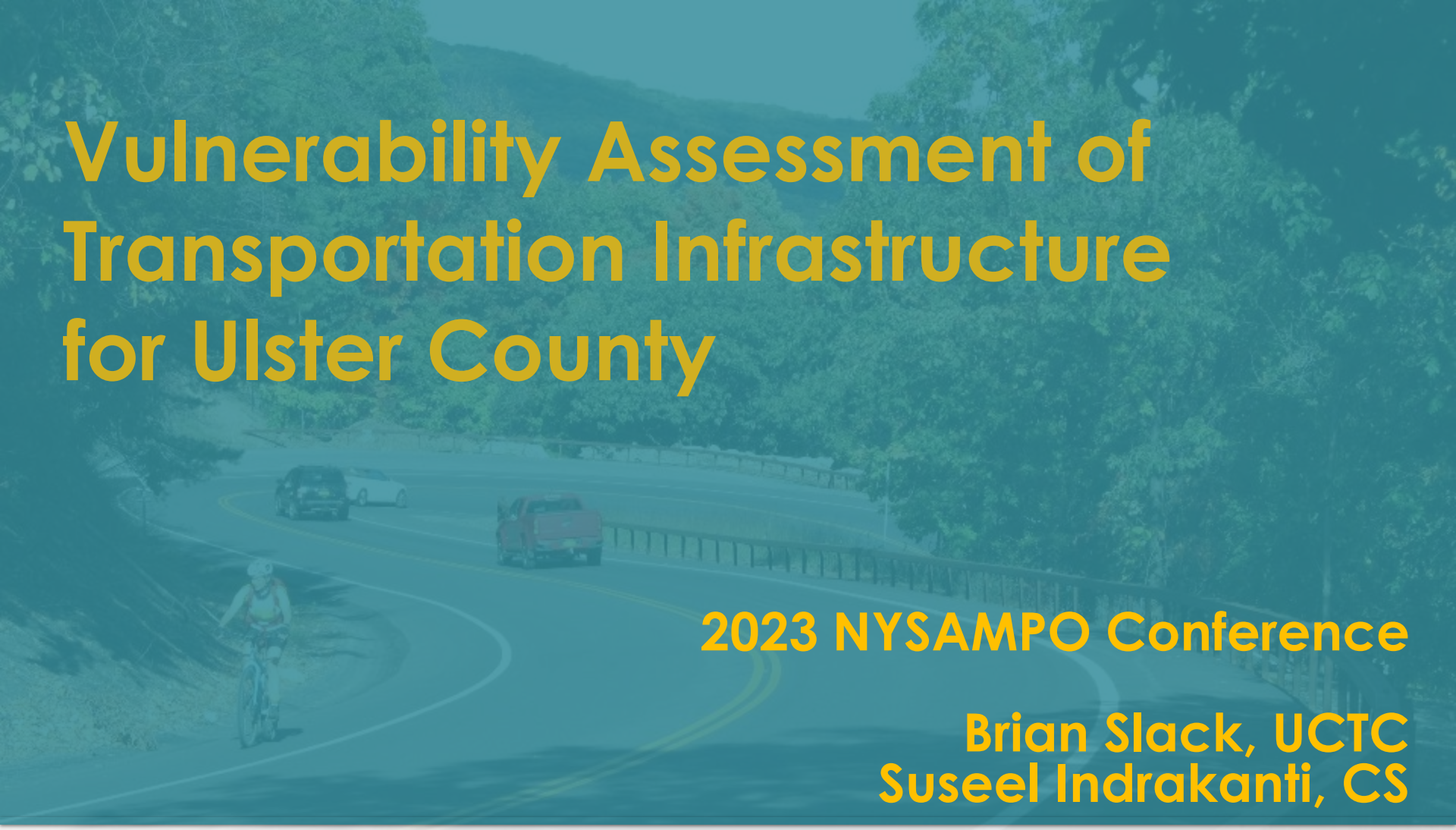
Vulnerability Assessment of Transportation Infrastructure for Ulster County



2023 NYSAMPO Conference

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UCTC
ULSTER COUNTY TRANSPORTATION COUNCIL

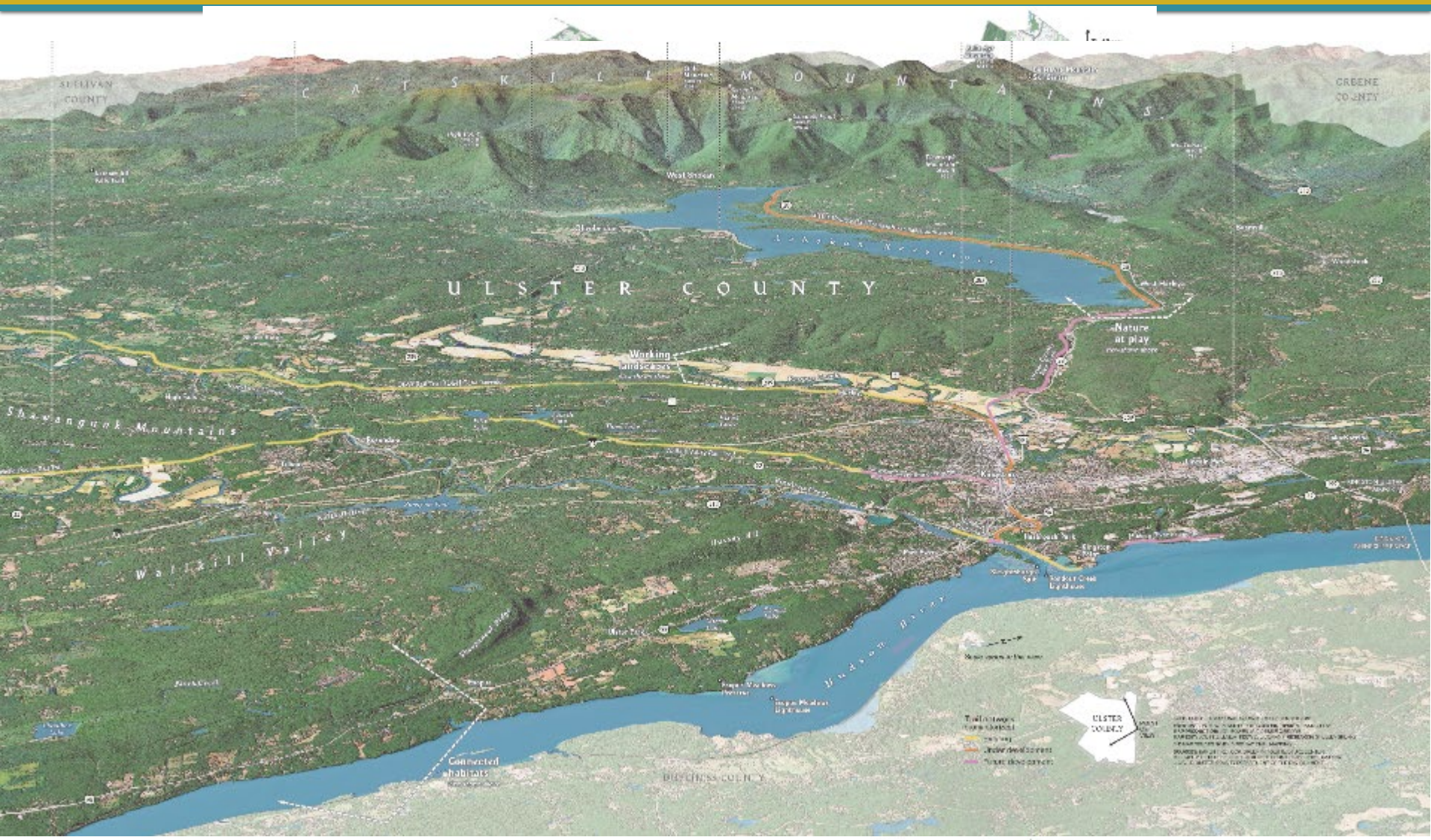
CAMBRIDGE SYSTEMATICS
Think Forward

GZA

Overview

- Project Background
- Vulnerability Assessment Framework
- Lessons Learned

Background

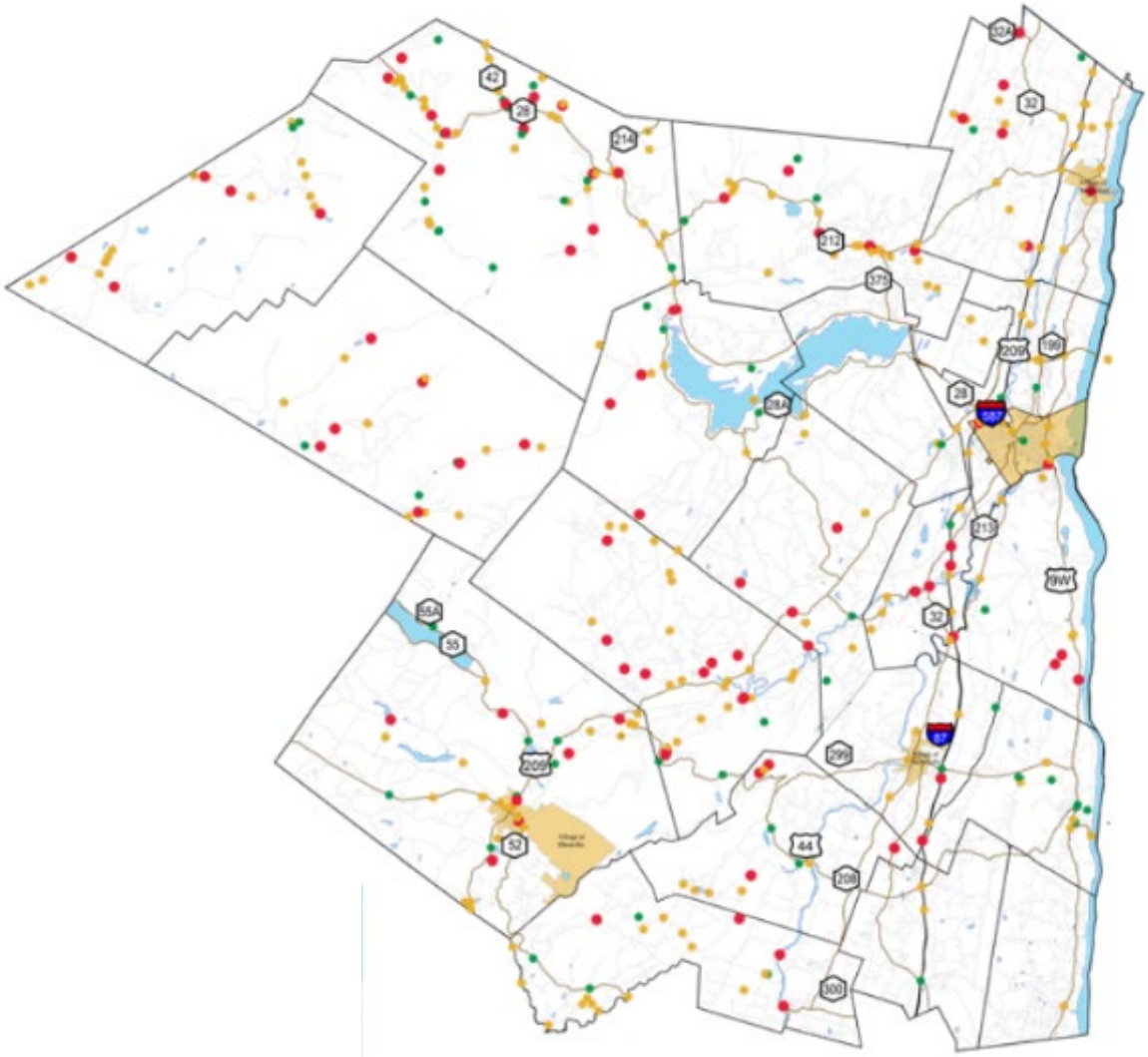

C A T S K I L L M O U N T A I N S
ULSTER COUNTY
Working landscapes
Nature at play
Shawangunk Mountains
Wallkill Valley
Hudson River
Connected habitats
ULSTER COUNTY

Background

- Bridges
  - 387 structures

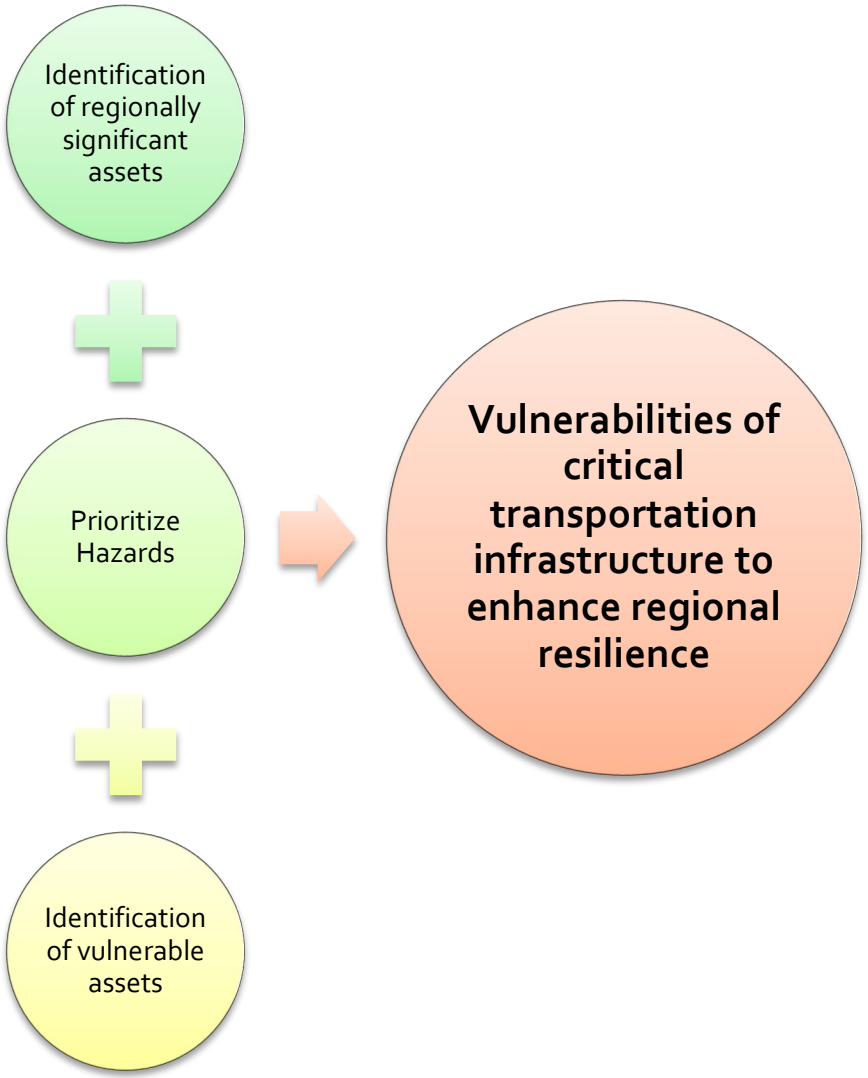
Owner	# of Bridges	Good	Fair	% Structurally Deficient
City of Kingston	1	100%	0%	0%
Ulster County	154	10%	60%	31%
NYC Water Supply	10	40%	40%	20%
NYS Bridge Authority	3	0%	100%	0%
NYS Thruway Authority	30	20%	63%	17%
NYS DOT	110	18%	71%	11%
State-Other	2	100%	0%	0%
Town	73	25%	51%	25%
Village	4	25%	50%	25%
Total	**387**	**17%**	**61%**	**22%**

Background



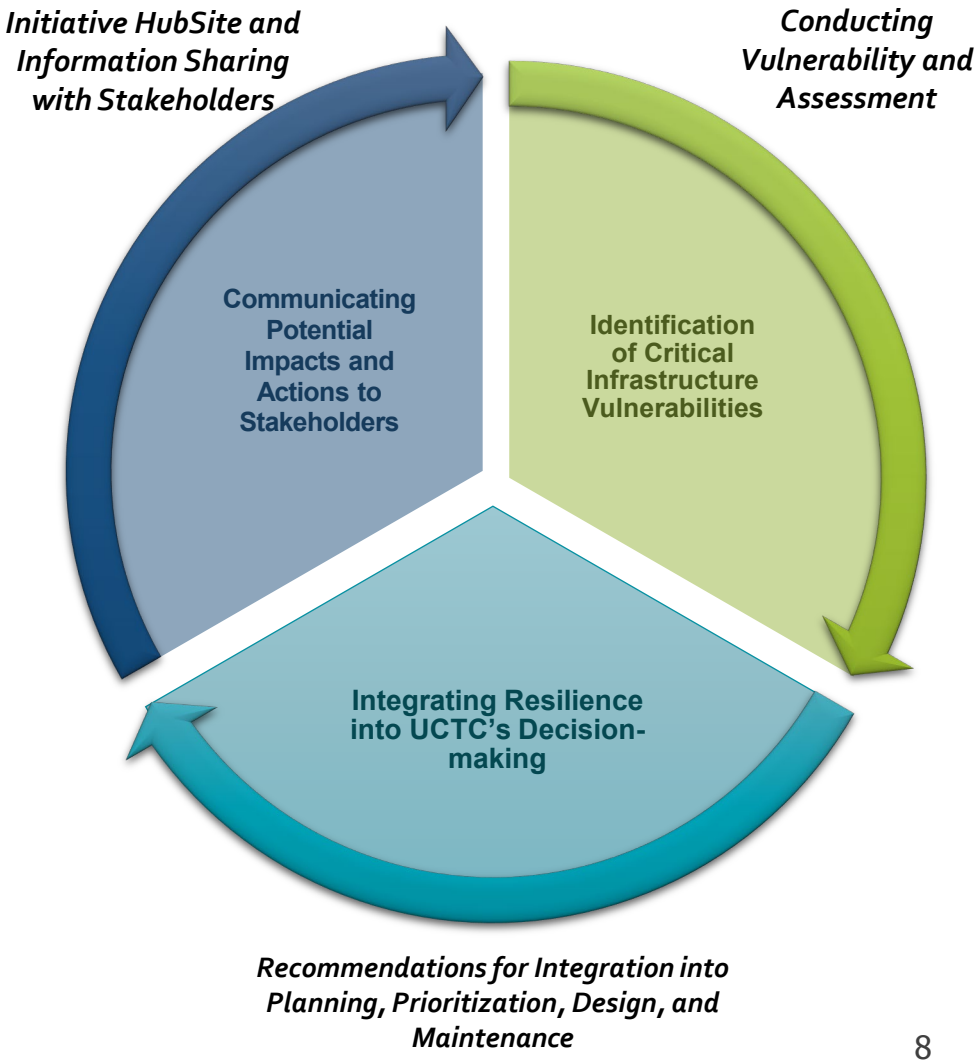
Motivation and Purpose

- Prioritize transportation infrastructure projects that address a broad range of issues including mitigating hazard impacts
- Safeguarding public investments against hazards.



Framework and Vision

- UCTC's vision and framework to advance resilience



Our Guiding Principles

Alignment with UCTC's planning goals and business processes

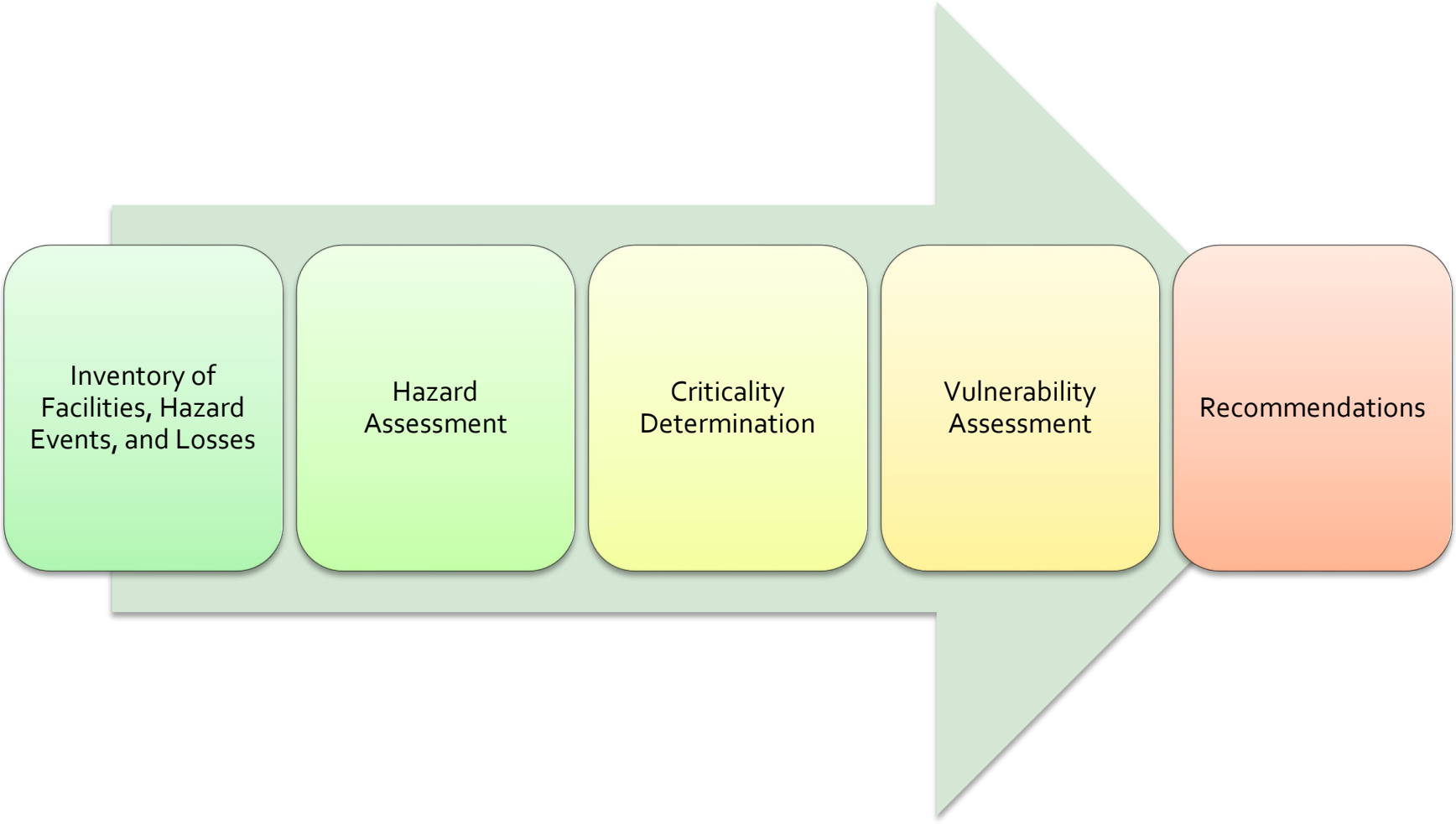
Use of interactive deliverables to provide access to stakeholders

Incorporation of equity into the vulnerability assessment

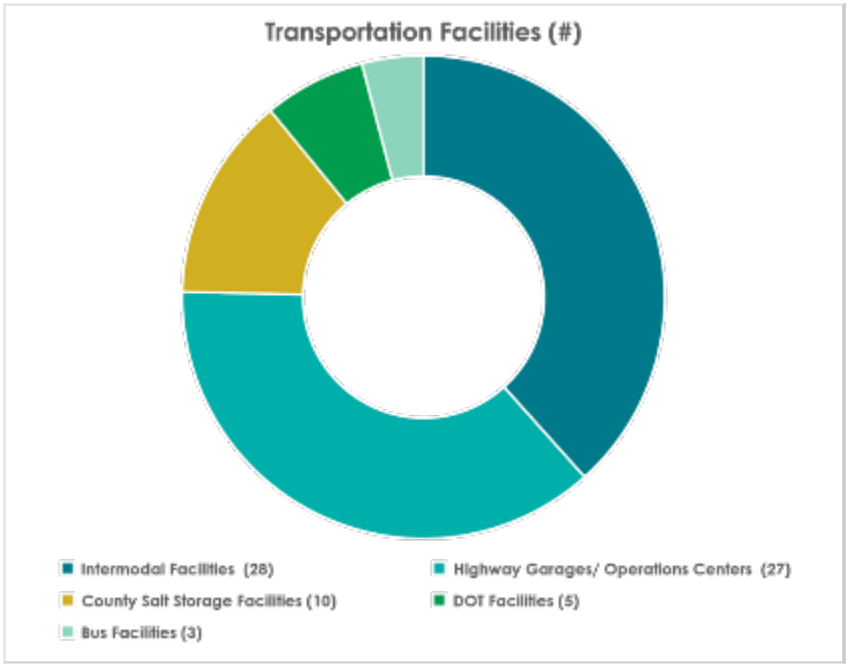
Using assessment information for project screening and prioritization

Recommendations and next steps

Approach and Steps



- Asset Inventory – Transportation and Other Essential Facilities



Hazard Assessment Approach

- Develop Past Hazards and Current Hazard Data Inventory
- Develop Future Climate Change Projections using statistically downscaled data
- Prioritized hazards

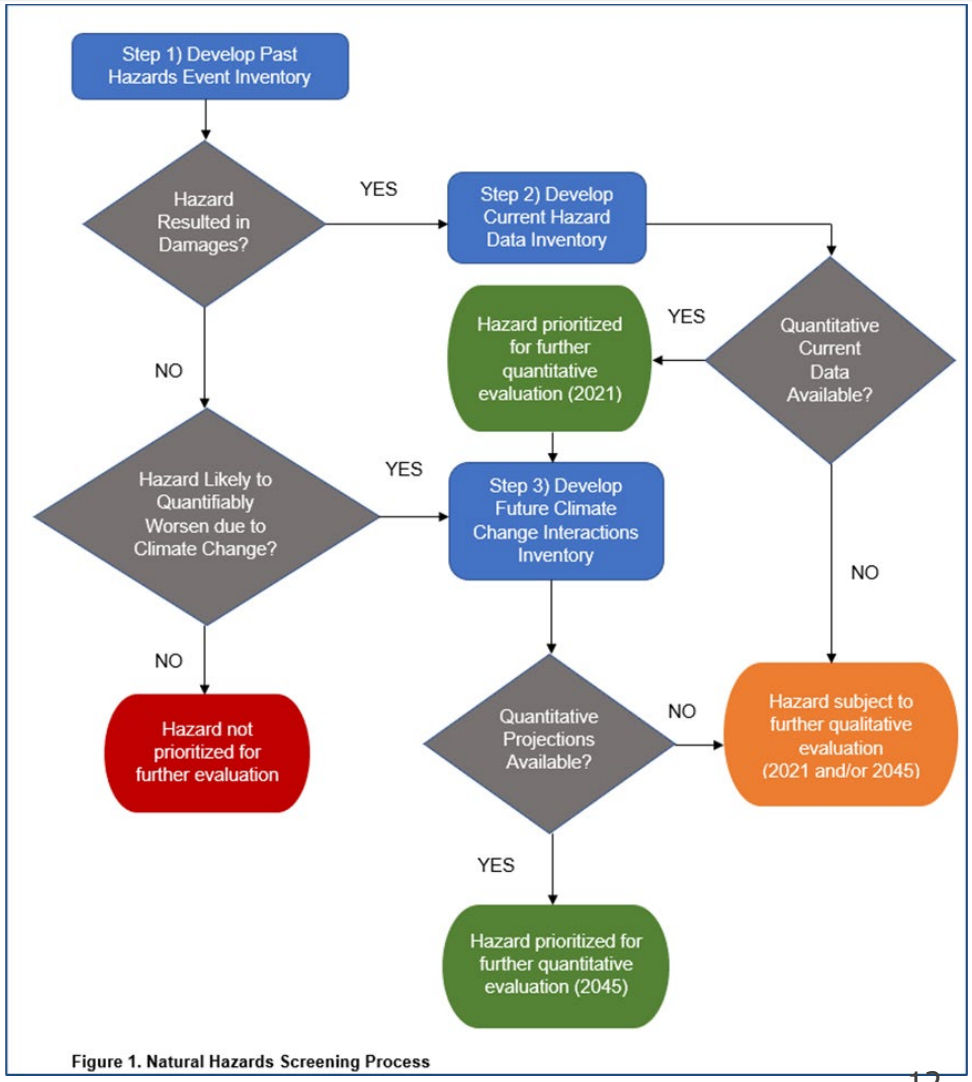
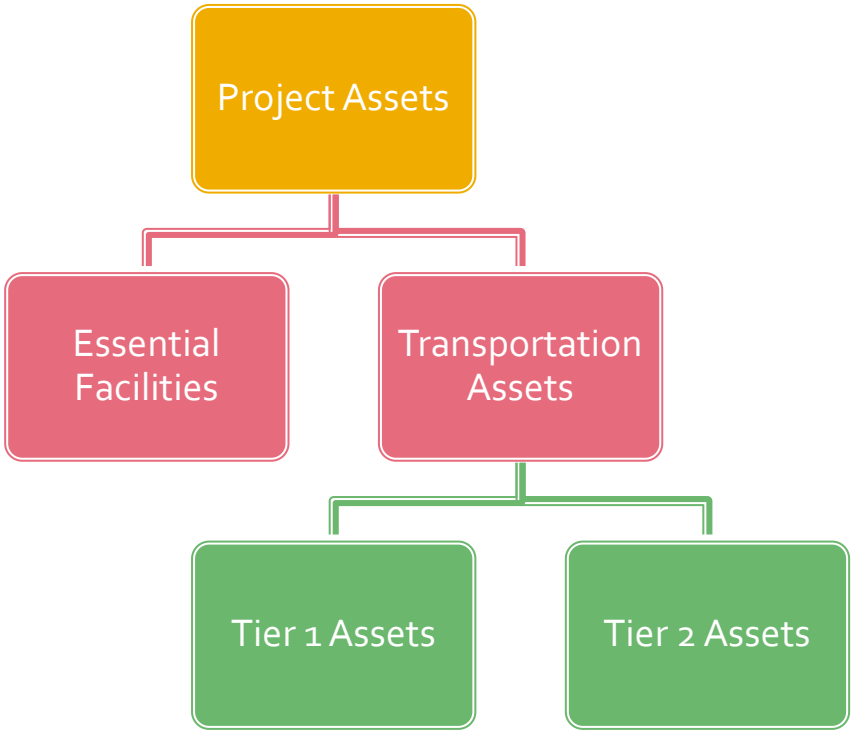


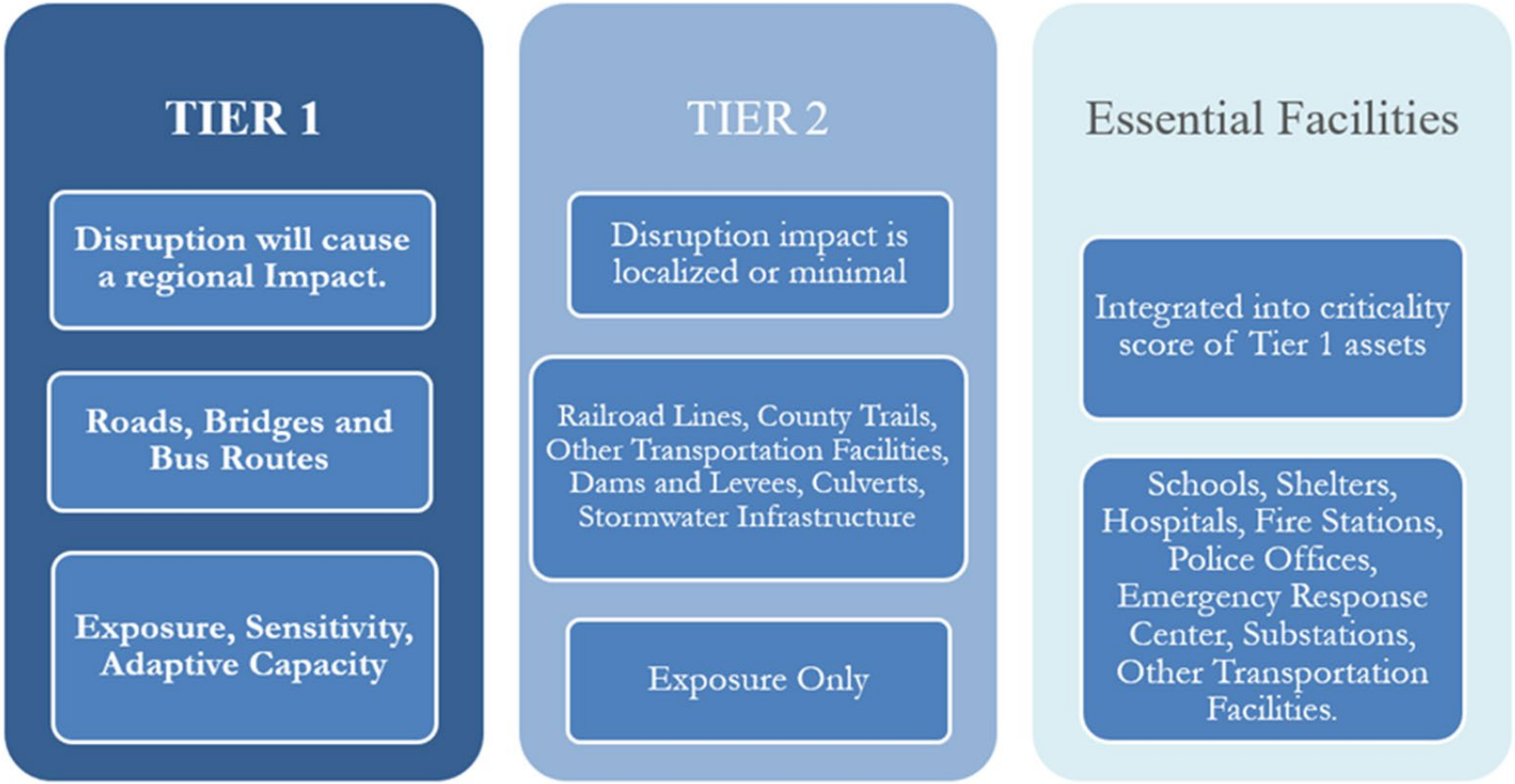
Figure 1. Natural Hazards Screening Process

Criticality Determination

- Degree to which a given asset is important to fulfilling the mission and goals of the agency/project sponsor
  - Conducting a vulnerability assessment
  - Service continuity and alignment with regional accessibility and mobility goals



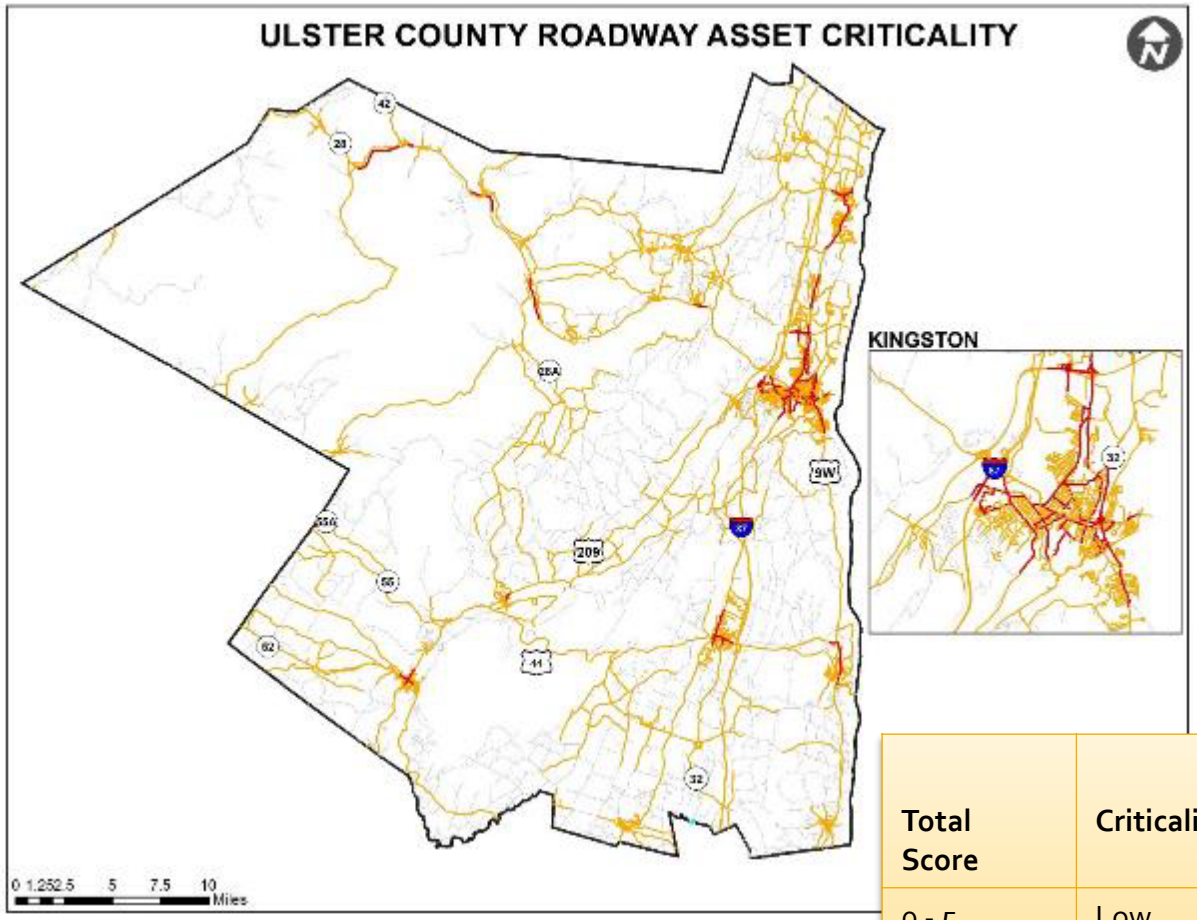
Tiering Criteria and Facilities



Criticality Construct

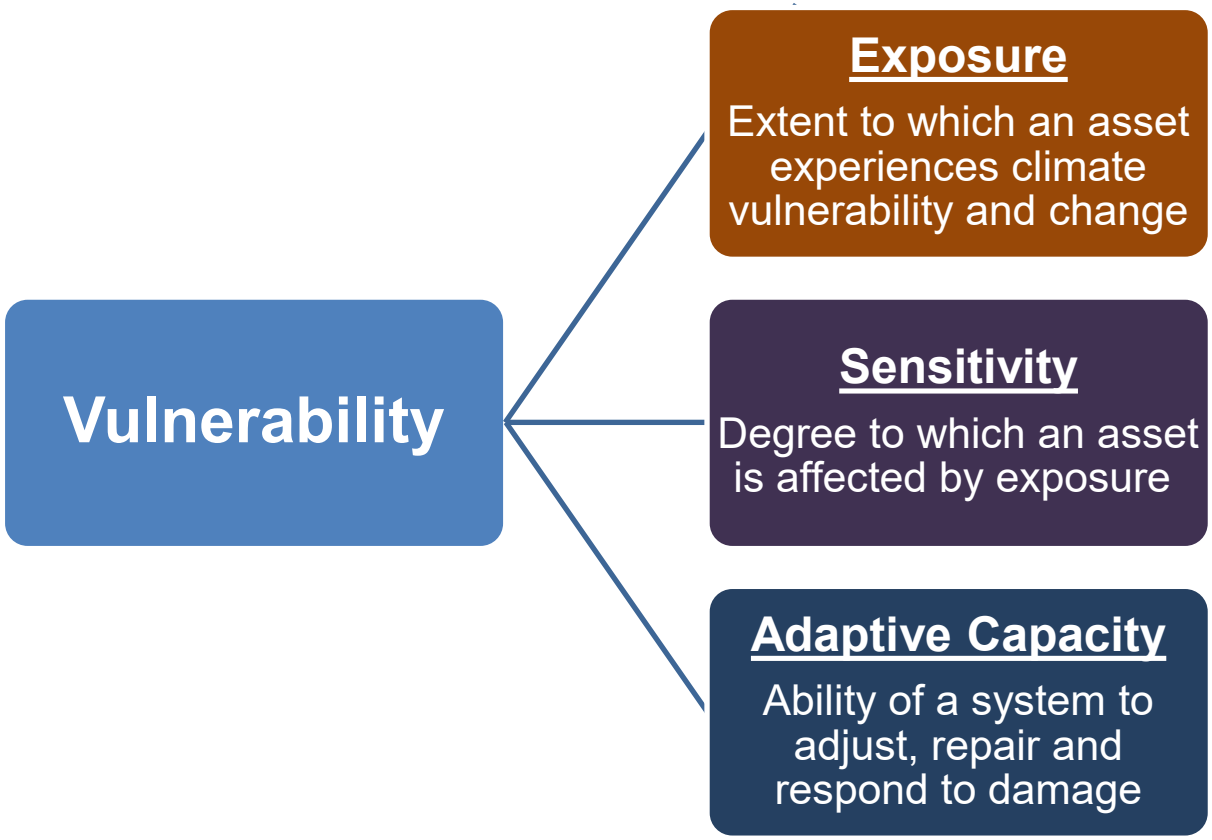
Factor	Max Score	Scoring Method	Score	Description
Functional Class	4	Local	1	Roadway functional classification (UCTC) combining urban and rural roadway classes.
		Major Collector	2	
		Minor Arterial	3	
		Principal Arterial	4	
Access to Essential Facilities	3	0 facilities in a ½-mile distance	0	Number of Essential Facilities within a ½-mile distance from the road (distance calculated is crow-fly distance)
		1 to 2 facilities in a ½-mile distance	1	
		3 to 5 facilities in a ½-mile distance	2	
		>5 facilities in a ½-mile distance	3	
Evacuation/Detour Route	1	1 if Yes, 0 otherwise	0-1	Whether the roadway is an evacuation route
Transit Corridor	1	1 if Yes, 0 otherwise	0-1	Whether the roadway is a transit corridor
Population Density	3	<=100;	1	Population density normalized by network density to avoid any disproportionate impact to rural areas/assets
		101 – 200;	2	
		> 201;	3	
Equity Areas	3	0 - 10%	1	Based on the proportion of population with 3+ risk factors (Census Community Resilience Estimates (CRE) Data)
		11% - 20%	2	
		21 % - 35%	3	
Maximum Total Score	***15***			

Criticality Determination Results

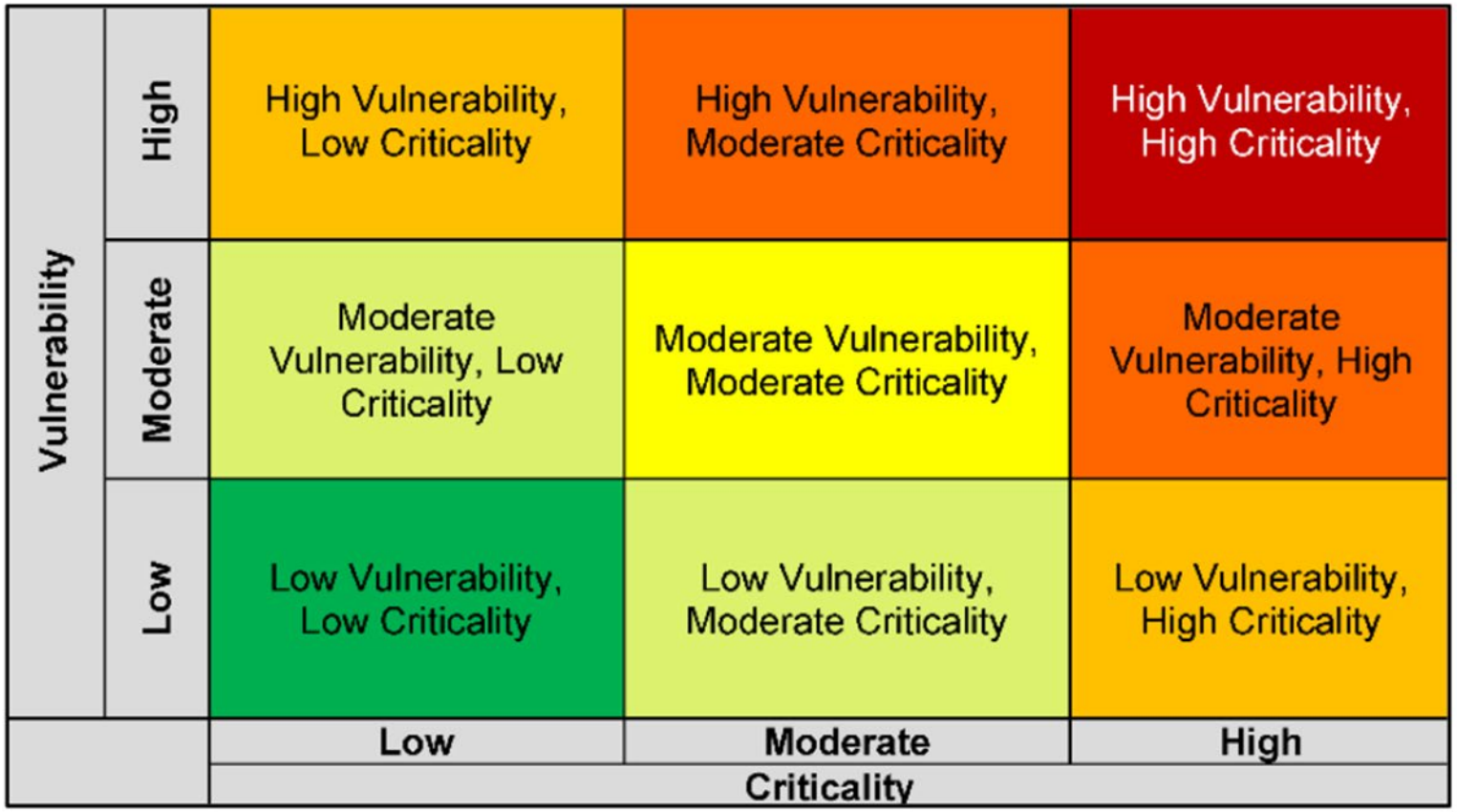


Total Score	Criticality	Number of Roads	Number of Bridges
0 - 5	Low	2,982 (44%)	170 (41%)
6 - 10	Medium	3,359 (50%)	215 (52%)
11 - 15	High	369 (5%)	25 (6%)

Vulnerability Assessment



Framing the Results



Source: FHWA Resilient Tampa Bay Pilot

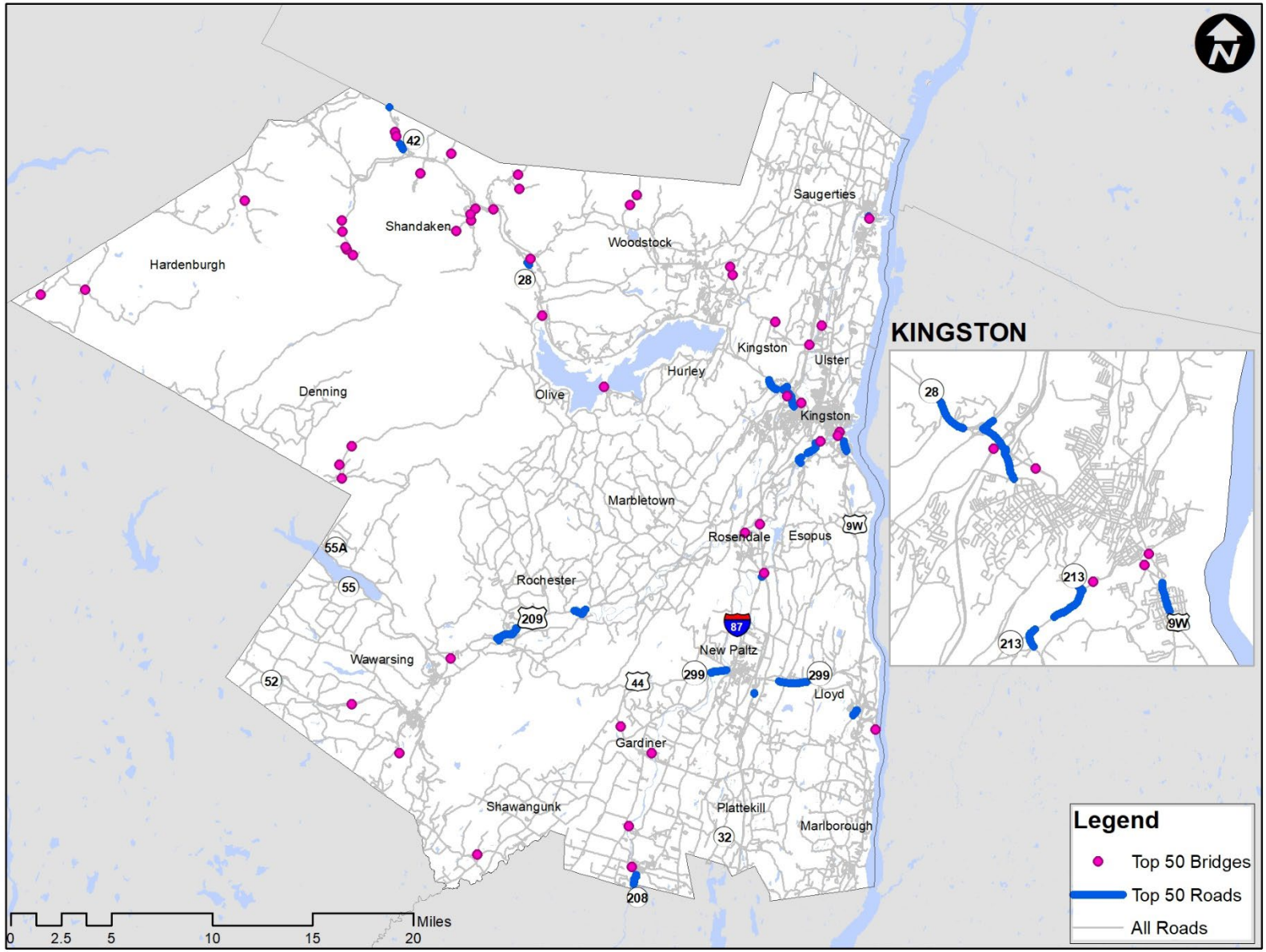
Results for Decision-making

Vulnerability to Flooding **or** Extreme Temperature

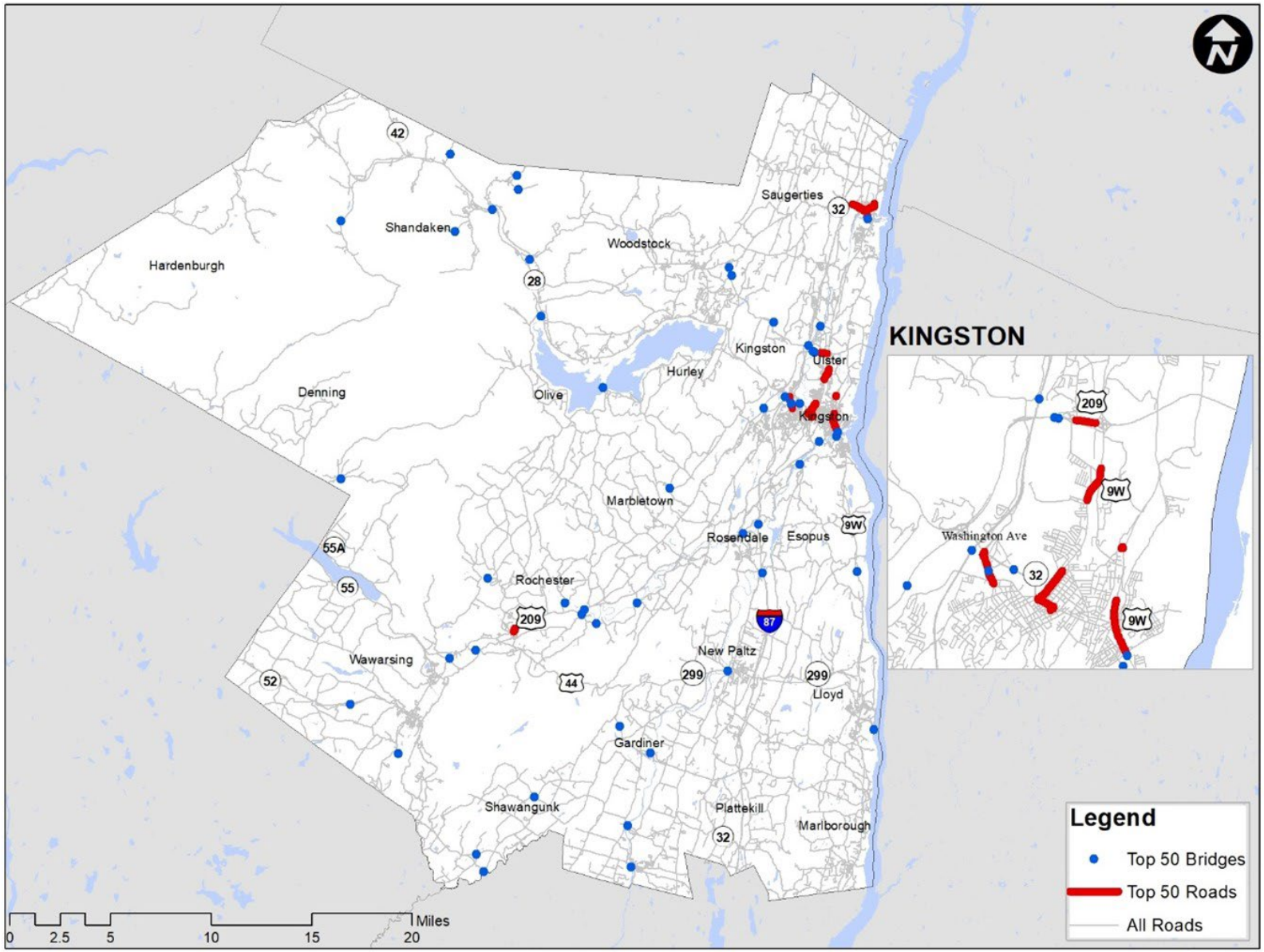
Composite Vulnerability

Vulnerability and Criticality

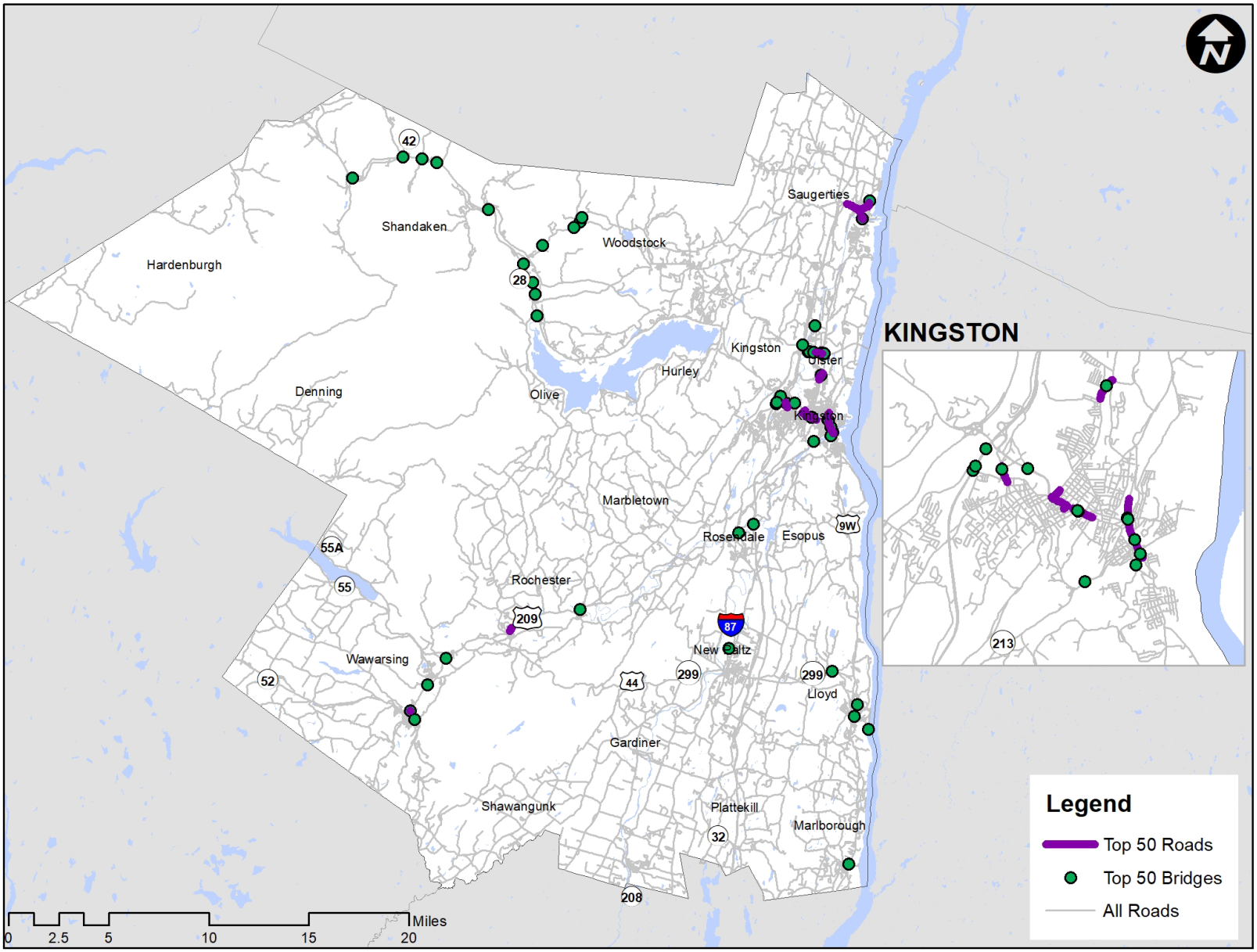
Top 50 Highly Vulnerable Roads and Bridges - 2030



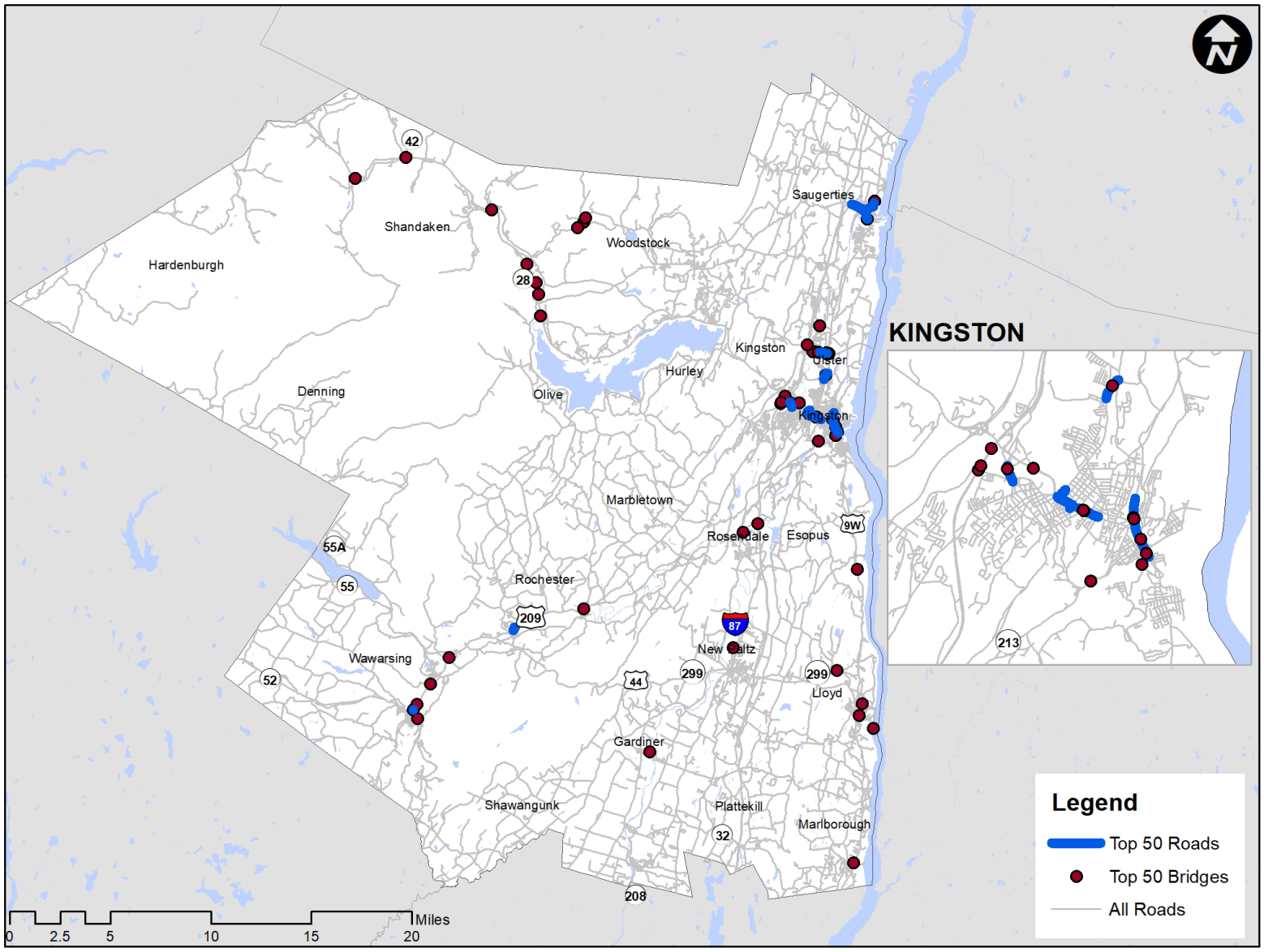
Top 50 Highly Vulnerable Roads and Bridges - 2050



Top 50 Highly Vulnerable and Critical Roads and Bridges for 2030



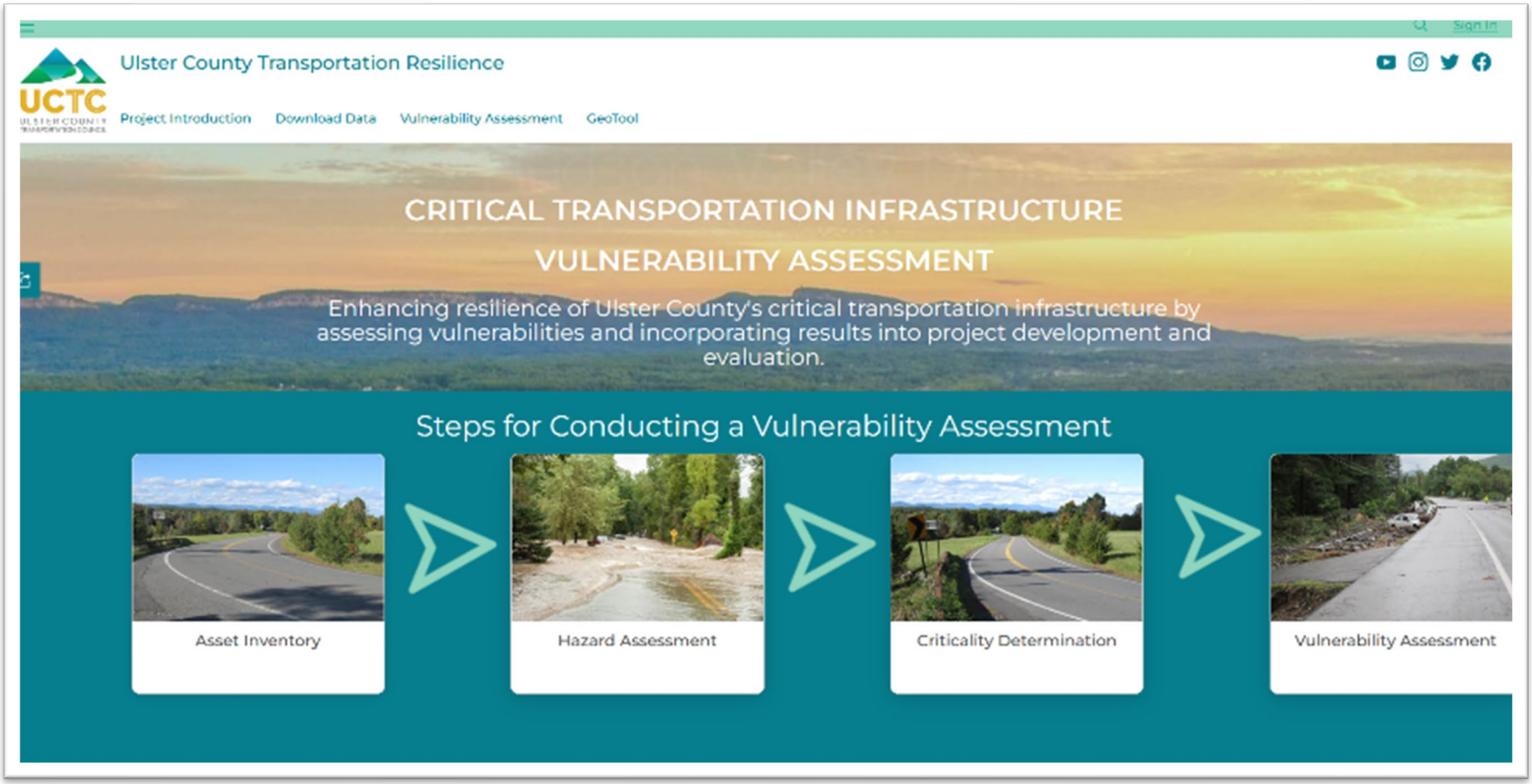
Top 50 Highly Vulnerable and Critical Roads and Bridges for 2050



Integrating Resilience into UCTC's Functions

- White Papers
  - Design and Maintenance
  - Project Prioritization
- Integration Pathways
  - Needs-based prioritization vs Opportunity Investments
  - TIP selection criteria
- Incorporate Risk (post-IIJA)

Communicating the Results



Lessons & Next Steps…

- **Collaboration is Key…**
  - MPO
  - Planning
  - Dept. of Environment
  - Emergency Management
  - DPW/Engineering
  - NYSDOT
  - Information Services

Lessons & Next Steps…

- Data Quality
  - Flood elevation data vs. asset elevation data
  - On the ground truthing
- Phase II – PROTECT application

Questions?

https://tinyurl.com/3dk8e9v4

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