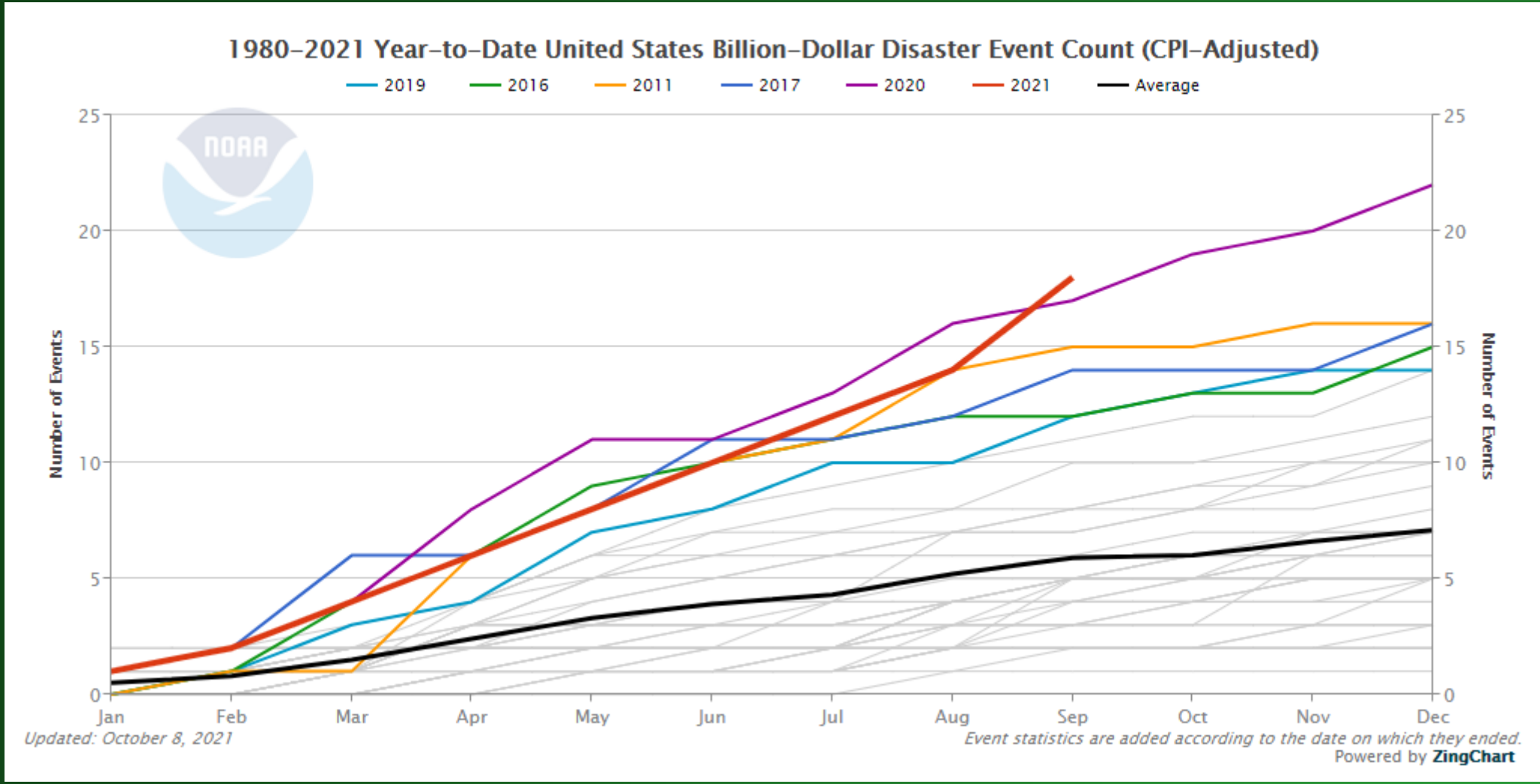
Designing Resilient Transportation Networks with GIS

Terry Bills
Transportation
Esri

"Global climate change's potential impacts on infrastructure create some of the most significant and challenging issues facing transportation planners and asset managers today." *US FHWA*

Frequency and Cost of Billion Dollar Events Rising



https://www.ncdc.noaa.gov/billions/

Exposure of US Assets

CNN Weather Climate Storm Tracker Wildfire Tracker Video LIVE TV Edition

25% of all critical infrastructure in the US is at risk of failure due to flooding, new report finds

By Drew Kann and Ella Nilsen, CNN

Updated 12:03 AM ET, Mon October 11, 2021

Vehicles were submerged in flooding in the Bronx, after the remnants of Hurricane Ida put large swaths of New York City under water in early September.

(CNN) — As a massive investment to repair roads and adapt to climate change faces an uncertain fate in Congress, a new report finds much of the country's infrastructure is already at risk of being shut down by flooding. And as the planet heats up, the threat is expected to grow.

Today, one-in-four pieces of all critical infrastructure in the US — including police and fire stations, hospitals, airports and wastewater treatment facilities — face substantial risk of being

https://www.cnn.com/2021/10/11/weather/infrastructure-flood-risk-climate-first-street/index.html

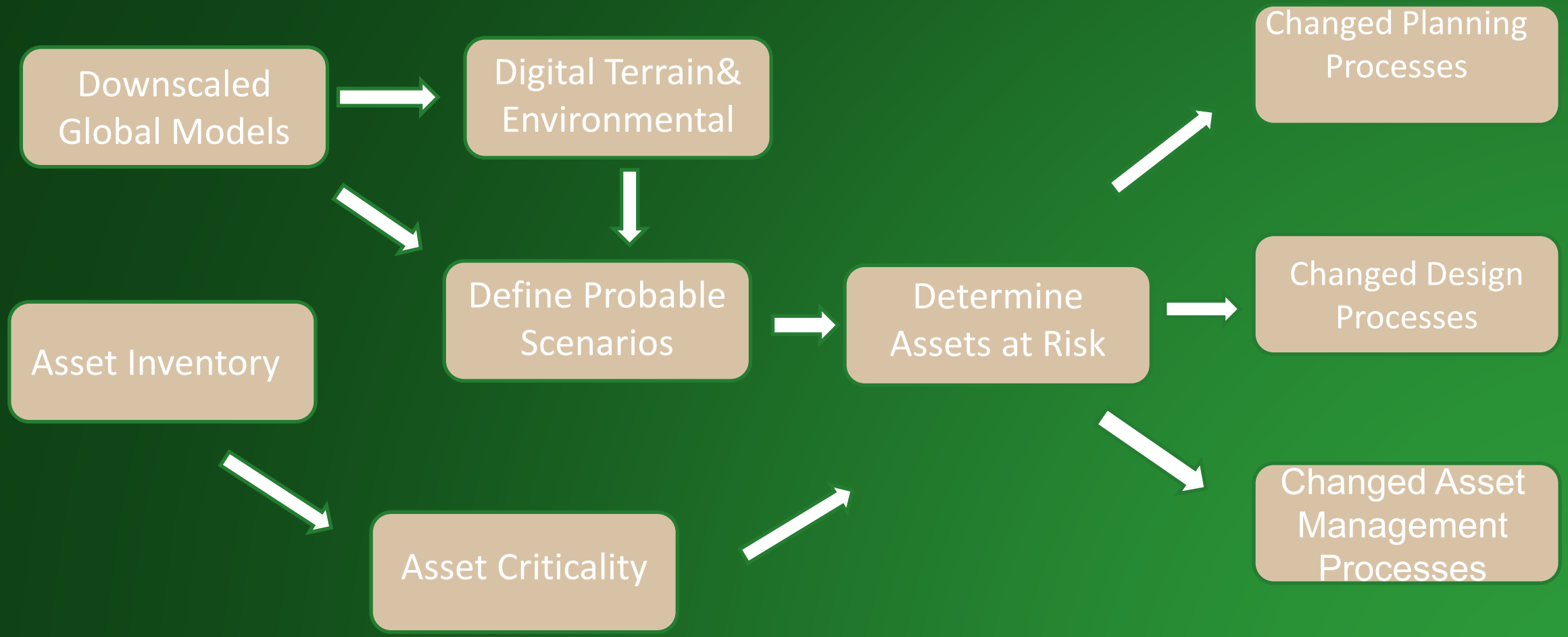
The Role of GIS

“Data visualization is so important…. In fact, I would go so far as to say that you could be doing the best science in the world, but if you do not visualize that science, it could end up being completely useless to anybody but you.”

Dr. Katharine Hayhoe of the Climate Science Center at Texas Tech University

Vermont Department of Transportation

Climate Resiliency Workflow



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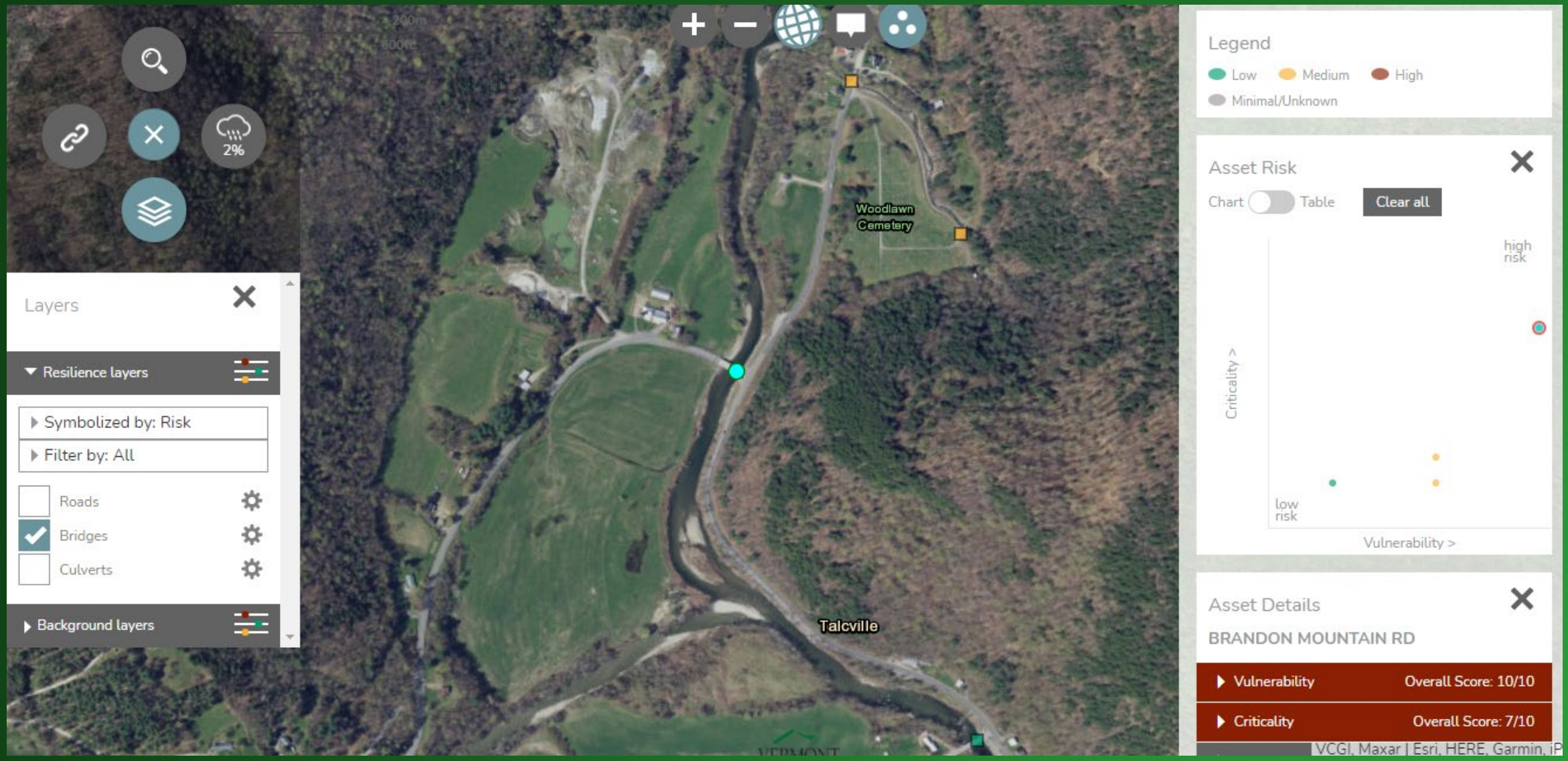


https://roadfloodresilience.vermont.gov/#/map

Vermont Department of Transportation

https://roadfloodresilience.vermont.gov/#/map

Colorado DOT

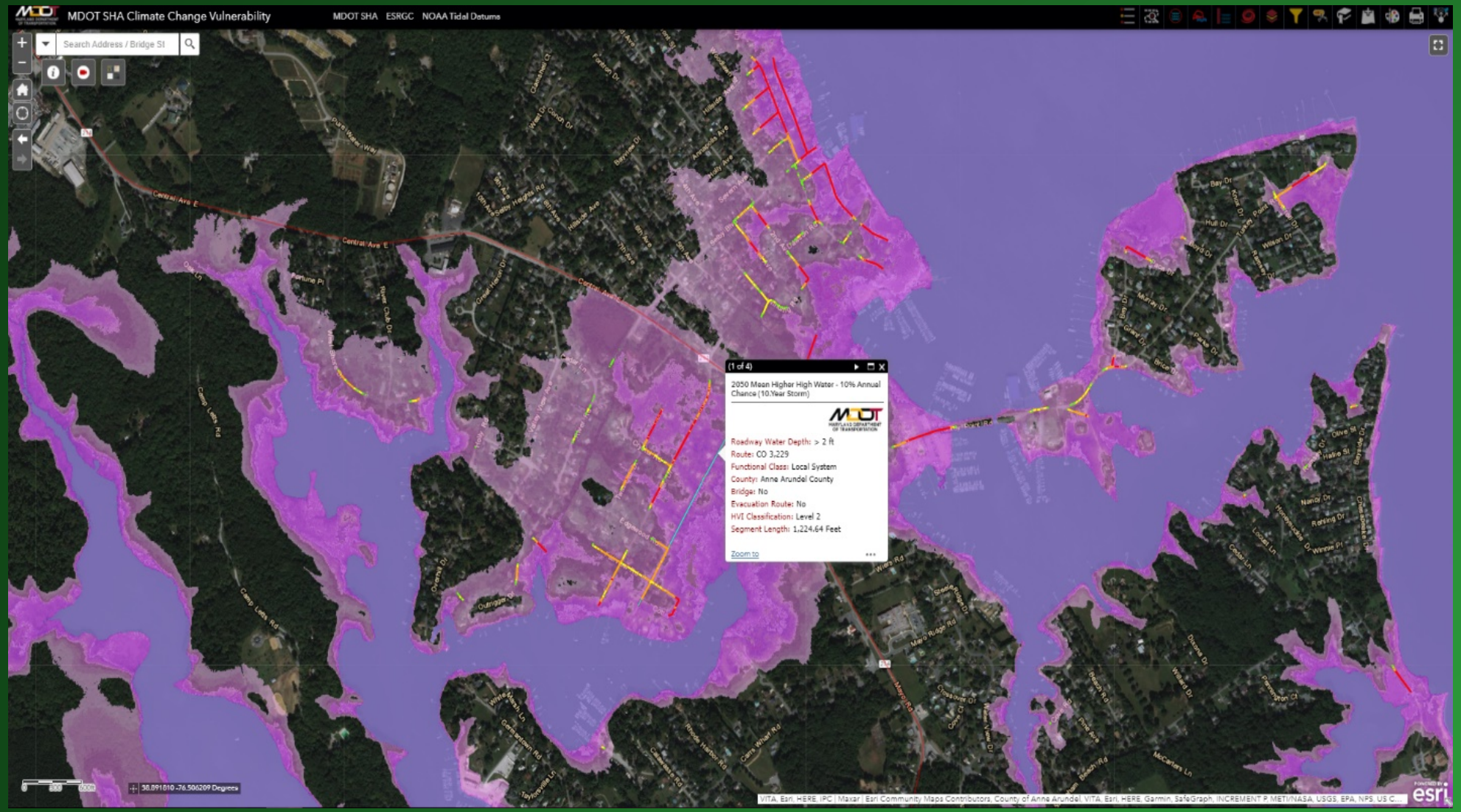
I-70 Corridor Level of Resilience (LOR) Index for 1-Mile Roadway Segments

Level of Resilience (LOR) Index			
Cumulative Annual Risk from Physical Threats	Criticality for Systems Operations		
	Low	Moderate	High
0-20% C.A.R.	A	B	C
21-40% C.A.R.	B	B	C
41-60% C.A.R.	C	C	C
61-80% C.A.R.	C	C	D
81-100% C.A.R.	D	D	E

Level of Resilience (LOR) Index Total Annual Risk		
LOR Index	Number of 1-Mile Segments	% of Total 1-Mile Segments
A	139	30.8%
B	27	6.0%
C	175	38.8%
D	53	11.8%
E	57	12.6%
TOTAL	451	100%

Highways
Counties
I-70
Level of Resilience
A
B
C
D
E

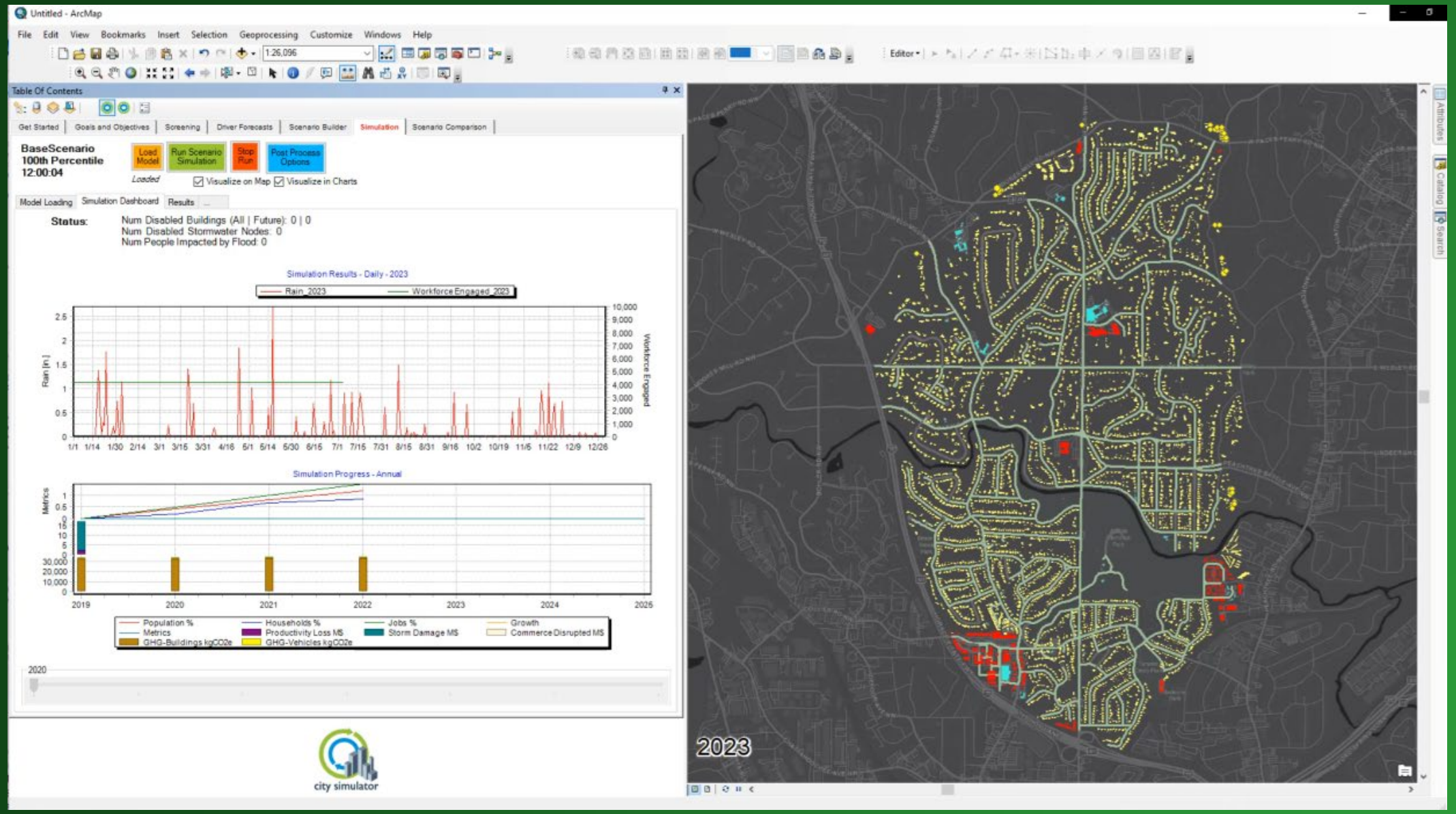
Maryland DOT



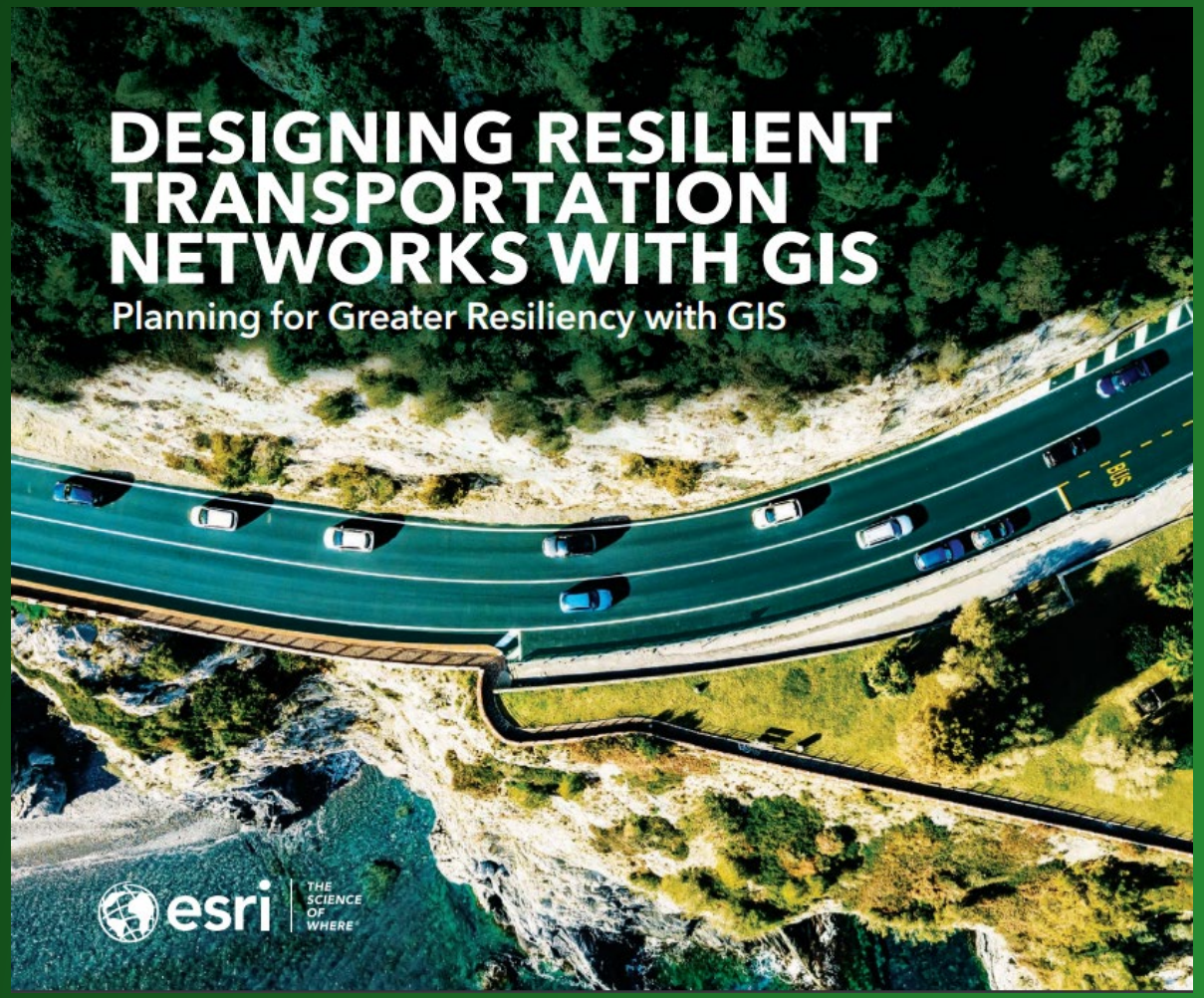
https://bit.ly/2YTUWWd

Atkins City Simulator

http://casestudies.atkinsglobal.com/city-simulator/



To Learn More:



https://www.esri.com/content/dam/esrisites/en-us/media/ebooks/climate-resiliency-for-transportation.pdf

Discussion