



## Resilient Ways Forward: Map Viewer

The [Resilient Ways Forward Map Viewer](#) shows the results of our [climate vulnerability analysis](#) of the transportation system in Dutchess County. We used a two-phase approach for this assessment: [Phase 1](#) analyzed the sensitivity of various components of the transportation system to specific climate hazards, and [Phase 2](#) identified specific assets and locations that are most vulnerable to the impacts of climate change and should be prioritized for adaptation investments.

The Flood Vulnerability and Landslide Vulnerability map layers show the results of this analysis, including vulnerability scores for the following hazard/asset pairs:

Climate Hazard	Transportation Asset
 Flooding	<ul style="list-style-type: none"> <li>• Roads • Bridges • Culverts</li> <li>• Rail lines &amp; stations • Rail trails</li> </ul>
 Landslides	<ul style="list-style-type: none"> <li>• Roads • Bridges</li> <li>• Rail lines &amp; stations</li> </ul>

For each pair, exposure and criticality were scored on a scale of 0 to 3 and added together using the equation and weighting below:

$$(Exposure\ Score)(70\%) + (Criticality\ Score)(30\%) = Vulnerability\ Score$$

The final vulnerability scores range from 0 to 3, with 3 being the highest possible score. Vulnerability ratings of high, medium, low, or not exposed were assigned using the scoring framework below. Assets that are **not exposed** have a vulnerability score of zero.

Final Vulnerability Rating	Vulnerability Score
High	2.5 – 3.0
Medium	2.0 – 2.49
Low	0.01 – 1.99
Not exposed	0

## Key Terms

**Exposure** indicates whether an asset is in an area affected by climate hazards. Assets that have high exposure, such as those in floodplains, are more likely to be affected by climate hazards than those that are not.

**Criticality** is the level of importance of an asset to the transportation system. For example, roads with higher volumes are more critical than roads with lower volumes, because if they are damaged or closed, more people are affected. The consequence to the transportation system is significant for highly critical assets.

**Vulnerability** is the susceptibility of an asset to adverse impacts from climate hazards. Exposure and criticality can be used to determine how vulnerable an asset is to climate hazards: high exposure and criticality indicate high vulnerability.

## Climate Exposure Data

See our [Phase 2 report](#) for specific details on how exposure was scored for each asset/hazard pair.

**Flooding:** We used 100- and 500-year floodplain maps from the [Federal Emergency Management Agency's \(FEMA\) Flood Map Service Center](#), coupled with public input and future sea level rise scenarios, to understand current flood risk in the region. Before scoring flood exposure, elevated road sections were removed from the analysis since they are above the floodplain. The 100-year floodplain indicates a historical 1% annual chance of flooding. The 500-year floodplain indicates a historical 0.2% annual chance of flooding and includes areas in the 100-year floodplain. Although FEMA flood maps are a useful tool to understand flood exposure at a specific location, these maps are based on historical data and do not consider future climate change. To estimate future flood extent with climate change, the current 500-year floodplain can be used as a proxy for the future 100-year floodplain.

Self-reported input on where flood events have occurred was also used to supplement the FEMA flood maps. We received feedback through our [Moving Dutchess Forward](#) plan and a Resilient Ways Forward mapping survey. We also incorporated input from other agencies on where past flood events had occurred, including NYSDOT's frequent flood locations. If a flood event was reported, the asset received an exposure score of 3 regardless of its floodplain or sea level rise rating. [Sea level rise](#) was also incorporated in the flood exposure scoring. Under an intermediate high scenario, Dutchess County is expected to see 18 inches of sea level rise by 2060.

**Landslides:** We scored landslide exposure using [NASA landslide susceptibility scores](#). These scores indicate how susceptible the terrain is to landslides based on factors such as slope, rock and soil type, forest cover change, distance to road networks, and distance to fault zones. High susceptibility corresponds to high landslide risk if the terrain is exposed to intense rainfall. Recognizing that the gridded NASA landslide data is a coarse resolution for the county, the level of risk may be

overestimated. To supplement this data, steep slopes greater than or equal to 100% and within 25 feet of the road or bridge, as well as the locations of “Fallen Rock” signs on county roads, were also factored into the exposure score. These localized datasets are useful in tandem with the NASA landslide susceptibility data to capture potentially vulnerable areas in the County.

## Criticality Data

**Transportation Equity Index:** The [Transportation Equity Index](#) developed for [Moving Dutchess Forward](#) measures the cumulative vulnerability of a community to transportation decisions. Data from the 2020 Census was used to identify focus populations that have been historically marginalized by land use and transportation decisions. The index was used in the vulnerability assessment to highlight the need for resilience investments in these communities. Communities with high equity scores tend to be more significantly impacted by the loss of a transportation option because they often have limited or no access to alternative modes of transportation.

**Proximity to Public Safety Services:** Public safety service locations include police stations, fire stations, emergency services, and hospitals. Transportation assets near these locations are crucial for providing access to public safety services during extreme weather events and natural disasters and therefore prioritized for resiliency investments.

**Traffic Volume (Average Annual Daily Traffic):** Roads with higher traffic volumes are prioritized for investment since they are more critical to a functioning transportation system. Though lower-volume roads are important for local access, the loss of a higher-volume road has a greater impact across the county. See our [Traffic Data app](#) for current traffic volumes.

## Disclaimer

The analysis done for Resilient Ways Forward is intended for planning purposes only. The DCTC shall not be held liable for any damages of any kind in connection with the use of this data, or for any misuse or misrepresentation of this data. The data provided is subject to change and presented “as is” and without warranty of any kind, express or implied. DCTC assumes no responsibility for errors or omissions, including technical and/or typographical errors or other inaccuracies. DCTC may make improvements and/or changes to the data, product(s) and/or program(s) at any time and without prior notice.