

Hydraulic Vulnerability and Flood Resiliency

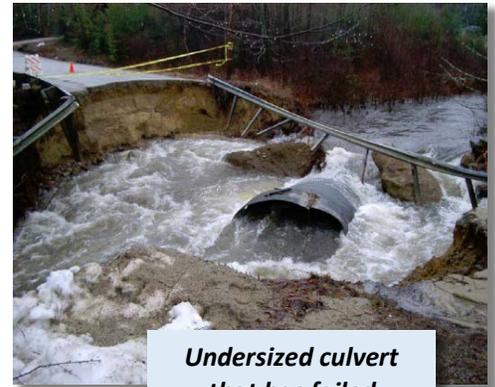
What is Hydraulic Vulnerability? This describes how well a stream crossing transports flows during storm events and can be evaluated based on predictions of hydraulic capacity or flood event records.

How is Hydraulic Capacity predicted?

A hydraulic capacity analysis estimates the amount of water that a culvert can transport based on hydraulic equations and streamflow predictions. It also estimates the water that will accumulate upstream of a culvert. The results help predict a culvert's potential to sustain damage or overtop during a specific storm event.

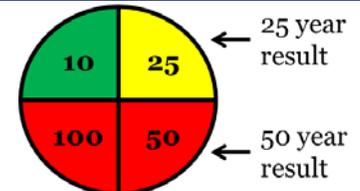
Data used in the hydraulic capacity analysis include:

- **Field-based data** on culvert inlet shape, structure material, dimensions, slope and elevation relative to road surface.
- **Watershed Characteristics** based on a geospatial analysis, including drainage area, landcover, soil type, precipitation, etc. Streamflow predictions are based on the [USDA Technical Release 55 curve number method](#) for smaller drainages and the [USGS NH Streamflow Regression Equations](#) for larger watersheds.



Undersized culvert that has failed

Hydraulic Vulnerability Symbols

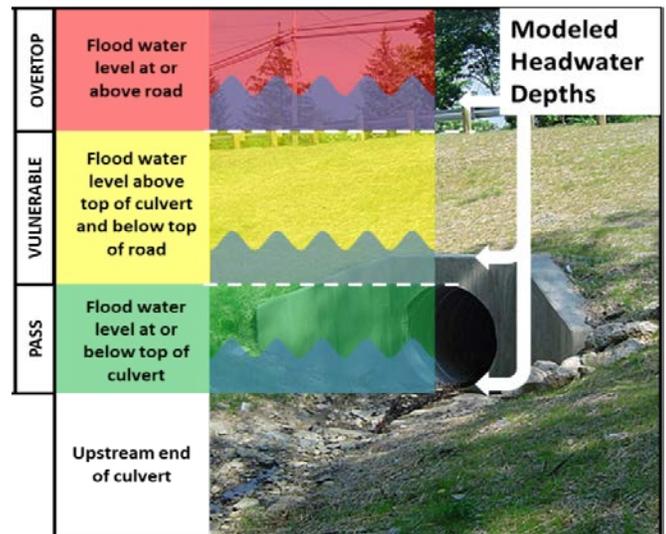


How are Hydraulic Capacity results interpreted?

The results are translated into the following scores:

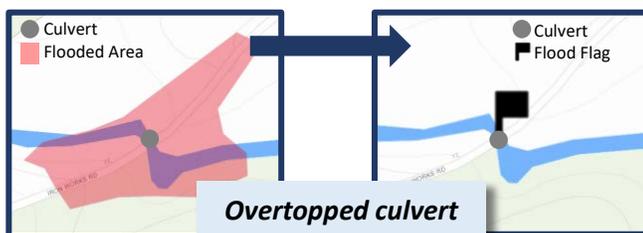
- Overtop** – Flows are predicted to reach the top of the road fill and possibly flood the road.
- Vulnerable** – Water levels are predicted to reach above the top of the culvert, but remain below the top of the road, so erosion of road fill is possible, but road flooding unlikely.
- Pass** – Water is predicted to remain below the top of the culvert, so the structure may transport that streamflow.

These predictions are useful for identifying potentially vulnerable culverts and are not intended to replace in-depth engineering analyses for design and permitting.



Recorded Historical Flood Events

Local hazard reports provide descriptions of flood concern within a community and identify problem culverts.



- Emergency planners and road agents document past and potential flooding as part of their Hazard Mitigation Plan process.
- Information on flooding related to stream crossings is available for viewing and flagged in the NHDES' [Aquatic Restoration Mapper](#).