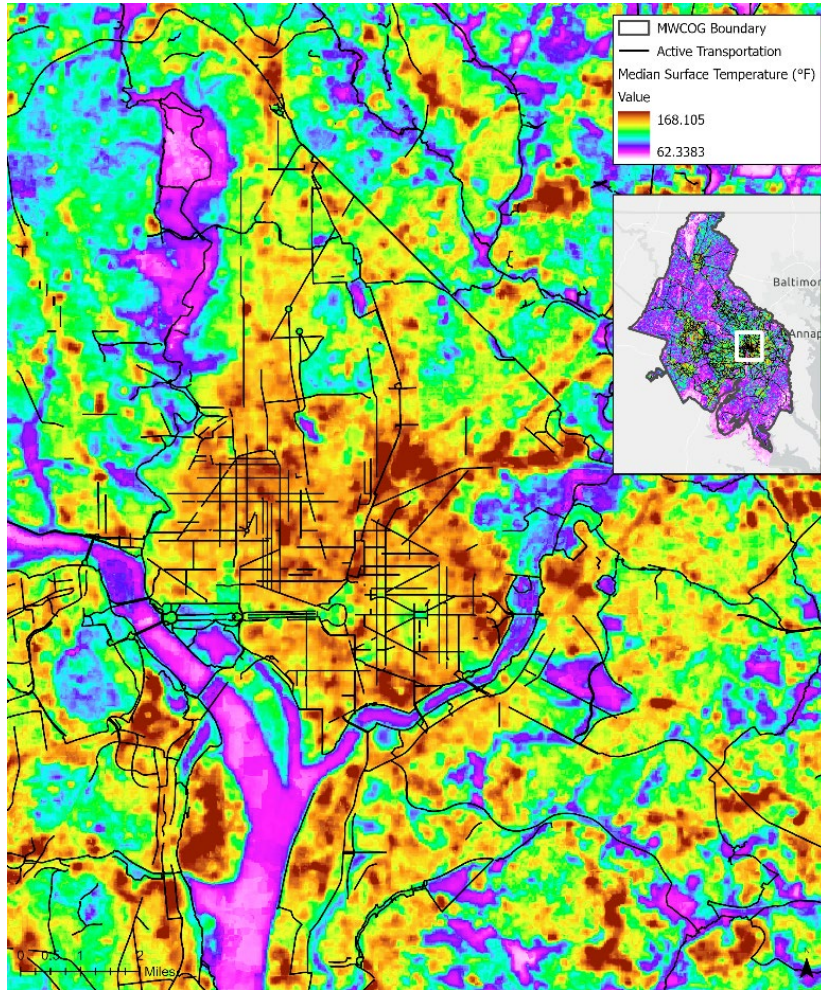


Asset-Level Assessment Results






Asset Type	 Extreme Heat				 Temporary Flooding (Coastal and Riverine)				 Permanent Flooding (Sea Level Rise)			
	High	Medium	Low	Not Exposed	High	Medium	Low	Not Exposed	High	Medium	Low	Not Exposed
Roads/Highways (miles)	Not Assessed				1,097 (5%)	1318 (6%)	733 (3%)	19,754 (86%)	50 (0.2%)	17 (0.1%)	14 (0.1%)	22,820 (99.6%)
Bridge	Not Assessed				1 (0%)	39 (3%)	1,281 (97%)	0 (0%)	* Bridges were evaluated for flood vulnerability generally based on condition data rather than coastal and riverine vs. sea level rise			
Bus Stops	196 (3%)	6,467 (89%)	583 (8%)	0 (0%)	173 (2%)	336 (5%)	377 (5%)	6,360 (88%)	0 (0%)	0 (0%)	0 (0%)	7,246 (100%)
Rail Stops	0 (0%)	53 (33%)	107 (67%)	0 (0%)	1 (1%)	6 (4%)	4 (3%)	149 (93%)	0 (0%)	0 (0%)	0 (0%)	160 (100%)
Rail Line (miles)	18 (2%)	352 (35%)	646 (64%)	0 (0%)	115 (11%)	154 (15%)	128 (13%)	619 (61%)	19 (1.9%)	42 (4.1%)	2 (0.2%)	954 (93.8%)



Map Layer Results



Literature Review Results Overview

	Hazard	Historical Trends	Future Conditions	Example Impacts to Transportation Assets
	Extreme Heat	Average temperatures increasing	Number of extreme heat days increasing	Extreme heat can cause changes to physical transportation infrastructure and decrease the usability of transportation options.
	Temporary Flooding (Coastal and Riverine)	Annual precipitation increasing	Extreme precipitation more frequent and intense	More frequent and intense rainfall events could significantly affect stormwater infrastructure in the region.
	Permanent Flooding (Sea Level Rise)	Increasing	Increasing	Rising sea level and more intense coastal storms could significantly affect stormwater infrastructure in the COG region.
	Extreme Winter	Decreasing	Average winter conditions decreasing; storm intensity increasing	Above ground rail tracks can ice over during severe storms, and snow and ice conditions can make rail yards impassable.
	Extreme Wind	No clear trend	No clear trend	Extreme wind can create and move debris and bring down trees and power lines, resulting in service delays and detours, power outages, and in some cases, physical infrastructure damage.



PROJECT SUBMISSIONS



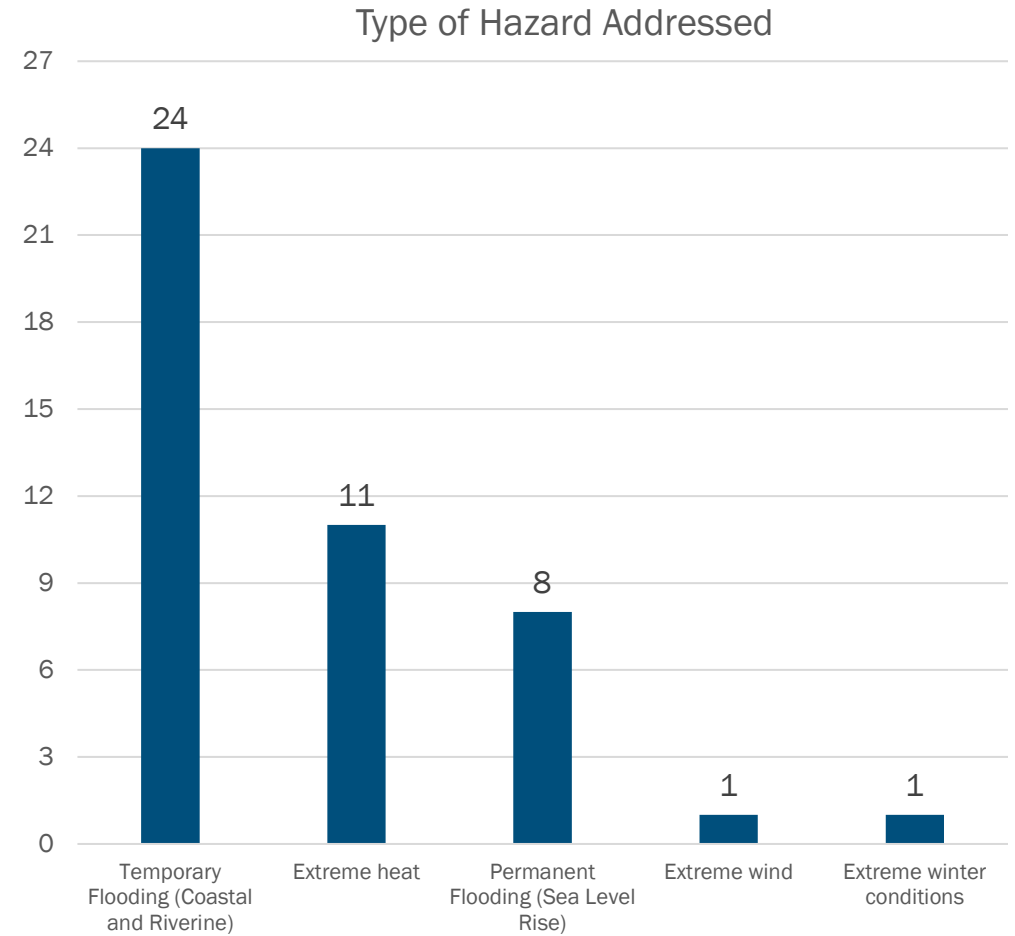
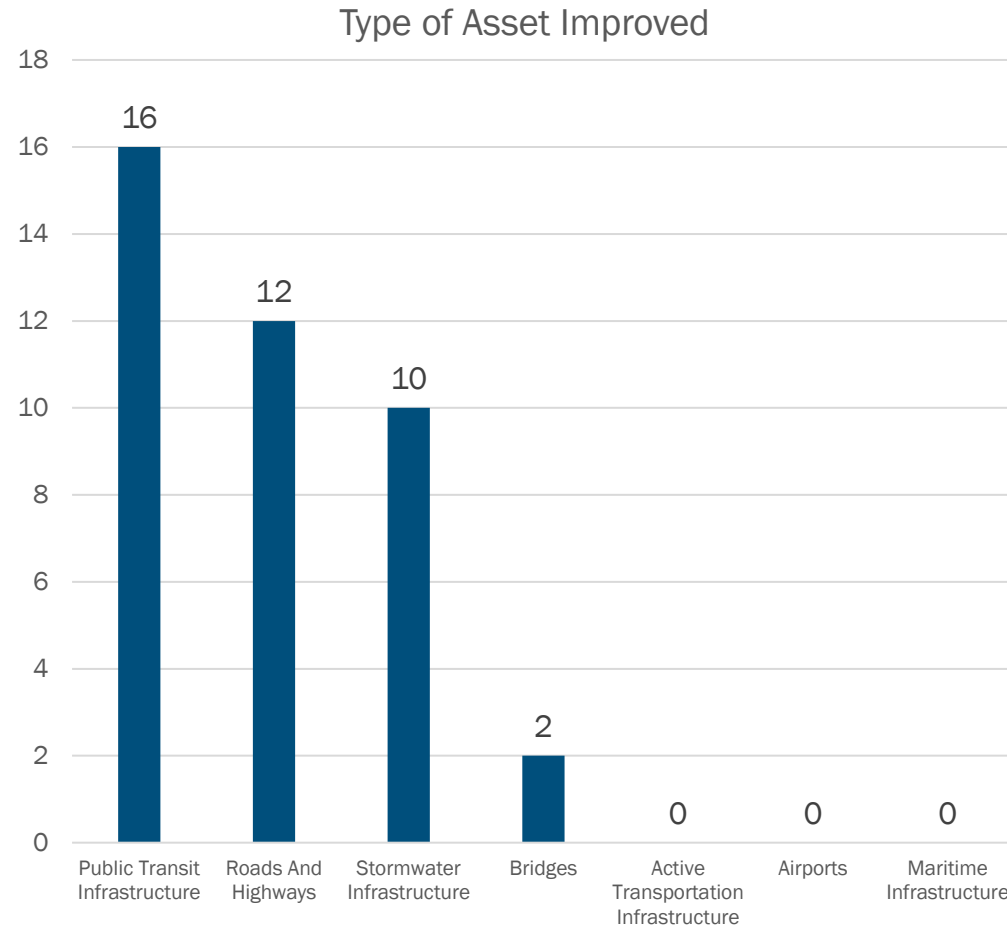
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Priority Resilience Improvement Projects





- 34 projects from 8 jurisdictions submitted
 - 14 resilience plans
 - 20 resilience improvement projects
- Final project list included in the TRIP with submitting agencies providing information such as:
 - Project description and location
 - Climate hazards impacting the asset and resilience measures to be completed
 - Cost and timeline
 - Whether the project supports an EEA



Priority Resilience Improvement Projects



Resilience Improvement Projects - Examples

Lead Agency	Project Title	Location	Description	Hazards
DDOT (supported by the DOEE)	Nannie Helen Burroughs Avenue DC-295 Underpass	Nannie Helen Burroughs Avenue NE underpass beneath DC-295 in the District of Columbia.	The Nannie Helen Burroughs Avenue experiences frequent flash flooding due to the impermeable surfaces in the nearby Watts Branch watershed. Flooding happens quickly, leaving disadvantaged neighborhoods with vulnerable populations between DC-295 and the Anacostia River isolated with very little warning. The proposed Engineering Feasibility Study would identify methods to improve the flood resilience of transportation infrastructure while creating additional greenspaces between the Anacostia River and Kenilworth Park and the Nannie Helen Burroughs Avenue Commercial Corridor.	
Lead Agency	Project Title	Location	Description	Hazards
Virginia Railway Express	VRE Stations Heat Vulnerability and Mitigation Strategies Analysis	Station assets located on VRE's Manassas and Fredericksburg Lines, as well as on the joint line between Alexandria and Union Station.	Increasing temperatures have the potential to cause significant passenger discomfort to VRE riders. This project will identify the appropriate mitigation strategies to address the adverse effects of heat in five VRE station facilities. The project will detail potential effects on passengers and facilities, and will propose, at a planning level, conceptual projects that could mitigate or eliminate the adverse condition(s) through the horizon planning year.	
Lead Agency	Project Title	Location	Description	Hazards
Charles County Government (supported by the Resilience Authority of Charles County)	Cobb Island (MD-254) - Bridge Approach	MD-254 (Cobb Island Road) between MD-257 and the Cobb Island Bridge.	While the Cobb Island Bridge was recently replaced in 2020, the bridge approach and surrounding roadways still experience tidal flooding and inundation from sea level rise. There is ongoing planning for this project, and possible options include a range of possible nature-based and innovative interventions to address flood vulnerability from multiple hazards.	 

Resilience Improvement Projects

TPB will continue to solicit resilience improvement projects from member agencies for inclusion in a possible future TRIP.

Each year, TPB will:

- Call for project submission through TRIP project request form.
- Update of projects included in the Resilience Investment Plan and post the updated list on TPB website.



Future TRIP Enhancements

Potential future improvements to the TRIP include:

- **Additional flooding impact analysis**
Consider urban flooding, pluvial flooding, floodplain change due to climate change, combined effects of sea level rise and coastal and riverine flooding; ground-truth flooding results.
- **Increased consideration of equity and potential impacts to critical services**
Conduct user-based analysis, critical service access analysis.
- **Economic impacts and system-level analysis**
Identify monetary risk associated with hazard; consider how alternative transportation options or a lack thereof impact vulnerability.
- **Mapping regional closures due to natural hazards**
Analyze Regional Integrated Transportation Information System data alongside hazard data.

Thank You!



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