Resilient Ways Forward
Transportation planning for our changing climate

dctc

Step 2: Analysis
Phase 1: System-Level

Where are we vulnerable?

The Dutchess County Transportation Council (DCTC) is preparing a Climate Vulnerability Assessment, titled *Resilient Ways Forward*, that identifies where our transportation system is most vulnerable to the impacts of climate change. This will help us find ways to reduce and adapt to the adverse impacts on our transportation system. The Phase 1 System-Level Report analyzes the sensitivity of various components of the transportation system to specific climate hazards. The Phase 2 Asset-Level Report identifies specific assets and locations where the transportation system is most vulnerable to the impacts of climate change.

Measuring Sensitivity

The Phase 1 System-Level analysis evaluates how sensitive our transportation system is to six climate hazards: extreme heat, flooding, drought, wind, winter conditions, and landslides. For each type of transportation asset, sensitivity is measured on a scale of low, medium, or high, focusing on the sensitivity of physical infrastructure and services/user experience. Physical transportation infrastructure is most sensitive to flooding and landslides, while transportation services and users are most sensitive to flooding, wind, winter conditions, and landslides.

Transportation Asset	Extreme Heat		Flooding		Drought		Wind		Winter Conditions		Landslides	
	I	S	I	S	I	S	I	S	I	S	I	S
Roads	Medium	Low	High	High	Low	Low	Low	High	Medium	High	High	High
Bridges	Medium	Low	High	High	-	-	Low	High	Medium	High	High	High
Culverts	-	-	High	High	Low	-	Low	-	Low	-	Medium	-
Rail lines/stations	Medium	Medium	High	High	-	-	Low	High	Medium	Medium	High	High
Bus system/ facilities	Low	Medium	Low	Medium	-	Low	Low	Medium	Low	High	Low	Low
Sidewalks	Low	High	Low	Medium	-	Low	Low	Low	Low	Medium	Medium	Medium
Rail trails	Low	High	High	High	-	Low	Low	Low	Low	Low	Medium	Medium
Regional airport	Medium	Low	NE	NE	Low	-	Low	Medium	Low	Low	NE	NE
Highway garages	Low	-	Medium	-	-	-	Low	-	Low	-	Medium	-
Park and rides	Low	Low	Medium	Medium	-	-	Low	Low	Low	Medium	NE	NE
Transit hub	Low	Medium	NE	NE	-	-	Low	Low	Low	Medium	NE	NE
Beacon ferry dock	Low	Low	Low	Medium	Low	-	Low	Medium	Medium	Medium	NE	NE

Climate Hazard

Key

I = Infrastructure Rating: the degree to which the asset (physical infrastructure) undergoes damage or loses functionality

S = Service Operations and User Experience Rating: the degree to which users are affected by service disruptions

NE = Not Exposed: asset was pre-screened and is not exposed to hazard

(-) = Unaffected: asset is unaffected by the hazard

Resilient Ways Forward Vulnerability Assessment Phase 1 Report: Read the full report.
www.ResilientWaysForward.com

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Where are we vulnerable?

Step 2: Analysis
Phase 2: Asset-Level

Identifying Priorities

Phase 2 provides an asset-level (e.g., individual road segment) vulnerability assessment of the priority asset/hazard pairs to identify specific assets for improvements. Vulnerability is calculated based on whether an asset is in an area affected by a climate hazard (such as a floodplain) and whether the asset is critical to the transportation system (based on traffic volume, proximity to key destinations, and location in an equity area).

A summary of the vulnerability results for our transportation assets are shown below. The numbers indicate how many assets of each type are categorized as high, medium, low, or no vulnerability to flooding and landslides.

Priority Transportation Asset/Climate Hazard Pairs Analyzed in Phase 2

Climate Hazard	Transportation Asset
Flooding	• Roads • Bridges • Culverts • Rail lines & stations • Rail trails
Landslides	• Roads • Bridges • Rail lines & stations

Example:
- 180 = miles of roads with high vulnerability to flooding
- 6% = percentage of roads analyzed with high vulnerability to flooding

Transportation Asset	Climate Hazard							
	Flooding				Landslides			
	High	Medium	Low	Not Vulnerable	High	Medium	Low	Not Vulnerable
Roads (miles)	180 (6%)	337 (11%)	47 (2%)	2,490 (82%)	37 (1%)	77 (3%)	263 (9%)	2,678 (88%)
Bridges	9 (3%)	20 (6%)	78 (21%)	259 (71%)	4 (1%)	7 (2%)	21 (6%)	234 (91%)
Culverts	4 (1%)	19 (4%)	264 (57%)	177 (38%)	Not assessed			
Rail Lines (miles)	14 (11%)	78 (62%)	6 (5%)	28 (22%)	1 (1%)	11 (9%)	2 (2%)	122 (89%)
Rail Stations	0 (0%)	3 (27%)	1 (9%)	7 (64%)	0 (0%)	3 (27%)	0 (0%)	8 (73%)
Rail Trails (miles)	3 (7%)	23 (47%)	2 (3%)	20 (42%)	Not assessed			

Assets with high vulnerability scores will be prioritized for future adaptation investments. Medium and low scoring assets also have vulnerabilities that should be addressed over time. This analysis, coupled with input from stakeholders and the public, will inform Step 3: Recommendations.

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The Climate Vulnerability Assessment Phase 1 and Phase 2 Reports inform state, county, and local governments and transportation agencies about where their infrastructure and services are most vulnerable to our changing climate. This information will help them prioritize future resilience investments. The final report for *Resilient Ways Forward* will summarize the findings from Phase 1 and Phase 2 and provide strategies and recommendations to address vulnerabilities and prioritize resilience investments.

Reports

- **Climate Change Summary:** Read the full report
- **Climate Vulnerability Assessment Phase 1:** Read the full report
- **Climate Vulnerability Assessment Phase 2:** Read the full report

We are here!

How is the climate changing?
Step 1: Data Collection
- Gather climate and transportation data
- Identify communities that face inequities or disparities
- Assess future climate scenarios

Where are we vulnerable?
Step 2: Analysis
- *System Level:* Understand risks of climate hazards for transportation assets
- *Asset Level:* Identify priority locations for adaptation investments

What can we do?
Step 3: Recommendations
- Toolbox of adaptation options
- Design guidelines
- Policy-based actions
- Implementation plan
- Monitoring and update plan

Stakeholder and Public Input

Interactive Map Survey   **Virtual Public Meeting #1**   **Virtual Public Meeting #2**

Stay Informed

- Visit **ResilientWaysForward.com** for more information.

- Learn about the public meetings and sign up for email updates at **ResilientWaysForward.com/get-involved**

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