

The Vermont Transportation Resilience Planning Tool: A Web Tool for Assessing Infrastructure Risk

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100% EMPLOYEE-OWNED

Services / Expertise

Geospatial & Data Solutions
Web Application Development
Spatial Analysis and Mapping
Database Design and Maintenance
User Interface/User Experience Design
Vulnerability Screening Tool Development
Transportation & River Corridor Planning

Markets

State Government
Local & Regional Planning
Risk Assessment
Climate Resilience
Infrastructure Planning

Project Owner

Vermont Agency of Transportation,
Operations Division
2015–Present

Project Manager

Barb Patterson
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Technology

JavaScript API, ArcGIS Server, MS SQL
Server, Google Charts, AngularJS

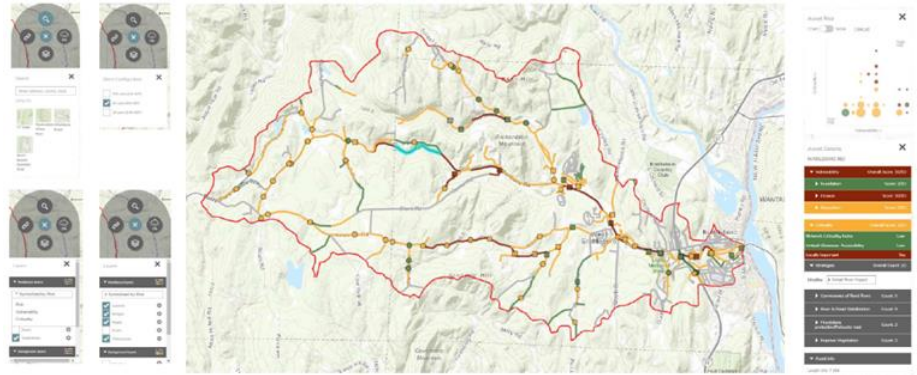
Awards & Recognition



2018 Grand Award, American
Council of Engineering Companies
of Vermont (ACEC/VT)



2018 GIS & Data Science Project of
the Year, Vermont Center for
Geographic Information



We developed the fully custom Vermont Transportation Flood Resilience Planning Tool (TRPT) web application for VTTrans to better understand the criticality and risk of bridges and the road network in the event of extreme weather events.

STONE worked with the Vermont Agency of Transportation (VTTrans), a multidisciplinary team of consultants, and a variety of local, regional, and state agency partners to develop the Vermont Transportation Resilience Planning Tool (TRPT), a web-based dashboard designed to help integrate climate risk and transportation resiliency into VTTrans' planning process and create a more resilient transportation network in Vermont. The TRPT, advanced through the Methods and Tools for Transportation Resilience Planning Project, is a publicly available tool (roadfloodresilience.vermont.gov) that combines river science, hydraulics, and transportation planning methods to help VTTrans and project partners understand the vulnerability of their transportation systems and prioritize mitigation strategies to minimize the impacts of future damage in high-risk locations.

We used agile or iterative development to ensure the application would meet the expectations of the stakeholders and users. The platform has sustainability and longevity in mind, with data processing automation built in to allow VTTrans and other state agencies to update and include new data within the tool. The application identifies bridges, culverts, and road embankments within a watershed vulnerable to damage from floods, estimates risk based on the vulnerability and criticality of roadway segments, and identifies potential mitigation measures based on the factors driving the vulnerability and criticality. The TRPT, which is applied at the watershed level, was developed and tested in three pilot watersheds.

The TRPT uses Esri's ArcGIS Enterprise to publish spatial datasets from the indexed database and charts to display the results of vulnerability, criticality/transportation modeling, risk, and mitigation strategies assessments in these watersheds. It allows users to review these data for three flood sizes (10-year, 50-year, and 100-year; or 10%, 2%, and 1% chance annual recurrence interval) and three processes (inundation, erosion, and deposition). Key features include a map service for viewing spatial datasets, graphical data for summary analyses, and a tabular display of mitigation alternatives for at-risk transportation assets. The app is available for anyone connected



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to the internet and is compatible with multiple browsers and devices. It provides a centralized repository and display for all users without requiring any specialized desktop software or internet browser plug-ins.

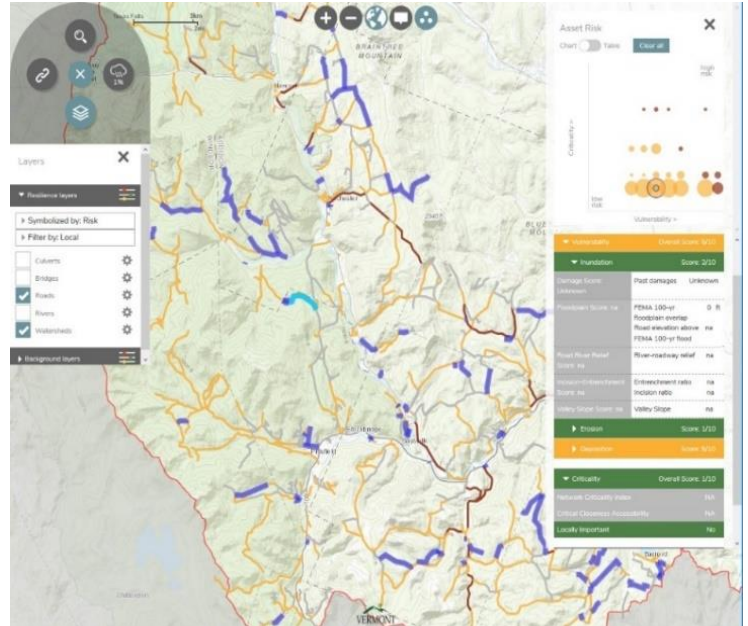
As an extension of the project, our team developed data processing and validation tools using Python to allow regional planning commissions and VTTrans to easily calculate new vulnerability, criticality and risk scores and upload data for new watersheds into the application database. These updates are immediately reflected in the front-end application. This extension also included additional background data layers and direct links to VTTrans Route logs. Stone also provided training to teach regional planning commissions and VTTrans about application functionality, data scoring, and upload tools.

In 2018, the project and app received the Engineering Excellence Grand Award from the American Council of Engineering Companies of Vermont and the GIS & Data Science Project of the Year from the Vermont Center for Geographic Information.

Stone has long supported VTTrans in developing program enhancements, policy, and practical tools for improved flood resilience and stormwater management. We developed the fully custom Vermont Transportation Flood Resilience Planning Tool (TRPT) web application for VTTrans as a means to better understand the risk of bridges and the road network in the event of extreme weather events. The tool was developed with sustainability and longevity in mind, with data processing automation built in to allow VTTrans and other state agencies to update and include new data within the tool

Link to TRPT Application

<https://roadfloodresilience.vermont.gov>



Within the TRPT tool, users can visualize and analyze asset risks under various scenarios using filters and queries, as well as graphs and charts.

