National Capital Region
Transportation Planning Board

TPB Interactive Mapping Tool Companion Text

About This Map

This interactive map shows the results of the National Capital Region Transportation Planning Board's (TPB) 2023 Climate Change Vulnerability Assessment. TPB conducted an asset-level, indicator-based vulnerability assessment to identify transportation assets with the greatest climate hazard risks and inform climate resilience and transportation planning efforts in the region. This interactive map can be used to identify vulnerable assets that may be good candidates for resilience projects in the TPB region.

Climate vulnerability was assessed and scored for the following hazard/asset pairs:

- **Extreme Heat** and:
  - Rail routes
  - Rail stops
  - Bus stops
- **Inland Flooding** and:
  - Roads
  - Bridges
  - Rail routes
  - Rail stops
  - Bus stops
- **Sea Level Rise** and:
  - Roads
  - Bridges
  - Rail routes
  - Rail stops
  - Bus stops

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

$$Vulnerability = (Exposure\ Score \times 0.7) + (Criticality\ Score\ \times\ 0.3)$$

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 below scoring rubric. Assets that are **not exposed** are not indicated with any vulnerability rating.

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

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Key Terms

Exposure refers to whether an asset is located in an area that is affected by climate hazards.

Criticality refers to the importance of an asset to the transportation system and communities. Criteria used to evaluate an asset's criticality in this assessment include functional classification and whether the asset is located in one of COG's Equity Emphasis Areas.

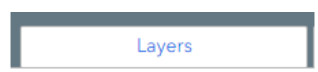
Vulnerability is the degree to which an asset is unable to cope with adverse climate impacts. Vulnerability can be used to understand how susceptible or at-risk an asset is to a climate hazard. In this assessment, exposure and criticality are used to determine an asset's vulnerability, with high exposure and criticality indicating high vulnerability or high risk to the asset. Sensitivity is also considered because all assets included in the analysis have been determined to have high sensitivity to the climate risks based on a review of available literature. Because sensitivity is not a differentiator it is not included in the scores.

COG Equity Emphasis Areas

Historically disadvantaged communities tend to be disproportionately impacted by extreme weather events, and often have limited alternatives when public transit is disrupted. COG's Equity Emphasis Areas (EEAs) were used to understand how climate hazards may disproportionately impact underserved communities. EEAs represent census tracts that have been identified as having high concentrations of low-income individuals and/or traditionally disadvantaged racial and ethnic population groups.

Map Functionality

The mapping tool allows users to view the vulnerability results and different hazard and asset layers in addition to other important regional considerations such as Equity Emphasis Areas. Users can click the Layers tab to see a full list of map layers and toggle them on or off.



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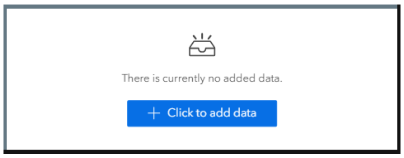
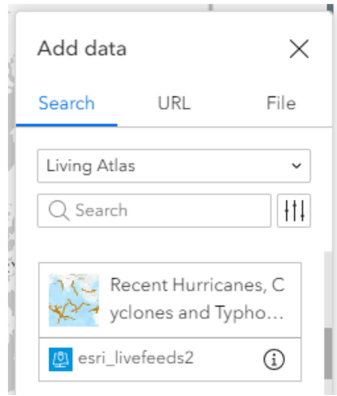
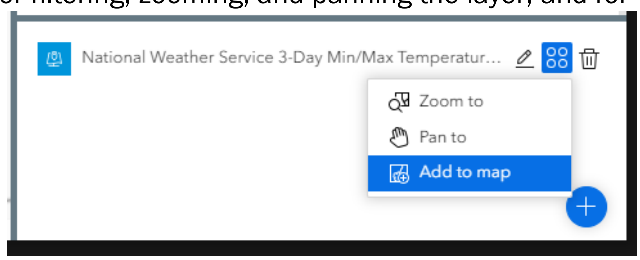
Adding Your Own Data

Users can also overlay their own datasets with the built-in infrastructure and hazard layers by clicking the **Click to add data** button. Users can add data layers from web sources by copying in the data source URL, upload data layer files, or add saved layers from the user's ArcGIS account.





Once users add their own data, the added layer(s) will be added to the Layers tab and users can toggle the additional layers on and off. There are three buttons the user can use to edit each added layer: Rename, Actions, Delete. The Rename button allows users to rename the added data layer. The Actions button provides different options for filtering, zooming, and panning the layer, and for adding to the layer or exporting it. The Delete button allows users to remove the layer from the Add data window. This does not, however, remove layers that have been added to the map – to do so, users must refresh the session. The user can click the plus sign to add additional layers.



Note: when data is added by a user during a session, the data is not uploaded into the mapping tool and is removed upon closing out the session.

Climate Hazard Data

Temperature: Median historical land surface temperature data, which shows localized hot spots in temperature due to the urban heat island effect and other factors, was obtained from Landsat following established methodology using Google Earth Engine (GEE). Data for the months of June through August was obtained for 2018-2022. As temperatures rise due to climate change, it is anticipated that the differential pattern of heat across the region will persist.

Inland Flooding: 100- and 500-year floodplain maps from the Federal Emergency Management Agency's (FEMA) Flood Map Service Center were used to understand current flood risk in the region. The 100-year floodplain represents a historical 1% annual chance of flooding, and the 500-year floodplain represents a historical 0.2% annual chance of flooding. The 500-year floodplain includes areas in the 100-year floodplain. These maps are not forward looking and do not consider future climate change, but the 500-year floodplain can be used as a proxy for the future 100-year floodplain. A differential buffer was also created to represent an extreme inland flooding scenario.

The width of the buffer varies throughout the floodplain as it is generated based on the width of the floodplain. This buffer was created using the methodology described in Virginia's Transportation Plan Flooding Risk Assessment.

Sea Level Rise: Future sea level rise estimates were obtained from the National Oceanic and Atmospheric Administration (NOAA) Sea Level Rise Inundation Data. Depth of inundation at mean higher-high water was obtained for an intermediate-high sea level rise scenario in 2060 (i.e., 2 feet).

Transportation Asset Data

Functional Classification: Road functional classifications were used to understand the criticality of roads in the COG region. The Federal Highway Administration (FHWA) designated functional classification is based on the degree of mobility the road offers (where the road goes and how fast one can travel on it) and how easy it is to access the road.

National Bridge Inventory: Channel condition, waterway adequacy, and scour criticality data was obtained from the National Bridge Inventory (NBI). This data was used to understand flood exposure for bridges.

Disclaimer

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