

Resiliency Enhancements HRTPO Project Prioritization

RESILIENCY ENHANCEMENTS APPROVED JULY 2025

FOR QUESTIONS, CONTACT:
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HRTPO LRTP Approach



EXPLORATORY SCENARIO PLANNING

- Prepare for future uncertainty
- Candidate projects evaluated across all scenarios to identify most robust projects



PROJECT PRIORITIZATION TOOL

- Objective, data driven methodology
- Performance-based approach
- Used to select projects for LRTP and TIP



RESILIENCY AND VULNERABILITY PLANNING

- Evaluate potential impacts of multiple Sea Level Rise and storm surge flooding scenarios



EQUITY AND ACCESSIBILITY

- Enhance Equity and Accessibility measures

2050 LRTP Scenario Narratives



Greater Urban Growth



Greater Suburban Growth



Greater Inland/Westward Growth



WHAT THESE HELP US TEST

Test more urban and multimodal travel patterns.

Test more overall regional travel.

Test major impacts from climate change and alternate commuting patterns.

2050 LRTP Scenario Narratives



Greater Urban Growth



Greater Suburban Growth



Greater Inland/ Westward Growth



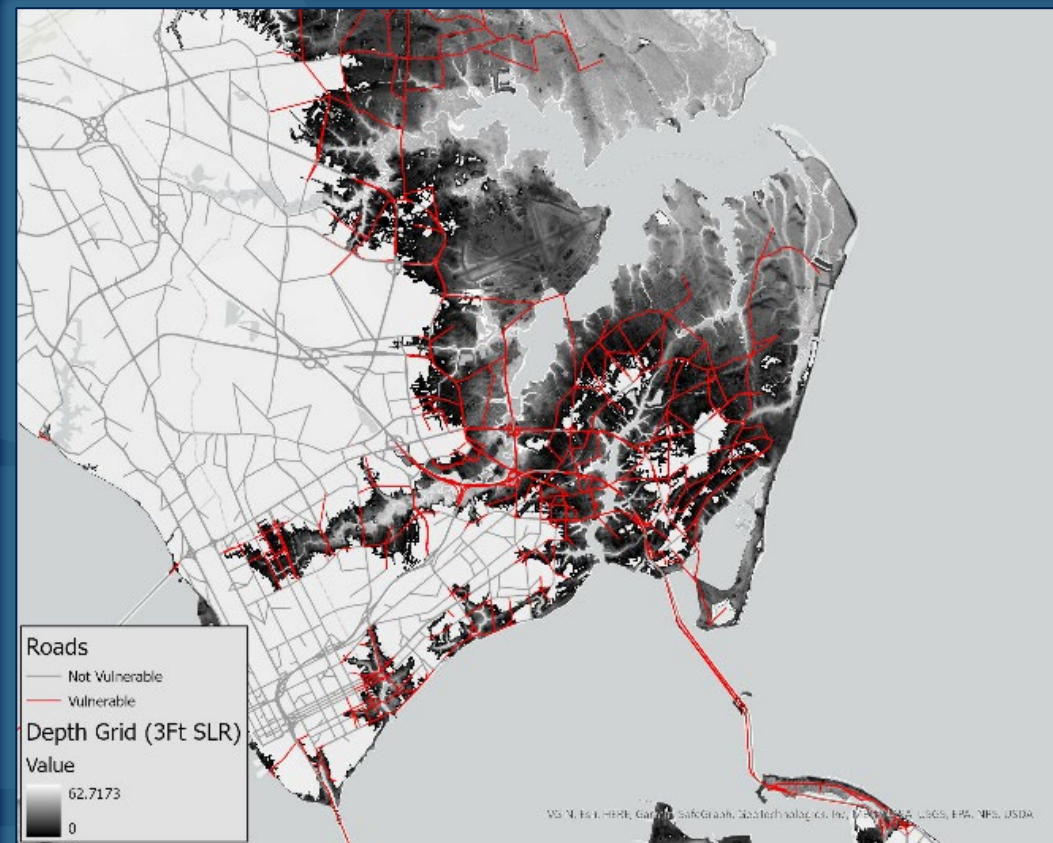
SEA LEVEL RISE/STORM SURGE ASSUMPTIONS

3-feet Sea Level Rise
10-year Storm Surge

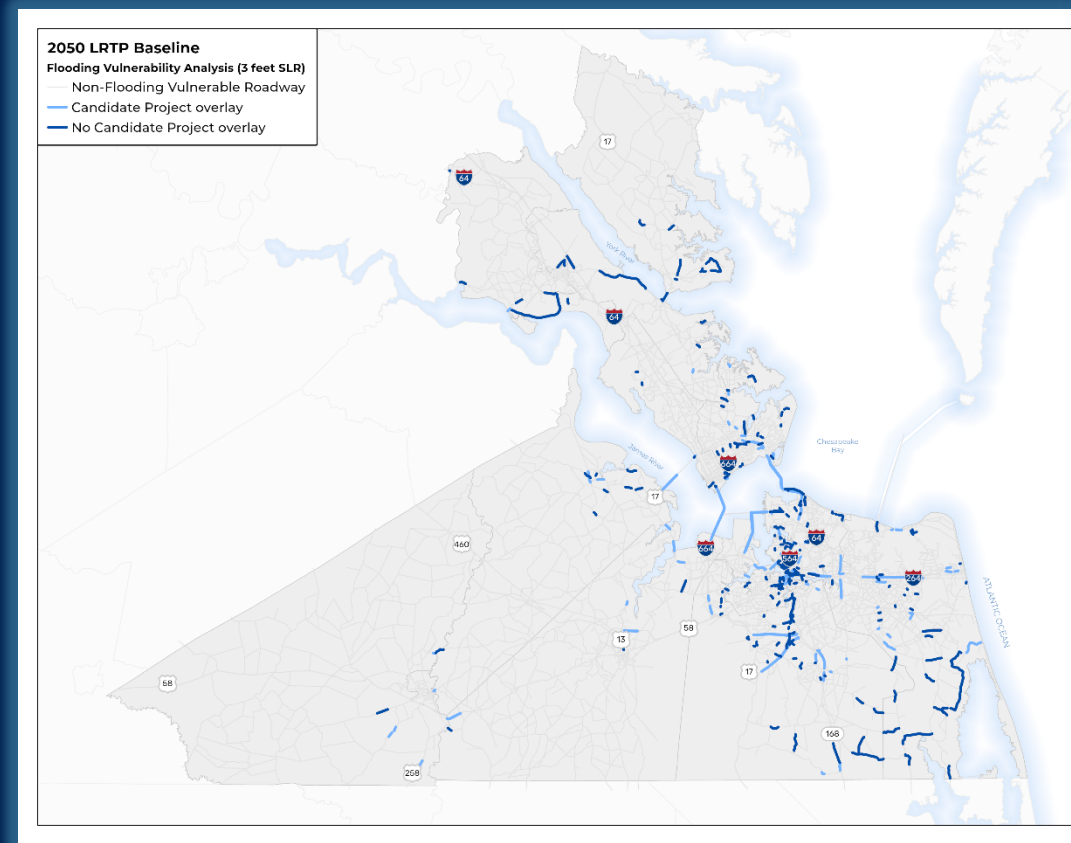
3-feet Sea Level Rise
100-year Storm Surge

4.5-feet Sea Level Rise
100-year Storm Surge

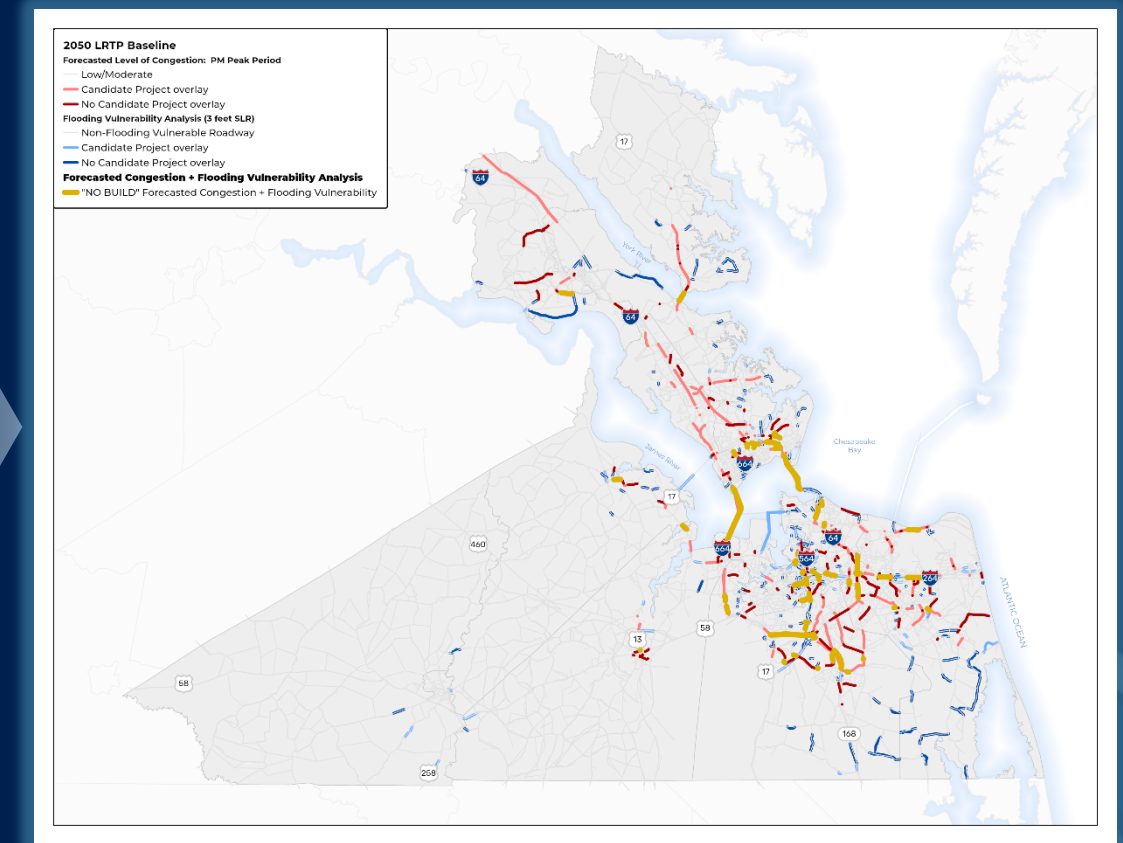
Identifying Network Vulnerabilities



Where are there vulnerabilities?



How does this line up with candidate projects already identified?



Which vulnerable segments are heavily traveled?

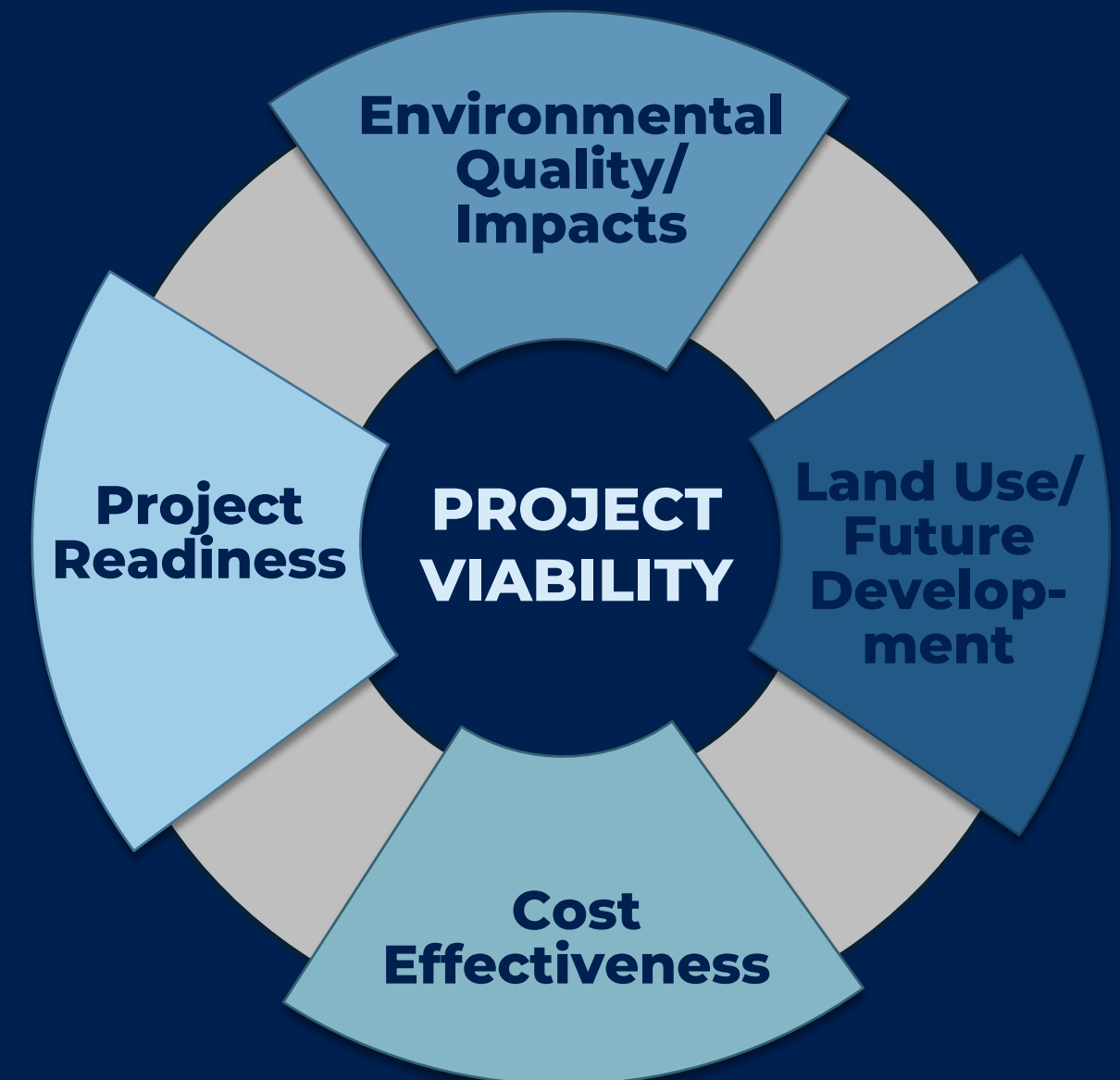
HRTPO Project Prioritization Tool



Ability to solve a transportation problem



Potential for economic gain



Project readiness and compatibility

Criticality Measures

Examples of Regional Significance (Criticality) Prioritization Measures:

- Usage (Volumes/Ridership)
- Degree of Regional Impact
- Regional Travel Time
- Travel Time Reliability
- Diversion Impacts
- Impact to Freight Movement
- Incident Management/Evacuation Routes
- Defense, Port, Tourism Access
- Labor Market Access (Access to High Density Employment/Major Employment Centers)
- Access to Areas with High Unemployment and Low-Income Areas

Initial Resiliency Measures

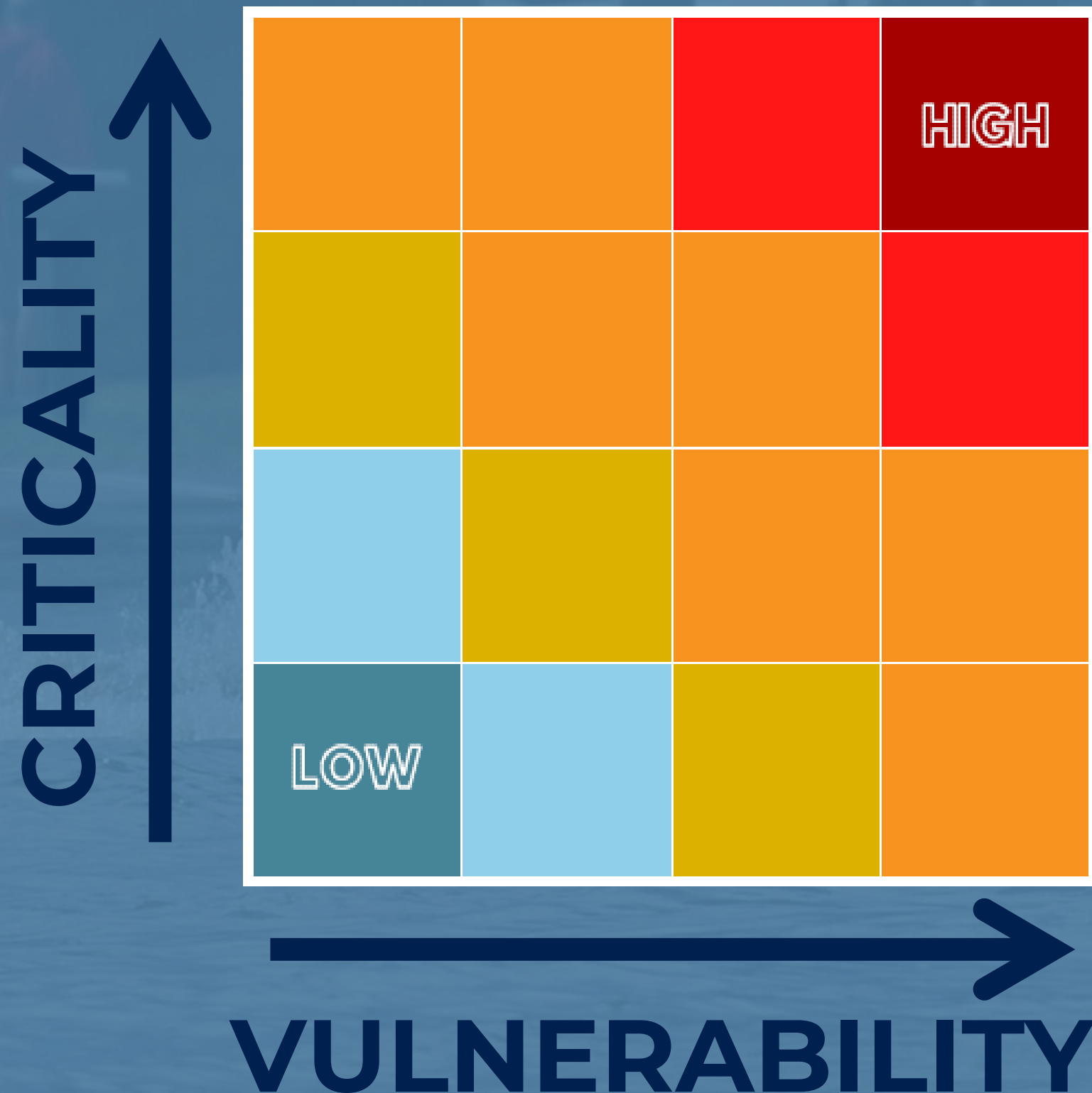
Vulnerability to sea level rise/storm surge/recurrent flooding. (High, Medium, Low)

If Vulnerable, resiliency design features included. (Yes/No)

Level of access provided to critical areas or facilities that projected to be disrupted by flooding. (High, Medium, Low)

(e.g., hospitals, Fire-EMS, emergency shelters, dense employment area, and single entry/exit point for flood prone areas or neighborhoods)

Why Enhance Resiliency and Criticality Scoring



Improving how we identify the relationship between **CRITICALITY** and **VULNERABILITY** and **ACCESSIBILITY**

Why Enhance Resiliency and Criticality Scoring

RESILIENCY

- **Encourage robust, future-ready transportation infrastructure –
PREPARE FOR FUTURE
UNCERTAINTY**
- **Strengthen our response to system vulnerabilities.**
- **Reflect how well projects maintain access, mobility, and investment value during disruptive events.**

Resiliency measures ensure LRTP Prioritization Process reflects regional vulnerability to hazards and rewards projects that maintain essential access and mobility.

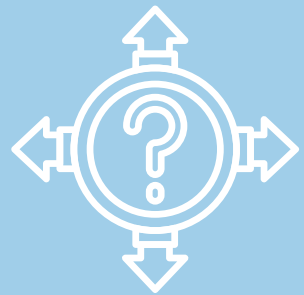
Why Enhance Resiliency and Criticality Scoring

CRITICALITY

- **Highlight the projects that matter most to the daily and regional function of the system.**
- **Incorporate objective factors like usage, economic role, emergency relevance, and strategic access.**
- **Complement resilience by ensuring critical corridors receive due attention even outside hazard contexts.**
- **Promote efficient investment in the “backbone” of the transportation network.**

Complements
resiliency by
identifying system-
critical infrastructure
in all conditions, not
just hazard events.

Challenges in Analyzing Future Hazard Resiliency Investments



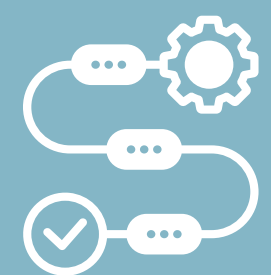
**FUTURE HAZARD
CONDITIONS ARE
HIGHLY
UNCERTAIN.**



**OFTEN A RANGE OF
RESILIENCE
INVESTMENT
OPTIONS THAT CAN
MITIGATE EFFECTS.**



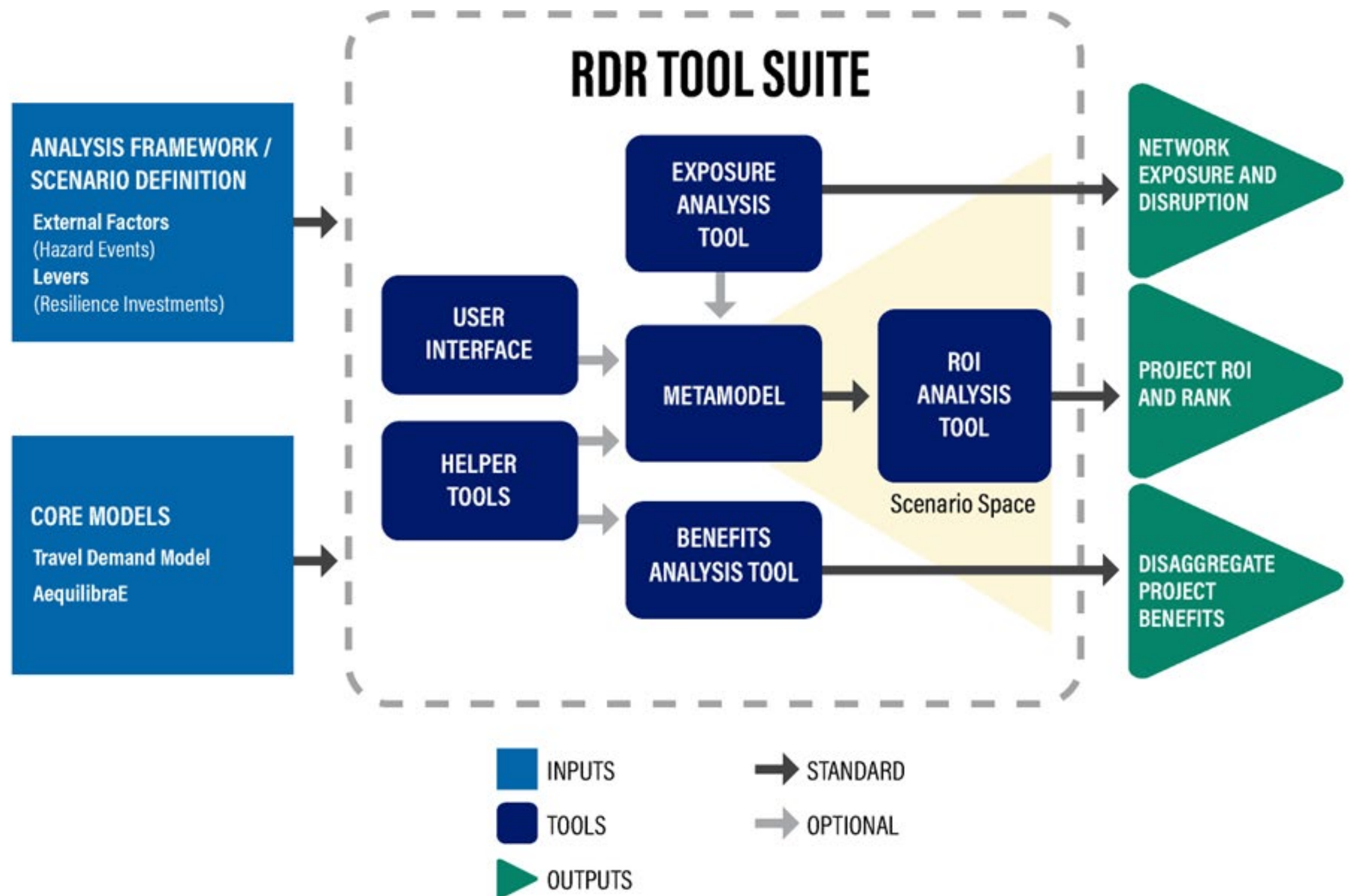
**LEADS TO
THOUSANDS OF
SCENARIOS TO
TEST.**



**EXISTING TRAVEL
MODELS ARE TOO
SLOW TO ANALYZE
MANY SCENARIOS AND
CANNOT COMBINE
PERFORMANCE
BENEFITS ACROSS
HAZARD CONDITIONS.**

Solution: US DOT Volpe RDR Tool

A robust tool suite to help transportation practitioners evaluate resilience return on investment (ROI) for long-range planning across a range of uncertain scenarios.



RDR Tool – Notable Metrics

Trip Loss and Critical Access

Evaluates how well projects maintain mobility to critical services and vulnerable communities during disruptive events.

Return on Investment (ROI)

Looks at how much benefit a project offers per dollar spent, under a range of plausible futures (delay and repair costs).

“Regret” Across Scenarios

How much might the region regret not investing in the project under future scenarios.

**Straight forward to incorporate in
Prioritization Tool**

Key Proposed Metrics

- **Minimize Trip Loss** During Disruptive Events
- **Maintain Access to Critical Facilities/Areas** During Hazard Events
- **Maintains Access to Transportation-Vulnerable Communities** During Disruptive Events
- **Return on Investment** across scenarios (based off delay and repair cost savings)
- **Regret-based scoring** across future scenarios (regret if project is not implemented)
- Infrastructure **Criticality**

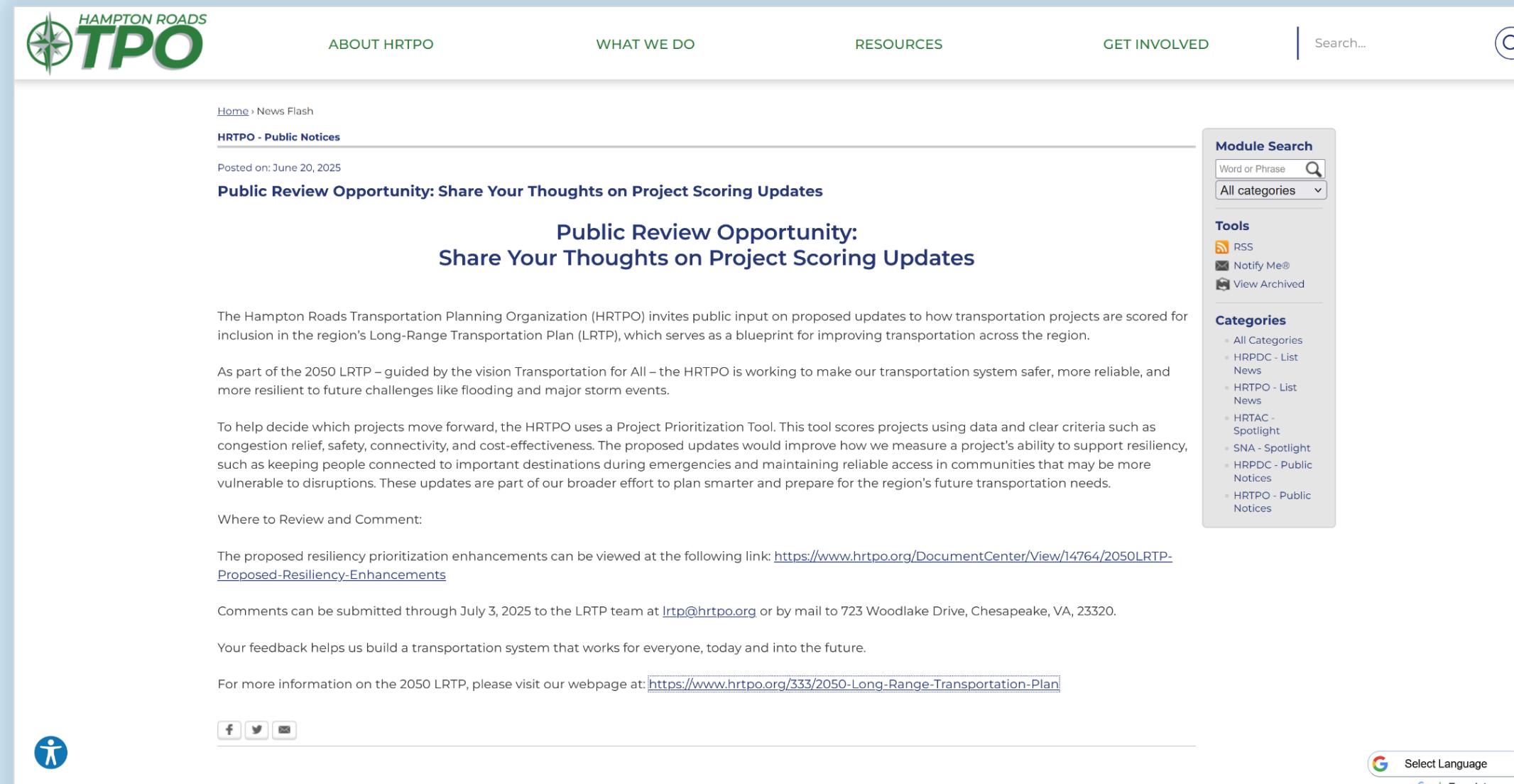
PROPOSED RESILIENCY PRIORITIZATION ENHANCEMENTS					
Scoring Location		Draft Measure Name	Draft Scoring Language	Draft Scoring Tiers	Source
Project Utility	System Continuity / Resiliency - new measure	Minimize Trip-Loss During Disruptive Events	Project minimizes loss of trip-making under disruptive conditions (indicates project's importance for maintaining mobility/accessibility during disruptions).	High: ≥90% trips retained Medium: 75–89% Low: 50–74% No Points: <50% retained	Change in Trips (RDR Benefits Analysis Tool)
Project Utility	System Connectivity / Resiliency - refine current level of access to critical areas/facilities	Maintains Access to Critical Areas/Facilities During Disruptive Events	Project preserves access to essential services or facilities during hazard conditions.	High, Medium, Low, No Access Multiplier for retained access during disruptive events	Critical Areas/Facilities data (GIS overlay) + Trip Retention (RDR)
Economic Vitality	Modify current Economic Distress Factors, adding new submeasure	Maintains Access to Transportation-Vulnerable Communities During Disruptive Events	Project preserves access for vulnerable communities during disruptive events (supports equitable mobility and recovery).	High: ≥75% of distressed TAZs retain ≥90% trips Medium: 50–74% Low: 25–49% No Points: <25%	TAZ-Level Metrics (RDR Benefits Tool + Transportation-Vulnerable Communities data)
Project Viability	Modify Cost Effectiveness measure, adding new submeasure	Return on Investment (ROI)	Return on Investment (ROI) across scenarios (includes delay and repair costs savings).	High: ROI ≥ 2.0 Medium: 1.5–1.99 Low: 1.0–1.49 No Points: <1.0	ROI Analysis Tool (RDR: NPV / Cost)
Project Viability	New category: System Importance - new measure	Regret Score	Reflects the potential for regret if a project is not implemented under future hazard conditions. Higher scores indicate greater importance under robust decision-making scenarios.	High: Top 25% of scores Medium: Middle 50% of scores Low: Bottom 25% of scores No Points: Score=0	ROI Analysis Tool (RDR Regret Ranking)
Project Viability	New category: System Importance - new measure	Infrastructure Criticality	Importance of project to maintaining critical regional functions.	High Criticality Medium Criticality Low Criticality No Points	See Criticality matrix (informed by other prioritization measures)

PROPOSED CRITICALITY MEASURE: ROADWAYS			
Measure Name	High Criticality (2 points)	Medium Criticality (1 point)	Low Criticality (0 points)
Future Usage (Volumes/Ridership) (double weight)	Top 25% of volumes/ridership (4 points)	25% to 75% volumes/ridership (2 points)	Bottom 25% volumes/ridership
Travel Time Reliability	Very High, High	Medium High, Medium, Medium Low	Low
Degree of Regional Impact	Regional	Multi-jurisdictional	Local
Incident Management/Evacuation Routes	Designated evacuation or incident mgmt route (or both evac and IM route)	Secondary evacuation support (or either evac or IM route)	No evacuation/incident management function
Labor Market Access	High	Medium	Low
Military Access	High	Medium	Low
STRAHNET	Yes	Military Roads	No
Port/Freight Access (Truck Zones)	High	Medium	Low
Impact to Freight Movement (Improved Delay for Port Facilities)	Very High, High (score >3)	Medium High, Medium (score 2 to 3)	Low, Very Low (score <2)
Tourism Access	High	Medium	Low
Access to High Unemployment/ Low-Income Areas	>7	7 to 3	<3
Functional Class	Interstate/Freeway/ Expressway/ Principal Arterial	Minor Arterial/Major Collector (Secondary)	Minor Collector/Local

ROADWAY CRITICALITY	
18-28 points	High Criticality
9-17 points	Medium Criticality
0-8 points	Low Criticality

Review Opportunities

- **L RTP Subcommittee review:** May 7 – 23, 2025
 - *No additional comments received*
- **Public Review:** June 20 – July 3, 2025
 - *No comments received*



Summary of Enhancements

- Uses **data-driven tools** and **aligns with LRTP goals**
- Can **incorporate in existing scoring framework**
- **Balanced:** every major scoring category will reflect resilience:
 - *Utility:* Can the system function during disruptive events?
 - *Vitality:* Can the project support economic resilience and reduce regional vulnerability?
 - *Viability:* Is the project a smart, robust investment under future uncertainty?

Approval Actions



- TTAC recommended HRTPO Board approval of proposed resiliency enhancements at its July 3, 2025 meeting
- HRTPO Board approved the Project Prioritization resiliency enhancements at its July 17, 2025 meeting

THANK YOU!

2050
HAMPTON ROADS
LONG-RANGE TRANSPORTATION PLAN

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